

# Classic Subnetting

19 Settembre 2019

Dato un blocco di indirizzi nel range 10.0.128.0/17, configurare la seguente rete. Si noti che il nodo *X* possiede indirizzo 10.1.1.1.

Nome rete	Numero di host	Bit host	Subnet mask	Rete	Broadcast
LAN02	1000				
LAN04	400				
LAN05	250				
LAN03	50				
LAN01	4				
LAN00	2				

1. Inserisco il numero di bit per l'host necessario a far sì che ogni host all'interno della lan possa disporre del proprio indirizzo. Il numero di bit per l'host è uguale a  $p : (2^p - 2) \geq n. hosts.$

Nome rete	Numero di host	Bit host	Subnet mask	Rete	Broadcast
LAN02	1000	10			
LAN04	400	9			
LAN05	250	8			
LAN03	50	6			
LAN01	4	3			
LAN00	2	2			

2. Inserisco la subnet mask per ogni LAN. Quest'ultimo è un valore uguale a  $32 - num\_bit\_host = x.$

Nome rete	Numero di host	Bit host	Subnet mask	Rete	Broadcast
LAN02	1000	10	22		
LAN04	400	9	23		
LAN05	250	8	24		
LAN03	50	6	26		

Nome rete	Numero di host	Bit host	Subnet mask	Rete	Broadcast
LAN01	4	3	29		
LAN00	2	2	30		

3. Inizio l'operazione di subnetting. I bit in grigio rappresentano la parte di rete e sottorete e non possono essere modificati; i bit in grassetto rappresentano i bit dedicati all'host.

- $10.0.128.0/17 = 000001010.00000000.10000000.00000000/17 \rightarrow$  Passando da maschera 17 a 22, ho la possibilità di creare al più  $22 - 17$  possibili sottoreti. In questo caso, ne prendo in considerazione esclusivamente 2.
  - $10.0.128.0/22 = 000001010.00000000.10000000.00000000/22 \rightarrow$  **Scelto per la LAN02**
  - $10.0.132.0/22 = 000001010.00000000.10000100.00000000/22 \rightarrow$  Dedicato al subnetting delle successive LAN.
    - $10.0.132.0/23 = 000001010.00000000.10000100.00000000/23 \rightarrow$  **Scelto per la LAN04**
    - $10.0.134.0/23 = 000001010.00000000.10000110.00000000/23 \rightarrow$  Dedicato al subnetting delle successive LAN.
      - $10.0.134.0/24 = 000001010.00000000.10000110.00000000/24 \rightarrow$  **Scelto per la LAN05**
      - $10.0.135.0/24 = 000001010.00000000.10000111.00000000/24 \rightarrow$  Dedicato al subnetting delle successive LAN.
        - $10.0.135.0/26 = 000001010.00000000.10000111.00000000/26 \rightarrow$  **Scelto per la LAN03**
        - $10.0.135.64/26 = 000001010.00000000.10000111.01000000/26 \rightarrow$  Dedicato al subnetting delle successive LAN.
          - $10.0.135.64/29 = 000001010.00000000.10000111.01000000/29 \rightarrow$  **Scelto per la LAN01**
          - $10.0.135.72/29 = 000001010.00000000.10000111.01001000/29 \rightarrow$  Dedicato al subnetting delle successive LAN.
            - $10.0.135.72/30 = 000001010.00000000.10000111.01001000/30 \rightarrow$  **Scelto per la LAN00**

4. Inserisco l'indirizzo di rete e broadcast, rispettivamente gli indirizzi formati esclusivamente da 0 ed esclusivamente da 1 all'interno della parte di host.

Nome rete	Numero di host	Bit host	Subnet mask	Rete	Broadcast
LAN02	1000	10	22	10.0.128.0/22	10.0.131.255/22
LAN04	400	9	23	10.0.132.0/23	10.0.133.255/23
LAN05	250	8	24	10.0.134.0/24	10.0.134.255/24
LAN03	50	6	26	10.0.135.0/26	10.0.135.63/26
LAN01	4	3	29	10.0.135.64/29	10.0.135.71/29
LAN00	2	2	30	10.0.135.72/30	10.0.135.75/30

5. Scelgo gli indirizzi per l'interfaccia di ogni host.

Nome host	LAN	Interfaccia enp0s3	Interfaccia enp0s8	Interfaccia enp0s9
A	lan01	10.0.135.65/29	/	/
B	lan02	10.0.128.1/22	/	/
C	lan02	10.0.128.2/22	/	/
D	lan03	10.0.135.1/26	/	/
E	lan03	10.0.135.2/26	/	/
F	lan04	10.0.132.1/23	/	/
G	lan04	10.0.132.2/23	/	/
H	lan05	10.0.134.1/24	/	/
J	lan05	10.0.134.2/24	/	/
X	lanISP	10.1.1.1/17	/	/
ISP	lanISP, lan00	10.1.1.2/17	10.0.135.74/30	/
R0	lan00, lan01	10.0.135.73/30	10.0.135.70/29	/
R1	lan01, lan02, lan03	10.0.135.69/29	10.0.131.254/22	10.0.135.62/26

