
LİNUX AĞ YÖNETİMİ 2020

FİNAL PROJESİ

1. LİNUX AĞ YÖNETİMİ 2020 FİNAL PROJESİ

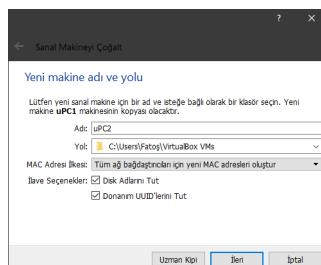
2. LİNUX NETWORKİNG

Kişisel bilgisayarımda Virtualbox(6.0)üzerinde:

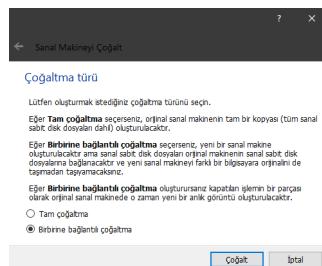
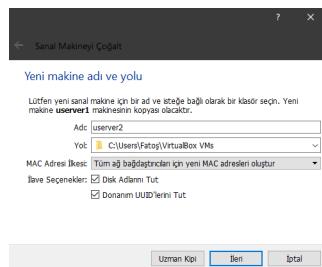
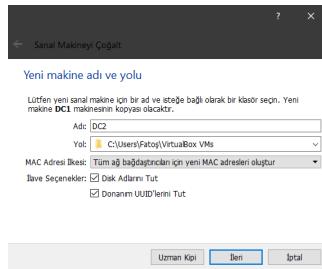
- Ubuntu Desktop 20 yükledim.uPC1 olarak isimlendirdim. Kullanıcı adı olarak soyadımı seçtim.
- TinyCore Linux (DCore Linux) yükledim. DC1 olarak isimlendirdim. Kullanıcı adı olarak ismimi seçtim.
- Ubuntu 20 Server yükledim.userver1 olarak isimlendirdim.Kullanıcı adı olarak soyadımı seçtim.

2.1. Makinelerin Klonlanması

Kullanaçığımız makineyi oluşturduktan sonra klon makine için sağ tıklayıp çoğalt seçenek ile istediğimiz şekilde oluşturabiliriz.Daha az yer kaplamak ve ortak networklere bağlandığımız için MAC adresi ilkesini "Tüm ağ bağlantıcları için yeni MAC adresleri oluştur" ve çoğaltma türünü "Birbirine bağlılı çoğaltma" olarak seçtik.

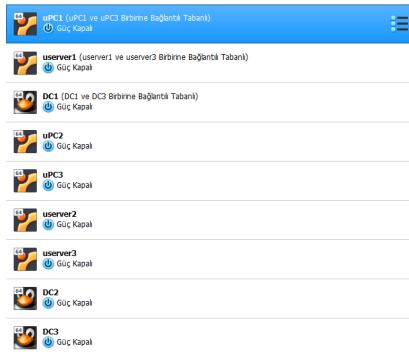


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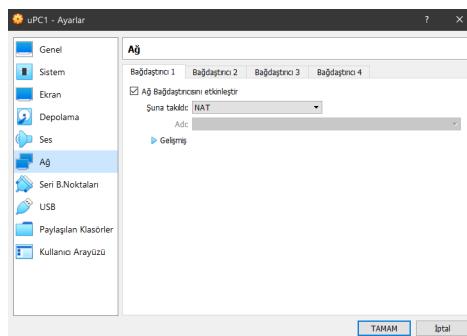
- Ubuntu Desktop yükleyip uPC1 adını verdiğim sanal makinemi birbirine bağlılı çoğaltma(klonlama) ile uPC2 adında yeni bir sanal makine klonladım.Aynı adımları uygulayarak uPC3 adını verdiğim başka bir sanal makine klonladım.
- TinyCore Linux (DCore Linux) yükleyip DC1 adını verdiğim sanal makinemi birbirine bağlılı çoğaltma(klonlama) ile DC2 adında yeni bir sanal makine klonladım.Aynı adımları uygulayarak DC3 adını verdiğim başka bir sanal makine klonladım.
- Ubuntu 20 Server yükleyip userver1 adını verdiğim sanal makinemi birbirine bağlılı çoğaltma(klonlama) ile userver2 adında yeni bir sanal makine klonladım.Aynı adımları uygulayarak userver2 adını verdiğim başka bir sanal makine klonladım.

Klonlanmış Makineler:



2.2. SENARYO 1

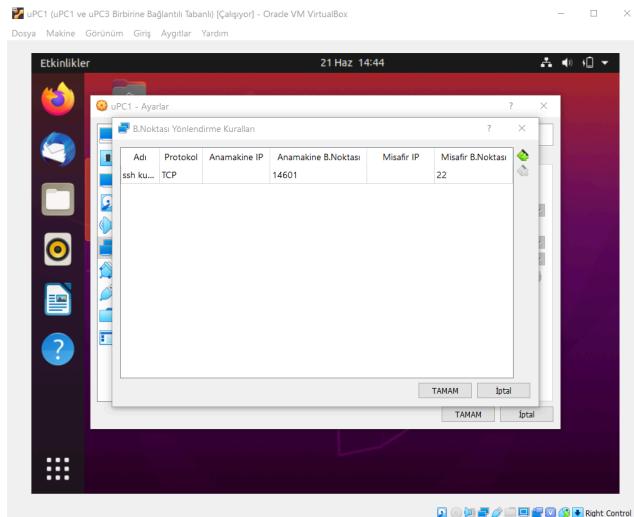
1.1. NAT ile Host-Guest Ubuntu PC Bağlantısı



uPC1 olarak isimlendirdiğim guest makinenin ağ bağdaştırıcısını NAT olarak seçtim.

