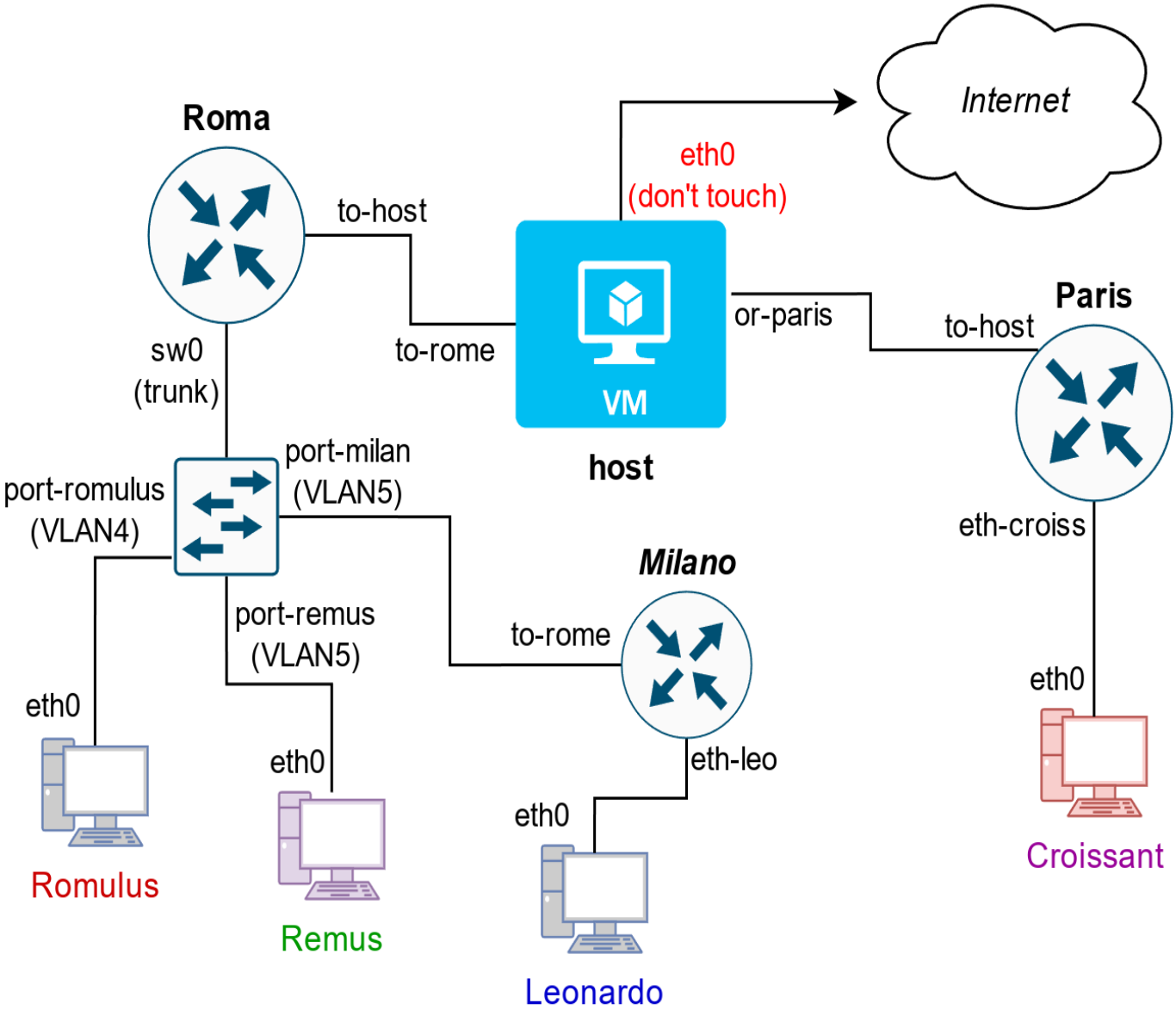
Rezolvare Tema 2 Retele Locale

Cuprins:


```
t2start bogdan.trifan2412
```

```
ip route add <adresa_retea>/<masca_subretea> via <gateway>
```

Topologie



Rutere:

- host
- Roma
- Milano
- Paris

Contine un singur switch (denumit **sw0**), cu doua VLAN-uri: VLAN4 si VLAN5.