Nome host	LAN	Interfaccia enp0s3	Interfaccia enp0s8	Interfaccia enp0s9
R2	lan01, lan04, lan05	10.0.135.68/29	10.0.133.254/23	10.0.134.254/24

7. Creo gli host necessari a comporre nella pratica la rete. Utilizzo lo script descritto nelle pagine precedenti.
8. Scrivo il file di configurazione che possa settare, per ogni host, tutte le informazioni precedentemente calcolate.

```

echo "Configurazione nodo A"
# Login
VBoxManage guestcontrol A run --exe /usr/bin/hostname --username root --password root --wait-stdout -- hostname/ A

# Set up address
VBoxManage guestcontrol A run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.128.0.1/11 dev enp0s3

# Set up routing
VBoxManage guestcontrol A run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add default via 10.128.7.254

echo "Configurazione nodo B"
# Login
VBoxManage guestcontrol B run --exe /usr/bin/hostname --username root --password root --wait-stdout -- hostname/ B

# Set up address
VBoxManage guestcontrol B run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.128.0.2/11 dev enp0s3

# Set up routing
VBoxManage guestcontrol B run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add default via 10.128.7.254

echo "Configurazione nodo C"
# Login
VBoxManage guestcontrol C run --exe /usr/bin/hostname --username root --password root --wait-stdout -- hostname/ C

# Set up address
VBoxManage guestcontrol C run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.209.0.1/16 dev enp0s3

# Set up routing

