Задана мережа рис.1

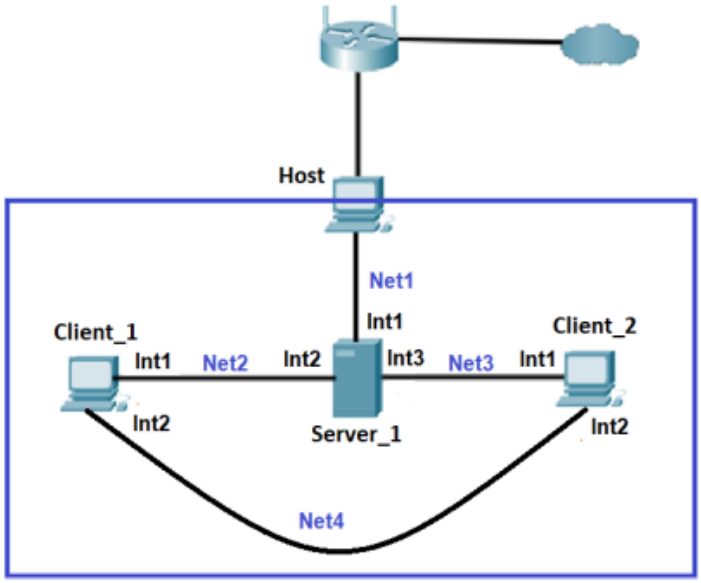


рис.1

Host – це комп’ютер, на якому запущений Virtual Box;

Server_1 – Віртуальна машина - сервер

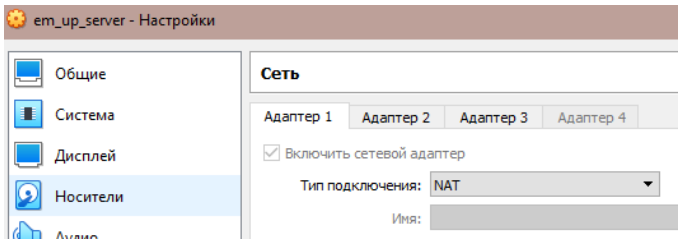
Client_1 - Віртуальна машина – юзер1

Client_2 - Віртуальна машина – юзер2

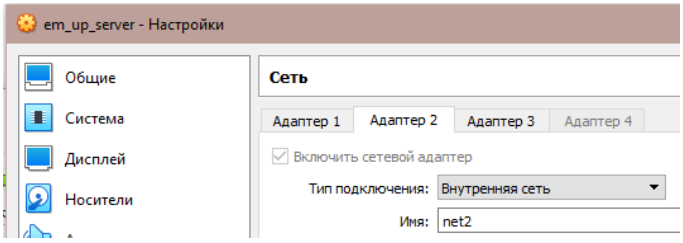
Net1 – Nat

Net2, Net3, Net4 – Внутрішні мережі

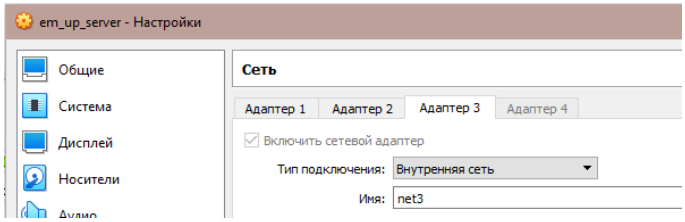
Підключення адапторів до Server_1: Net1, Net2, Net3