End-device-uri:

- Romulus
- Remus
- Leonardo
- Croissant

Conexiuni:

- host/eth0 <-> Internet (**DON'T TOUCH**)

- host/to-rome <-> Roma/to-host
- host/or-paris <-> Paris/to-host
- Roma <-> sw0 (trunk)
- sw0/port-romulus <-> Romulus/eth0 (VLAN4)
- sw0/port-remus <-> Remus/eth0 (VLAN5)
- sw0/port-milan <-> Milano/to-rome (VLAN5)
- Milano/eth-leo <-> Lenoardo/eth0
- Paris/eth-croiss <-> Croissant/eth0

Conectarre prin SSH

```
eu@localhost$ ssh -J bogdan.trifan2412@fep.grid.pub.ro student@10.9.2.246
```

sau, in `~/.bashrc`:

```
ssh_open_stack ()
{
    if [[ $# != 1 ]]; then
        echo "[ERROR] Expected a single argument: the IP address of the
OpenStack VM!";
        return;
    fi;
    IP=$1;
    ssh -J bogdan.trifan2412@fep.grid.pub.ro student@"$IP"
}
```

```
eu@localhost$ ssh_open_stack 10.9.2.246
```

Sau

```
cat ~/.ssh/config
# RL Tema 2
# ssh -J bogdan.trifan2412@fep.grid.pub.ro student@10.9.2.246
Host rl_tema_2
    User student
    HostName 10.9.2.246
    ProxyJump bogdan.trifan2412@fep.grid.pub.ro
```

```
$ ssh rl_tema_2
```

Asignment

> Moodle Username: bogdan.trifan2412

```
root@host:/home/student# cat /root/assignment.txt
USERNAME=bogdan.trifan2412
A=179
B=7
C=106
D=171
E=158
F=73
G=13
H=27
I=46
J=214
K=80
```

Conectarea prin echipamente

```
root@host:/home/student# docker ps | awk '{ print $NF }'
NAMES
mn.Croissant
mn.Leonardo
mn.Remus
mn.Romulus
mn.Paris
mn.Milano
mn.Switch0
mn.Roma
root@host:/home/student# docker ps | awk 'NR>1 { print $NF }' | sed
"s/mn.//g"
Croissant
Leonardo
Remus
Romulus
Paris
Milano
Switch0
Roma
```

```
root@host: go Croissant
```

```
root@host: go Leonardo
```

```
root@host: go Remus
```

```
root@host: go Romulus
```

```
root@host: go Paris
```

```
root@host: go Milano
```

```
root@host: go Switch0
```

```
root@host: go Roma
```

Task 1

Task 1.1 | Subnetare FIXA

1. Subnetați FIX (i.e., dimensiuni egale, maximizare nr. de stații) spațiul 10.$A.$B.0/24 și configurați cu adrese IPv4 toate legăturile din topologie în ordinea cerută (începând cu PRIMA adresă asignabilă), astfel:

- prima subrețea alocată va fi VLAN4, asignare în ordinea: Roma, Romulus;
- a doua subrețea alocată va fi VLAN5, asignare în ordinea: Roma, Milano, Remus;
- a treia subrețea alocată va fi cea dintre Milano și Leonardo (asignare în această ordine);
- a patra subrețea alocată va fi cea dintre Paris și Croissant (la fel, în această ordine);

Solutie:

```
IP = 10.$A.$B.0/24
A = 179
B = 7
----

IP = 10.179.7.0/24
adresa IP este adresa de retea (/24 acopera in intregime primii 3 octeti)


Reteaua 1 (VLAN 4): Roma, Romulus
Reteaua 2 (VLAN 5): Roma, Milano, Remus
```

```
Reteaua 3: Milano, Leonardo
Reteaua 4: Paris, Croissant

Avem 4 subretele (4 <= 2^2) -> avem nevoie de 2 biti de subretea
/(24+2) = /26

Noile adrese vor avea (TOATE) mastile de /26.

O masca de /26 ofera 2^(32-26)=2^6=64 de host-uri (in total, atat
asignabile, cat si neasignabile)


Format: `Retea: prima adresa IP -> ultima adresa IP`

R1: 10.179.7.0/26 -> +2^(32-26)-1 = +63 -> 10.179.7.63/26
R2: 10.179.7.64/26 -> +63 -> 10.179.6.127/26
R3: 10.179.7.128/26 -> +63 -> 10.179.7.191/26
R4: 10.179.7.192/26 -> +63 -> 10.179.7.255/26



R1-Roma-sw04: R/26
R1-Romulus: 10.179.7.2/26

R2-Roma: 10.175.7.65/26
R2-Milano: 10.179.7.66/26
R2-Remus: 10.179.7.67/26
R3-Milano: 10.179.7.129/26
R3-Leonardo: 10.179.7.130/26

R4-Paris: 10.179.7.193/26
R4-Croissant: 10.179.7.194/26
```