```

```
VBoxManage guestcontrol C run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add default via 10.209.255.254

echo "Configurazione nodo D"
# Login
VBoxManage guestcontrol D run --exe /usr/bin/hostname --username root --password
root --wait-stdout -- hostname/ D

# Set up address
VBoxManage guestcontrol D run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.1/16 dev enp0s3

# Set up routing
VBoxManage guestcontrol D run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add default via 10.210.255.254

echo "Configurazione nodo E"
# Login
VBoxManage guestcontrol E run --exe /usr/bin/hostname --username root --password
root --wait-stdout -- hostname/ E

# Set up address
VBoxManage guestcontrol E run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.160.0.1/11 dev enp0s3

# Set up routing
VBoxManage guestcontrol E run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add default via 10.160.7.254

echo "Configurazione nodo F"
# Login
VBoxManage guestcontrol F run --exe /usr/bin/hostname --username root --password
root --wait-stdout -- hostname/ F

# Set up address
VBoxManage guestcontrol F run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.160.0.2/11 dev enp0s3

# Set up routing
VBoxManage guestcontrol F run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add default via 10.160.7.254

echo "Configurazione nodo G"
# Login
VBoxManage guestcontrol G run --exe /usr/bin/hostname --username root --password
root --wait-stdout -- hostname/ G

# Set up address
VBoxManage guestcontrol G run --exe /sbin/ip --username root --password root --
```

```
wait-stdout -- ip/ addr add 10.192.0.1/12 dev enp0s3

# Set up routing
VBoxManage guestcontrol G run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add default via 10.192.15.254

echo "Configurazione nodo R1"
# Login
VBoxManage guestcontrol R1 run --exe /usr/bin/hostname --username root --
password root --wait-stdout -- hostname/ R1

# Set up interfaces (> enp0s3)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s8 up

VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s9 up

# Set up address

VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.128.7.254/11 dev enp0s3

VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.1/30 dev enp0s8

VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.5/30 dev enp0s9

# Set up routing

# Se riceve un pacchetto per LAN04, allora inoltra verso R2 (LAN02)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.209.0.0/16 via 10.210.0.2

# Se riceve un pacchetto per LAN05, allora inoltra verso R2 (LAN02)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.210.0.0/16 via 10.210.0.2

# Se riceve un pacchetto per LAN08, allora inoltra verso R2 (LAN02)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.160.0.0/11 via 10.210.0.2

# Se riceve un pacchetto per LAN08, allora inoltra verso R3 (LAN03)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.160.0.0/11 via 10.210.0.6

# Se riceve un pacchetto per LAN09, allora inoltra verso R3 (LAN02)
VBoxManage guestcontrol R1 run --exe /sbin/ip --username root --password root --
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```
wait-stdout -- ip/ route add 10.192.0.0/12 via 10.210.0.6

# Set up packet-forwarding
VBoxManage guestcontrol R1 run --exe /usr/sbin/sysctl --username root --password root --wait-stdout -- sysctl/ -w net.ipv4.ip_forward=1

echo "Configurazione nodo R2"
# Login
VBoxManage guestcontrol R2 run --exe /usr/bin/hostname --username root --password root --wait-stdout -- hostname/ R2

# Set up interfaces (> enp0s3)
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ link set enp0s8 up

VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ link set enp0s9 up

VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ link set enp0s10 up

# Set up address
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.210.0.2/30 dev enp0s3

VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.209.255.254/16 dev enp0s8

VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.210.255.254/16 dev enp0s9

VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ addr add 10.210.0.9/30 dev enp0s10

# Set up routing
# Se riceve un pacchetto per LAN01, allora inoltra verso R1 (LAN02)
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add 10.128.0.0/11 via 10.210.0.1

# Se riceve un pacchetto per LAN08, allora inoltra verso R4 (LAN06)
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add 10.160.0.0/11 via 10.210.0.10

# Se riceve un pacchetto per LAN09, allora inoltra verso R4 (LAN06)
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add 10.192.0.0/12 via 10.210.0.10

# Se riceve un pacchetto per LAN09, allora inoltra verso R1 (LAN02)
VBoxManage guestcontrol R2 run --exe /sbin/ip --username root --password root --
```

```
wait-stdout -- ip/ route add 10.192.0.0/12 via 10.210.0.1

# Set up packet-forwarding
VBoxManage guestcontrol R2 run --exe /usr/sbin/sysctl --username root --password
root --wait-stdout -- sysctl/ -w net.ipv4.ip_forward=1

echo "Configurazione nodo R3"
# Login
VBoxManage guestcontrol R3 run --exe /usr/bin/hostname --username root --
password root --wait-stdout -- hostname/ R3

# Set up interfaces (> enp0s3)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s8 up

VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s9 up

# Set up address
# LAN03
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.6/30 dev enp0s3

# LAN09
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.192.15.254/12 dev enp0s8

# LAN07
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.13/30 dev enp0s9

# Set up routing
# Se riceve un pacchetto per LAN01, allora inoltra verso R1 (LAN03)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.128.0.0/11 via 10.210.0.5

# Se riceve un pacchetto per LAN04, allora inoltra verso R1 (LAN03)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.209.0.0/16 via 10.210.0.5

# Se riceve un pacchetto per LAN05, allora inoltra verso R1 (LAN03)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.210.0.0/16 via 10.210.0.5

# Se riceve un pacchetto per LAN04, allora inoltra verso R4 (LAN07)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.209.0.0/16 via 10.210.0.14

# Se riceve un pacchetto per LAN05, allora inoltra verso R4 (LAN07)
```



```
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.210.0.0/16 via 10.210.0.14

# Se riceve un pacchetto per LAN08, allora inoltra verso R4 (LAN07)
VBoxManage guestcontrol R3 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.160.0.0/11 via 10.210.0.14

# Set up packet-forwarding
VBoxManage guestcontrol R3 run --exe /usr/sbin/sysctl --username root --password
root --wait-stdout -- sysctl/ -w net.ipv4.ip_forward=1

echo "Configurazione nodo R4"
# Login
VBoxManage guestcontrol R4 run --exe /usr/bin/hostname --username root --
password root --wait-stdout -- hostname/ R4

# Set up interfaces (> enp0s3)
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s8 up
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ link set enp0s9 up

# Set up address
# LAN06
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.10/30 dev enp0s3

# LAN08
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.160.7.254/11 dev enp0s8

# LAN07
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ addr add 10.210.0.14/30 dev enp0s9

# Set up routing
# Se riceve un pacchetto per LAN01, allora inoltra verso R2 (LAN06)
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.128.0.0/11 via 10.210.0.9

# Se riceve un pacchetto per LAN01, allora inoltra verso R3 (LAN07)
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.128.0.0/11 via 10.210.0.13

# Se riceve un pacchetto per LAN09, allora inoltra verso R3 (LAN07)
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --
wait-stdout -- ip/ route add 10.192.0.0/12 via 10.210.0.13

# Se riceve un pacchetto per LAN04, allora inoltra verso R2 (LAN06)
```

```
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add 10.209.0.0/16 via 10.210.0.9
```

```
# Se riceve un pacchetto per LAN05, allora inoltra verso R2 (LAN06)
```

```
VBoxManage guestcontrol R4 run --exe /sbin/ip --username root --password root --wait-stdout -- ip/ route add 10.210.0.0/16 via 10.210.0.9
```

```
# Set up packet-forwarding
```

```
VBoxManage guestcontrol R4 run --exe /usr/sbin/sysctl --username root --password root --wait-stdout -- sysctl/ -w net.ipv4.ip_forward=1
```