Net1



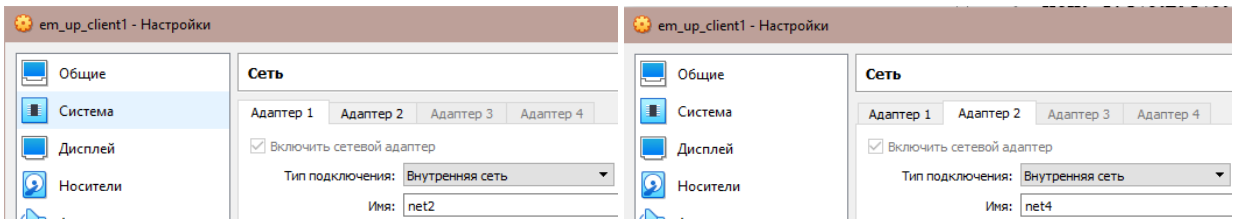
Net2



Net3

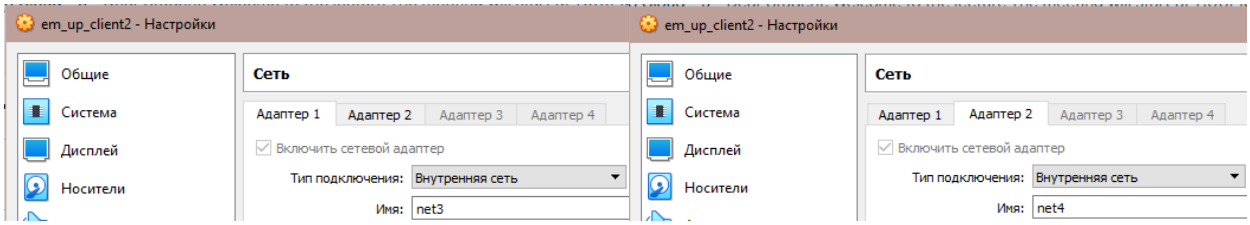
Підключення адапторів до Client_1: Net2, Net4

Net2 Net4



Підключення адапторів до Client_2: Net3, Net4

Net3 Net4



Netplan – Server

Конфігуруємо мережі через netplan

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s8:
      addresses: [10.4.22.22/24]
      gateway4: 10.4.22.2
      dhcp4: no
      routes:
        - to: 172.17.32.0/24
          via: 10.4.22.50
        - to: 172.17.42.0/24
          via: 10.4.22.50
    enp0s9:
      addresses: [10.8.4.22/24]
      gateway4: 10.8.4.2
      dhcp4: no
```

Net2 – enp0s8 – 10.4.22.0/24, int2 – 10.4.22.22

Net3 – enp0s9 – 10.8.4.0/24, int3 – 10.8.4.22

Netplan – Client_1

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s3:
      dhcp4: yes
#       addresses: [10.4.22.11/24]
#       gateway4: 10.4.22.1
      routes:
        - to: 10.8.4.0/24
          via: 10.4.22.22
        - to: 172.17.32.0/24
          via: 172.17.32.1
    enp0s8:
      dhcp4: no
      addresses: [172.16.22.11/24]
      gateway4: 172.16.22.1
```

Net2 – enp0s8 – 10.4.22.0/24, int2 – dhcp

Net4 – enp0s9 – 172.16.22.0/24, int3 – 172.16.22.11

Netplan – Client_2

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: NetworkManager
  ethernets:
    enp0s3:
      dhcp4: yes
#       addresses: [10.8.4.11/24]
#       gateway4: 10.8.4.1
      routes:
        - to: 10.4.22.0/24
          via: 10.8.4.22
        - to: 172.17.32.0/24
          via: 10.8.4.22
        - to: 172.17.42.0/24
          via: 10.8.4.22
    enp0s8:
      dhcp4: no
      addresses: [172.16.22.22/24]
      gateway4: 172.16.22.2
```

Net3 – enp0s8 – 10.8.4.0/24, int2 – dhcp

Net4 – enp0s9 – 172.16.22.0/24, int3 – 172.16.22.22

DHCP configuration Server

```
subnet 10.4.22.0 netmask 255.255.255.0 {
  range 10.4.22.50 10.4.22.100;
  option domain-name-servers server.example.org;
  option domain-name "example.org";
  option subnet-mask 255.255.255.0;
  option routers 10.4.22.1;
  option broadcast-address 10.4.22.255;
  default-lease-time 600;
  max-lease-time 7200;
}


subnet 10.8.4.0 netmask 255.255.255.0 {
  range 10.8.4.50 10.8.4.100;
  option domain-name-servers server.example.org;
  option domain-name "example.org";
  option subnet-mask 255.255.255.0;
  option routers 10.8.4.1;
  option broadcast-address 10.8.4.255;
  default-lease-time 600;
  max-lease-time 7200;
}
```

Перевіряємо через ip addr видані DHCP адреси до Client_1 та Client_2 (Net2,3(Int1))та адреси, які були задані статично(Net4(Int2))

Client_1 Int1-enp0s3 Int2-enp0s8

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:99:ed:2f brd ff:ff:ff:ff:ff:ff
    inet 10.4.22.50/24 brd 10.4.22.255 scope global dynamic noprefixroute enp0s
3
       valid_lft 375sec preferred_lft 375sec
    inet6 fe80::a00:27ff:fe99:ed2f/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:ac:c8:1d brd ff:ff:ff:ff:ff:ff
    inet 172.16.22.11/24 brd 172.16.22.255 scope global noprefixroute enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:feac:c81d/64 scope link
       valid_lft forever preferred_lft forever
```