Rezultat:

- Reteaua 1 (VLAN 4):
  - R1-Roma-sw04: 10.179.7.1/26
  - R1-Romulus: 10.179.7.2/26
- Reteaua 2 (VLAN 5):
  - R2-Roma: 10.179.7.65/26
  - R2-Milano: 10.179.7.66/26
  - R2-Remus: 10.179.7.67/26
- Reteaua 3:
  - R3-Milano: 10.179.7.129/26
  - R3-Leonardo: 10.179.7.130/26
- Reteaua 4:
  - R4-Paris: 10.179.7.193/26
  - R4-Croissant: 10.179.7.194/26

In `~/.bashrc` de pe `host`:

```
export IP_R1_Roma_sw04="10.179.7.1/26"
export IP_R1_Romulus="10.179.7.2/26"

export IP_R2_Roma_sw05="10.179.7.65/26"
export IP_R2_Milano_to_rome="10.179.7.66/26"
export IP_R2_Remus="10.179.7.67/26"

export IP_R3_Milano_eth_leo="10.179.7.129/26"
export IP_R3_Leonardo="10.179.7.130/26"

export IP_R4_Paris_eth_croiss="10.179.7.193/26"
export IP_R4_Croissant="10.179.7.194/26"
```

```
# Pentru Reteaua 1 (VLAN 4)
root@Roma:~# ip addr add $IP_R1_Roma_sw04 dev sw0.4
root@Romulus:~# ip addr add $IP_R1_Romulus dev eth0

# Pentru Reteaua 2 (VLAN 5)
root@Roma:~# ip addr add $IP_R2_Roma_sw05 dev sw0.5
root@Milano:~# ip addr add $IP_R2_Milano_to_rome dev to-rome
root@Remus:~# ip addr add $IP_R2_Remus dev eth0

# Pentru Reteaua 3
root@Milano:~# ip addr add $IP_R3_Milano_eth_leo dev eth-leo
root@Leonardo:~# ip addr add $IP_R3_Leonardo dev eth0

# Pentru Reteaua 4
# Pe host-ul Paris:
root@Paris:~# ip addr add $IP_R4_Paris_eth_croiss dev eth-croiss
root@Croissant:~# ip addr add $IP_R4_Croissant dev eth0
```

Adica:

```
# Pentru Reteaua 1 (VLAN 4)
root@Roma:~# ip addr add 10.179.7.1/26 dev sw0.4
root@Romulus:~# ip addr add 10.179.7.2/26 dev eth0

# Pentru Reteaua 2 (VLAN 5)
root@Roma:~# ip addr add 10.179.7.65/26 dev sw0.5
root@Milano:~# ip addr add 10.179.7.66/26 dev to-rome
root@Remus:~# ip addr add 10.179.7.67/26 dev eth0

# Pentru Reteaua 3
root@Milano:~# ip addr add 10.179.7.129/26 dev eth-leo
root@Leonardo:~# ip addr add 10.179.7.130/26 dev eth0

# Pentru Reteaua 4
```

```
root@Paris:~# ip addr add 10.179.7.193/26 dev eth-croiss
root@Croissant:~# ip addr add 10.179.7.194/26 dev eth0
```

Task 1.2 | Subnetarea VARIABILA (VLSM)

2. Subnetați OPTIM spațiul 172.30.$C.240/28 + configurați echipamentele (host va avea mereu prima adresă asignabilă) astfel:

- o rețea între host și Roma;
- cealaltă (ultima rămasă): host și Paris.