Client_2 Int1-enp0s3 Int2-enp0s8

```
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:99:ed:2f brd ff:ff:ff:ff:ff:ff
    inet 10.8.4.50/24 brd 10.8.4.255 scope global dynamic noprefixroute enp0s3
       valid_lft 427sec preferred_lft 427sec
    inet6 fe80::a00:27ff:fe99:ed2f/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:2f:76:a1 brd ff:ff:ff:ff:ff:ff
    inet 172.16.22.22/24 brd 172.16.22.255 scope global noprefixroute enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe2f:76a1/64 scope link
       valid_lft forever preferred_lft forever
```

Пропінговуємо наші мережі

Client1 -> Server Int1 -> Int2

```
root@client1:/etc/netplan# ping 10.4.22.22
PING 10.4.22.22 (10.4.22.22) 56(84) bytes of data.
64 bytes from 10.4.22.22: icmp_seq=1 ttl=64 time=0.352 ms
64 bytes from 10.4.22.22: icmp_seq=2 ttl=64 time=0.965 ms
```

Client1 -> Client_2 Int2 -> Int2

```
root@client1:/etc/netplan# ping 172.16.22.22
PING 172.16.22.22 (172.16.22.22) 56(84) bytes of data.
64 bytes from 172.16.22.22: icmp_seq=1 ttl=64 time=0.658 ms
64 bytes from 172.16.22.22: icmp_seq=2 ttl=64 time=0.990 ms
```

Client1 -> Server -> Client_2 Int1-> Int2-> Int3-> Int1

```
root@client1:/etc/netplan# ping 10.8.4.50
PING 10.8.4.50 (10.8.4.50) 56(84) bytes of data.
64 bytes from 10.8.4.50: icmp_seq=1 ttl=63 time=0.751 ms
^C
```

Client_2 -> Server Int1 -> Int3

```
root@client2:/etc/netplan# ping 10.8.4.22
PING 10.8.4.22 (10.8.4.22) 56(84) bytes of data.
64 bytes from 10.8.4.22: icmp_seq=1 ttl=64 time=0.366 ms
```

Client_2 -> Client1 Int2 -> Int2

```
root@client2:/etc/netplan# ping 172.16.22.11
PING 172.16.22.11 (172.16.22.11) 56(84) bytes of data.
64 bytes from 172.16.22.11: icmp_seq=1 ttl=64 time=0.411 ms
```

Client_2 -> Server -> Client1 Int1-> Int2-> Int3->Int1

```
root@client2:/etc/netplan# ping 10.4.22.50
PING 10.4.22.50 (10.4.22.50) 56(84) bytes of data.
64 bytes from 10.4.22.50: icmp_seq=1 ttl=63 time=0.783 ms
```

Перевірка проходження пакету через traceroute для Client_2

```
root@client2:/etc/netplan# traceroute 10.4.22.50
traceroute to 10.4.22.50 (10.4.22.50), 30 hops max, 60 byte packets
 1  10.8.4.22 (10.8.4.22)  0.247 ms  0.218 ms  0.273 ms
 2  10.4.22.50 (10.4.22.50)  0.582 ms  0.553 ms  0.540 ms
root@client2:/etc/netplan# traceroute 172.16.22.11
traceroute to 172.16.22.11 (172.16.22.11), 30 hops max, 60 byte packets
 1  172.16.22.11 (172.16.22.11)  0.468 ms  0.439 ms  0.430 ms
root@client2:/etc/netplan# traceroute 10.8.4.22
traceroute to 10.8.4.22 (10.8.4.22), 30 hops max, 60 byte packets
 1  10.8.4.22 (10.8.4.22)  0.379 ms  0.352 ms  0.342 ms
```

Client_1 lo – призначення адрес

```
    lo:
      renderer: networkd
      match:
        name: lo
      addresses:
        - 172.17.32.1/24
        - 172.17.42.1/24
```

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defau
lt qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet 172.17.32.1/24 brd 172.17.32.255 scope global lo
       valid_lft forever preferred_lft forever
    inet 172.17.42.1/24 brd 172.17.42.255 scope global lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
```

Роутінг для Client_2 до Server до Client_1(lo)

Client_2 – netplan confiig

```
    enp0s3:
      dhcp4: yes
#      addresses: [10.8.4.11/24]
#      gateway4: 10.8.4.1
      routes:
        - to: 10.4.22.0/24
          via: 10.8.4.22
        - to: 172.17.32.0/24
          via: 10.8.4.22
        - to: 172.17.42.0/24
          via: 10.8.4.22
```

Server – netplan confiig

```
    enp0s8:
      addresses: [10.4.22.22/24]
      gateway4: 10.4.22.2
      dhcp4: no
      routes:
        - to: 172.17.32.0/24
          via: 10.4.22.50
        - to: 172.17.42.0/24
          via: 10.4.22.50
```

ping Client_2 -> Server -> Client1(lo)