Solutie:

```
IP = 172.30.$C.240/28
C = 126
----


IP = 172.30.106.240/28
adresa IP este adresa de retea

R5: 2H (Host si Roma) + 2H (IP retea si broadcast) = 4H <= 2^2 -> avem
nevoie de 2 biti de host -> /(32-2) = /30
R6: 2H (Host si Paris) + 2H (IP retea si broadcast) = 4H <= 2^2 -> avem
nevoie de 2 biti de host -> /(32-2) = /30

R5: /30 -> 2^(32-30) = 2^2 = 4 adrese IP (in total, atat asignabile, cat si
neasignabile)
R6: /30 -> 2^(32-30) = 2^2 = 4 adrese IP (in total, atat asignabile, cat si
neasignabile)


R5: 172.30.106.240/30 -> +2^(32-30)-1 = +3 > 172.30.106.243/30
R6: 172.30.106.244/30 -> +3 > 172.30.106.247/30


R5-Host_to-rome: 172.30.106.241/30
R5-Roma_to-host: 172.30.106.242/30

R6-Host_or-paris: 172.30.106.245/30
R6-Paris_to-host: 172.30.106.246/30
```

Rezultat:

- Reteaua 5:
  - R5-Host_to-rome: 172.30.106.241/30
  - R5-Roma_to-host: 172.30.106.242/30
- Reteaua 6:
  - R6-Host_or-paris: 172.30.106.245/30

- R6-Paris_to_host: 172.30.106.246/30

In `~/.bashrc` de pe `host`:

```
export IP_R5_Host_to_rome="172.30.106.241/30"
export IP_R5_Roma_to_host="172.30.106.242/30"

export IP_R6_Host_or_paris="172.30.106.245/30"
export IP_R6_Paris_to_host="172.30.106.246/30"
```

```
# Pentru Reteaua 5
root@host:~# ip addr add $IP_R5_Host_to_rome dev to-rome
root@Roma:~# ip addr add $IP_R5_Roma_to_host to-host

# Pentru Reteaua 6
root@host:~# ip addr add $IP_R6_Host_or_paris dev or-paris
root@Paris:~# ip addr add $IP_R6_Paris_to_host dev to-host
```

Adica:

```
# Pentru Reteaua 5
root@host:~# ip addr add 172.30.106.241/30 dev to-rome
root@Roma:~# ip addr add 172.30.106.242/30 dev to-host

# Pentru Reteaua 6
root@host:~# ip addr add 172.30.106.245/30 dev or-paris
root@Paris:~# ip addr add 172.30.106.246/30 dev to-host
```

Task 1.3 | Rutare

3. Configurați rutarea IPv4 (default GWs și/sau rute statice) astfel încât toate stațiile să se poată accesa unele pe altele prin adresă IP!

> IP-urile se trec fara mastile de retea 😃.

Task 1.3 | Rutare | Default Gateways

Default Gateways:

```
# Pentru Reteaua 1 (VLAN 4)
root@Romulus:~# ip route add default via $IP_R1_Roma_sw04

# Pentru Reteaua 2 (VLAN 5)
root@Remus:~# ip route add default via $IP_R2_Roma_sw05
root@Milano:~# ip route add default via $IP_R2_Roma_sw05
```

```
# Pentru Reteaua 3
root@Leonardo:~# ip route add default $IP_R3_Milano_eth_leo


# Pentru Reteaua 4
root@Croissant:~# ip route add default via $IP_R4_Paris_eth_croiss

# Pentru Reteaua 5
root@Roma:~#ip route add default via $IP_R5_Host_to_rome

# Pentru Reteaua 6
root@Paris:~#ip route add default via $IP_R6_Host_or_paris
```

Adica:

Default Gateways:

```
# Pentru Reteaua 1 (VLAN 4)
root@Romulus:~# ip route add default via 10.179.7.1

# Pentru Reteaua 2 (VLAN 5)
root@Remus:~# ip route add default via 10.179.7.65
root@Milano:~# ip route add default via 10.179.7.65

# Pentru Reteaua 3
root@Leonardo:~# ip route add default via 10.179.7.129

# Pentru Reteaua 4
root@Croissant:~# ip route add default via 10.179.7.193

# Pentru Reteaua 5
root@Roma:~# ip route add default via 172.30.106.241

# Pentru Reteaua 6
root@Paris:~# ip route add default via 172.30.106.245
```

Task 1.3 | Rutare | Rute Statice

Reminder:

- Adresa IP retea R1: 10.179.7.0/26
- Adresa IP retea R2: 10.179.7.64/26
- Adresa IP retea R3: 10.179.7.128/26
- Adresa IP retea R4: 10.179.7.192/26
- Adresa IP retea R5: 172.30.106.240/30
- Adresa IP retea R6: 172.30.106.245/30

```

```

```
export $IP_NETWORK_R1="10.179.7.0/26"
export $IP_NETWORK_R2="10.179.7.64/26"
export $IP_NETWORK_R3="10.179.7.128/26"
export $IP_NETWORK_R4="10.179.7.192/26"
export $IP_NETWORK_R5="172.30.106.240/30"
export $IP_NETWORK_R6="172.30.106.245/30"
```

Reminder:

Nume interfata	Retea	IP
Roma/sw0.4	R1	10.179.7.1/26
Roma/sw0.5	R2	10.179.7.65/26
Milano/to-rome	R2	10.179.7.66/26
Milano/eth-leo	R3	10.179.7.129/26
Paris/eth-crois	R4	10.179.7.193/26
host/or-paris	R6	172.30.106.245/30
Paris/to-host	R6	172.30.106.246/30
host/to-rome	R5	172.30.106.241/30
Roma/to-host	R5	172.30.106.242/30

```
export IP_R1_Roma_sw04="10.179.7.1/26"
export IP_R2_Roma_sw05="10.179.7.65/26"

export IP_R2_Milano_to_rome="10.179.7.66"
export IP_R3_Milano_eth_leo="10.179.7.129"

export IP_R4_Paris_eth_croiss="10.179.7.193/26"

export IP_R5_Host_to_rome="172.30.106.241"
export IP_R5_Roma_to_host="172.30.106.242"

export IP_R6_Host_or_paris="172.30.106.245"
export IP_R6_Paris_to_host="172.30.106.246"
```

```
root@host:~# ip route add $IP_R4 via $IP_Paris_to_host

root@host:~# ip route add $IP_R1 via $IP_Roma_to_host
root@host:~# ip route add $IP_R2 via $IP_Roma_to_host
root@host:~# ip route add $IP_R3 via $IP_Roma_to_host
```

```
root@Roma:~# ip route add $IP_R3 via $IP_R2_Milano_to_rome
```

```
root@host:~# ip route add 10.179.7.192/26 via 172.30.106.246

root@host:~# ip route add 10.179.7.0/26 via 172.30.106.242
root@host:~# ip route add 10.179.7.64/26 via 172.30.106.242
root@host:~# ip route add 10.179.7.128/26 via 172.30.106.242

root@Roma:~# ip route add 10.179.7.128/26 via 10.179.7.66
```

Task 1.3 | Persistenta la restart

Pentru fiecare router (inclusiv host), decomenteaza linia care contine `net.ipv4.ip_forward=1` (linia **28** ar trebui sa fie) din fisierul `/etc/sysctl.conf`.

Pe router **Roma**, decomenteaza linia care contine `net.ipv6.conf.all.forwarding=1` (linia **33**) din fisierul `etc/sysctl.conf`.

In rest, uita-te la fisierele din directorul configs/.