```
root@client2:~# ping 172.17.32.1
PING 172.17.32.1 (172.17.32.1) 56(84) bytes of data.
64 bytes from 172.17.32.1: icmp_seq=1 ttl=63 time=0.696 ms
64 bytes from 172.17.32.1: icmp_seq=2 ttl=63 time=1.14 ms
```

```
root@client2:~# traceroute 172.17.32.1
traceroute to 172.17.32.1 (172.17.32.1), 30 hops max, 60 byte packets
 1  10.8.4.22 (10.8.4.22)  0.352 ms  0.335 ms  0.325 ms
 2  172.17.32.1 (172.17.32.1)  1.742 ms  1.737 ms  1.654 ms
```

```
root@client2:/etc/netplan# ping 172.17.42.1
PING 172.17.42.1 (172.17.42.1) 56(84) bytes of data.
^C
--- 172.17.42.1 ping statistics ---
14 packets transmitted, 0 received, 100% packet loss, time 13317ms
```

По завданню потрібно було закрити Forward Server з Client_2 -> Client1(lo)(172.17.42.1)

Конфігурація Firewall буде надана далі.

Підключення по ssh

Client_1 -> Client_2

```
root@client1:/etc/netplan# ssh bim@172.16.22.22
bim@172.16.22.22's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.15.0-52-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

392 updates can be applied immediately.
280 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Sun Oct 30 17:24:16 2022 from 172.16.22.11
bim@client2:~$
```

Client_2 -> Client_1

```
root@client2:/etc/netplan# ssh bim@172.16.22.11
bim@172.16.22.11's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.15.0-52-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

392 updates can be applied immediately.
280 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Sun Oct 30 17:24:42 2022 from 172.16.22.22
bim@client1:~$
```

Конфігурація firewall Server (для ssh підключення)

```
root@Server:/etc/netplan# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination
ACCEPT     all  --  anywhere             anywhere             state RELATED,EST
ABLISHED
ACCEPT     tcp  --  anywhere             anywhere             tcp dpt:http
DROP       tcp  --  10.8.4.0/24          anywhere             tcp dpt:ssh
ACCEPT     tcp  --  10.4.22.0/24         anywhere             tcp dpt:ssh
```

Client_1 -> Server дозволено

Client_2 -> Server заборонено

Client_1 -> Server

```
root@client1:/etc/netplan# ssh bim@10.4.22.22
bim@10.4.22.22's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.15.0-52-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

126 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Mon Oct 31 19:41:57 2022 from 10.4.22.50
bim@Server:~$
```

Client_2 -> Server

```
root@client2:/etc/netplan# ssh bim@10.8.4.22
ssh: connect to host 10.8.4.22 port 22: Connection timed out
root@client2:/etc/netplan#
```

Конфігурація firewall Forward Server (Client_2 -> Client_1)

```
Chain FORWARD (policy ACCEPT)
target     prot opt source               destination
DROP       icmp --  10.8.4.0/24         172.17.42.1
ACCEPT     icmp --  10.8.4.0            172.17.32.1
```

ping Client_2 -> Server -> Client1(lo)

```
root@client2:~# ping 172.17.32.1
PING 172.17.32.1 (172.17.32.1) 56(84) bytes of data.
64 bytes from 172.17.32.1: icmp_seq=1 ttl=63 time=0.696 ms
64 bytes from 172.17.32.1: icmp_seq=2 ttl=63 time=1.14 ms
```

```
root@client2:~# traceroute 172.17.32.1
traceroute to 172.17.32.1 (172.17.32.1), 30 hops max, 60 byte packets
 1  10.8.4.22 (10.8.4.22)  0.352 ms  0.335 ms  0.325 ms
 2  172.17.32.1 (172.17.32.1)  1.742 ms  1.737 ms  1.654 ms
```

```
root@client2:/etc/netplan# ping 172.17.42.1
PING 172.17.42.1 (172.17.42.1) 56(84) bytes of data.
^C
--- 172.17.42.1 ping statistics ---
14 packets transmitted, 0 received, 100% packet loss, time 13317ms
```

Конфігурація Nat Server

```
Chain POSTROUTING (policy ACCEPT)
target     prot opt source               destination
SNAT       all  --  10.8.4.0/24          anywhere             to:10.0.2.2
SNAT       all  --  10.4.22.0/24         anywhere             to:10.0.2.2
MASQUERADE  all  --  anywhere             anywhere
```

Пінги не проходять :/

```
root@client2:/etc/netplan# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1008ms
```

```
root@client1:/etc/netplan# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1020ms
```