Task 2 | Adresare IPv6

Configurați adrese IPv6 pentru rețeaua VLAN4 și VLAN5 (notă: variabila $VLANID va avea valoarea 4, respectiv 5, cu zero-uri în față până la completarea segmentului de 16 biți): Folosiți spațiul 2024:baba:$B:$A:$VLANID::/96. Aceeași ordine de asignare ca la IPv4. Configurați conectivitate IPv6 între Roma și host: Folosiți spațiul fdee:dada:$C:$D::/64. Prima adresă asignabilă este pentru host, a doua a lui Roma. Configurați rutarea IPv6 pentru a permite comunicarea între toate sistemele cu adresă IPv6. Atenție: echipamentele Leonardo, Paris și Croissant NU vor avea adresă IPv6!

```
export IPv6_Roma_sw0.4="2024:baba:07:179:004::1/96"
export IPv6_Romulus="2024:baba:07:179:004::2/96"

export IPv6_Roma_sw0.5="2024:baba:07:179:005::1/96"
export IPv6_Milano="2024:baba:07:179:005::2/96"
export IPv6_Remus="2024:baba:07:179:005::3/96"

export IPv6_Host_to_rome="fdee:dada:106:171::1/64"
export IPv6_Roma_to_host="fdee:dada:106:171::2/64"
```

```
# VLAN 4
root@Roma:~# ip -6 addr add 2024:baba:07:179:004::1/96 dev sw0.4
root@Romulus:~# ip -6 addr add 2024:baba:07:179:004::2/96 dev eth0
```

```
# VLAN 5
root@Roma:~# ip -6 addr add 2024:baba:07:179:005::1/96 dev sw0.5
root@Milano:~# ip -6 addr add 2024:baba:07:179:005::2/96 dev to-rome
root@Remus:~# ip -6 addr add 2024:baba:07:179:005::3/96 dev eth0


# Host-Roma
root@host:~# ip -6 addr add fdee:dada:106:171::1/64 dev to-rome
root@Roma:~# ip -6 addr add fdee:dada:106:171::2/64 dev to-host
```

```
# incercare (nu merge rutarea IPV6)


root@Romulus:~# ip -6 route add default via 2024:baba:07:179:004::1

root@Milano:~# ip -6 route add default via 2024:baba:07:179:005::1
root@Remus:~# ip -6 route add default via 2024:baba:07:179:005::1

root@host:~# ip -6 route add default via fdee:dada:106:171::2


# TODO: stiing ca Roma este switch-ul intermediat intre retelele VLAN 4,
VLAN 5 si Host-Roma, adauga comenzi de "ip route add" static pentru a avea
conectivitate intre toate sistemele setate cu adresa IPV6
```

Task 3 | Accessing Hosts

Editeaza cu `nano`/`vim` textele printate cu **cat**.

Task 3 | Accessing Hosts | **host** (router)

```
root@host:~# touch /etc/hosts.orig
root@host:~# nano -l /etc/hosts.orig
root@host:~# cat /etc/hosts.orig
127.0.0.1 localhost
127.0.1.1 host

# IPv4 of Roma/to-host (router/interface)
172.30.106.242 Roma

# IPv4 of Milano/to-rome (router/interface)
10.179.7.66 Milano

# IPv4 of Paris/to-host (router/interface)
172.30.106.246 Paris

# IPv4 of end-devices
10.179.7.2 Romulus
```

```
10.179.7.67 Remus
10.179.7.130 Leonardo
10.179.7.194 Croissant


# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters


root@host:~# nano -l /etc/network/interfaces.d/rl.conf
root@host:~# cat /etc/network/interfaces.d/rl.conf
iface eth0
    up cat /etc/hosts.orig > /etc/hosts
```

Romulus:

```
root@Romulus:~# cat /etc/hosts
127.0.0.1 localhost Romulus



# IPv4 of Roma/sw0.4 (router/interface)
10.179.7.1 Roma

# IPv4 of Milano/to-rome (router/interface)
10.179.7.66 Milano

# IPv4 of Paris/to-host (router/interface)
172.30.106.246 Paris

# IPv4 of end-devices
10.179.7.67 Remus
10.179.7.130 Leonardo
10.179.7.194 Croissant

# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

root@Romulus:~# cat /etc/network/interfaces.d/rl.conf
# Tema 2 RL - Interface configuration (on ifupdown-ng)
# RTFM: https://github.com/ifupdown-ng/ifupdown-
ng/blob/main/doc/interfaces.scd

# Example entry:
```

```
#auto eth0
#iface eth0
#   address 203.0.113.2/24
#   gateway 203.0.113.1

iface eth0
    up cat /etc/hosts.orig > /etc/hosts
```

Task 3 | Accessing Hosts | **Remus** (end-device)

```
root@Remus:~# nano -l /etc/hosts.orig
127.0.0.1 localhost Remus

# IPv4 of host/to-rome (router/interface)
172.30.106.241 host

# IPv4 of Roma/sw0.5 (router/interface)
10.179.7.65 Roma

# IPv4 of Milano/to-rome (router/interface)
10.179.7.66 Milano

# IPv4 of Paris/to-host (router/interface)
172.30.106.246 Paris

# IPv4 of end-devices
10.179.7.2 Romulus
10.179.7.130 Leonardo
10.179.7.194 Croissant

# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters


root@Remus:~# cat /etc/network/interfaces.d/rl.conf
# Tema 2 RL - Interface configuration (on ifupdown-ng)
# RTFM: https://github.com/ifupdown-ng/ifupdown-
ng/blob/main/doc/interfaces.scd

# Example entry:
#auto eth0
#iface eth0
#   address 203.0.113.2/24
#   gateway 203.0.113.1
```

```
iface eth0
    up cat /etc/hosts.orig > /etc/hosts
```

Task 3 | Accessing Hosts | **Leonardo** (end-device)

```
root@Leonardo:~# cat /etc/hosts.orig
127.0.0.1 localhost Leonardo


# IPv4 of host/to-rome (router/interface)
172.30.106.241 host

# IPv4 of Roma/sw0.5 (router/interface)
10.179.7.65 Roma

# IPv4 of Milano/eth-leo (router/interface)
10.179.7.129 Milano

# IPv4 of Paris/to-host (router/interface)
172.30.106.246 Paris

# IPv4 of end-devices
10.179.7.2 Romulus
10.179.7.67 Remus
10.179.7.194 Croissant


# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

root@Leonardo:~# cat /etc/network/interfaces.d/rl.conf
# Tema 2 RL - Interface configuration (on ifupdown-ng)
# RTFM: https://github.com/ifupdown-ng/ifupdown-
ng/blob/main/doc/interfaces.scd

# Example entry:
#auto eth0
#iface eth0
#   address 203.0.113.2/24
#   gateway 203.0.113.1


iface eth0
    up cat /etc/hosts.orig > /etc/hosts
```

Task 3 | Accessing Hosts | **Croissant** (end-device)

```
root@Croissant:~# cat /etc/hosts.orig
127.0.0.1 localhost Croissant

# IPv4 of host/or-paris (router/interface)
172.30.106.245 host

# IPv4 of Paris/eth-croiss (router/interface)
10.179.7.193 Paris

# IPv4 of Roma/to-host (router/interface)
172.30.106.242 Roma

# IPv4 of Milano/to-rome (router/interface)
10.179.7.66 Milano


# IPv4 of end-devices
10.179.7.2 Romulus
10.179.7.67 Remus
10.179.7.130 Leonardo


# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

root@Croissant:~# cat /etc/network/interfaces.d/rl.conf
# Tema 2 RL - Interface configuration (on ifupdown-ng)
# RTFM: https://github.com/ifupdown-ng/ifupdown-
ng/blob/main/doc/interfaces.scd

# Example entry:
#auto eth0
#iface eth0
#   address 203.0.113.2/24
#   gateway 203.0.113.1


iface eth0
    up cat /etc/hosts.orig > /etc/hosts
```

Task 3 | Accesing Hosts | **Roma** (router)

```
root@Roma:~# cat /etc/hosts.orig
127.0.0.1 localhost Roma
```

```
# IPv4 of host/to-rome (router/interface)
172.30.106.241 host

# IPv4 of Milano/to-rome (router/interface)
10.179.7.66 Milano

# IPv4 of Paris/to-host (router/interface)
172.30.106.246 Paris

# IPv4 of end-devices
10.179.7.2 Romulus
10.179.7.67 Remus
10.179.7.130 Leonardo
10.179.7.194 Croissant


# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

root@Roma:~# cat /etc/network/interfaces.d/rl.conf
# Sample ifupdown network interfaces config

auto to-host
iface to-host
    #address <CIDR/prefix notation>

# VLAN4 sub-interface
auto sw0.4
iface sw0.4
    #address <CIDR/prefix notation>

# VLAN5 sub-interface
auto sw0.5
iface sw0.5
    #address <CIDR/prefix notation>

iface to-host
    up cat /etc/hosts.orig > /etc/hosts
```

Task 3 | Accesing Hosts | **Milano** (router)

Task 3 | Accesing Hosts | **Paris** (router)

```
root@Paris:~# cat /etc/hosts.orig
127.0.0.1 localhost Paris

# IPv4 of host/or-paris
```

```
172.30.106.245 host

# IPv4 of Roma/to-host
172.30.106.242 Roma

# IPv4 of Milano/to-rome
10.179.7.66 Milano

# IPv4 of end-devices
10.179.7.2 Romulus
10.179.7.67 Remus
10.179.7.130 Leonardo
10.179.7.194 Croissant

# IPv6
::1 localhost ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

root@Paris:~# cat /etc/network/interfaces.d/rl.conf
# Sample ifupdown network interfaces config

auto to-host
iface to-host
    #address <CIDR/prefix notation>

auto eth-croiss
iface eth-croiss
    #address <CIDR/prefix notation>

iface to-host
    up cat /etc/hosts.orig > /etc/hosts
root@Paris:~#
```

Task 4 | Internet connectivity (**iptbables**)

```
root@host:/home/student# iptables -A FORWARD -i eth0 -o to-rome -m state --
state RELATED,ESTABLISHED -j ACCEPT
root@host:/home/student# iptables -A FORWARD -i eth0 -o or-paris -m state -
-state RELATED,ESTABLISHED -j ACCEPT
root@host:/home/student# iptables -A FORWARD -i to-rome -o eth0 -j ACCEPT
root@host:/home/student# iptables -A FORWARD -i or-paris -o eth0 -j ACCEPT
root@host:/home/student# iptables -t nat -A POSTROUTING -o eth0 -j
MASQUERADE
```

```
# In order to make them persistent
root@host:/home/student# iptables-save
```

```
root@host:/home/student# iptables-save > /etc/iptables/rules.v4
```

Task 7 | SSH Keys

> In caz sa trebuie sa refaci de la 0 generarea cheilor SSH, uita-te in directorul `/configs/` dupa perechile de chei SSH, da paste la ele si doar `ssh-add`.

Task 7 | SSH Keys | From Host to others (Romulus, Remus, Leonardo)

```
# Generating SSH key-pairs for other devices, for HOST to connect to
student@host:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-romu -N
""
student@host:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-remu -N
""
student@host:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-leo -N
""
```

```
student@host:~$ ssh student@Romulus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-romu.pub
student@host:~$ ssh student@Remus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-remu.pub
student@host:~$ ssh student@Leonardo "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-leo.pub
```

`

Task 7 | SSH Keys | From Romulus to others (Host, Remus, Leonardo)

```
# Generating SSH key-pairs for other devices, for HOST to connect to
student@Romulus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-host
-N ""
student@Romulus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-remu
-N ""
student@Romulus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-leo
-N ""
```

> Copiaza manual `student@Remus:~$ /home/student/.ssh/ssh-key-host.pub` la `student@host:~$ ~/.ssh/authorized_keys`

```
student@Romulus:~$ ssh student@Remus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-remu.pub
student@Romulus:~$ ssh student@Leonardo "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-leo.pub
```

Task 7 | SSH Keys | From Remus to others (Host, Romulus, Leonardo)

```
# Generating SSH key-pairs for other devices, for HOST to connect to
student@Remus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-host -
N ""
student@Remus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-romu -
N ""
student@Remus:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-leo -N
""
```

> Copiaza manual `student@Remus:~$ /home/student/.ssh/ssh-key-host.pub` la `student@host:~$ ~/.ssh/authorized_keys`

```
student@Remus:~$ ssh student@Romulus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-romu.pub
student@Remus:~$ ssh student@Leonardo "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-leo.pub
```

Task 7 | SSH Keys | From Leonardo to others (Host, Romulus, Remu)

```
# Generating SSH key-pairs for other devices, for HOST to connect to
student@Leonardo:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-
host -N ""
student@Leonardo:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-
romu -N ""
student@Leonardo:~$ ssh-keygen -t ed25519 -f /home/student/.ssh/ssh-key-
remu -N ""
```

> Copiaza manual `student@Leonardo:~$ /home/student/.ssh/ssh-key-host.pub` la `student@host:~$ ~/.ssh/authorized_keys`

```
student@Leonardo:~$ ssh student@Romulus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-romu.pub
student@Leonardo:~$ ssh student@Remus "mkdir -p ~/.ssh && cat >>
~/.ssh/authorized_keys" < /home/student/.ssh/ssh-key-remu.pub
```