SSH

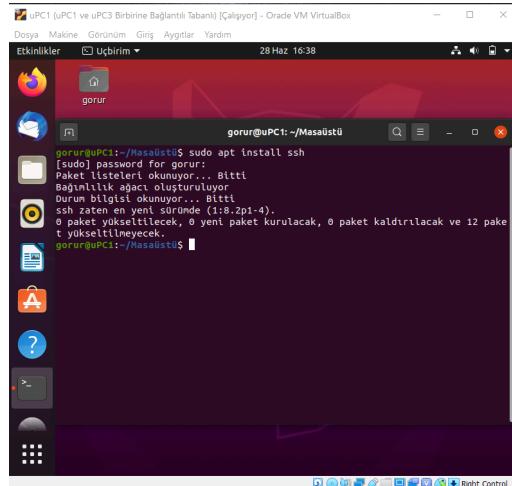
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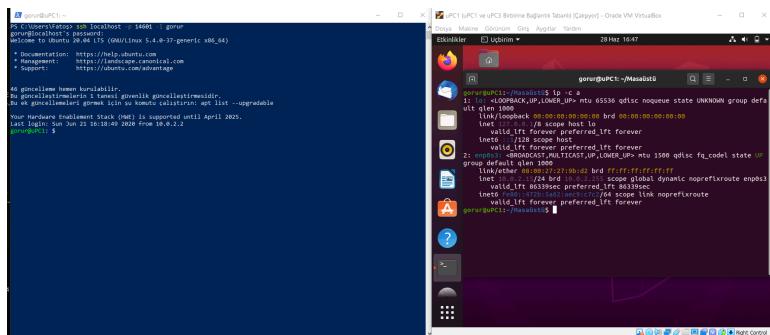
Host makineye NAT bağlantı ile erişebilmek için gerekli port yönlendirmesini yaptım. Anamakine b.noktasını 14601, misafir b.noktasını 22 olarak ayarladım.

```
gorur@gorur-VirtualBox:~$ sudo apt install ssh
[sudo] password for gorur:
Paket listeleri okunuyor... Bitti
Bağımlılık ağacı oluşturuluyor
Durum bilgisi okunuyor... Bitti
Aşağıdaki ek paketler kurulacak:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
Önerilen paketler:
  molly-guard monkeysphere ssh-askpass
Aşağıdakiler YENİ paketler kurulacak:
  ncurses-term openssh-server openssh-sftp-server ssh ssh-import-id
0 paket yüksetilicek, 5 yeni paket kurulacak, 0 paket kaldırılacak ve 3 paket yükseltilemeyecek.
693 kB arşiv dosyası indirilecek.
Bu işlem tamamlandıktan sonra 6.130 kB ek disk alanı kullanılacak.
Devam etmek istiyor musunuz? [E/h]
```

Gueste ssh ile bağlanabilmek için:
\$ sudo apt install ssh ile ssh yükleyiz.



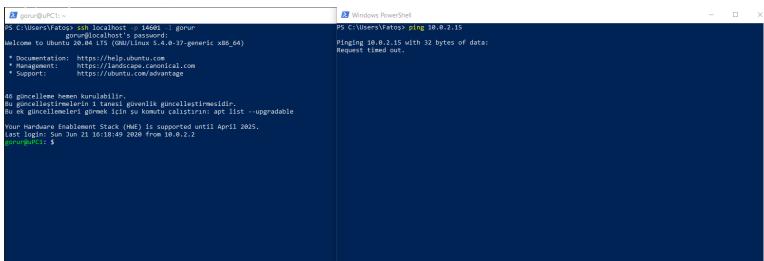
Gerekli isim düzenlemeleri yapıldıktan sonra ssh yüklemeyi tekrar göstermek istedim. SSH yüklü olduğu için "ssh zaten en yeni sürümde" bilgisi verilmiştir.



uPC1 sanal makinesi terminalinden \$ ip -c a yazarak ip adresimi 10.0.2.15 olarak buldum.
Port yönlendirmesi yaptıktan sonra host(kullandığım) bilgisayardan: ssh localhost -p 14601 -l gorur yazarak ssh bağlantısı yapılıp yapılmadığını kontrol ettim ve ssh bağlantısı yapılabildiğini gösterdim.

PİNG

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```
C:\Users\gorur> ssh localhost -l gorur
gorur@localhost's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-17-generic x86_64)

 * Documentation: https://help.ubuntu.com
 * Support:      https://ubuntu.com/advantage

All gpg keys were verified successfully.
No packages could be upgraded, as no upgrades have been made.
Your hardware Enablement Stack (HWE) is supported until April 2025.
Ubuntu 20.04 LTS was released on 2020-04-23 from iso/bionic.

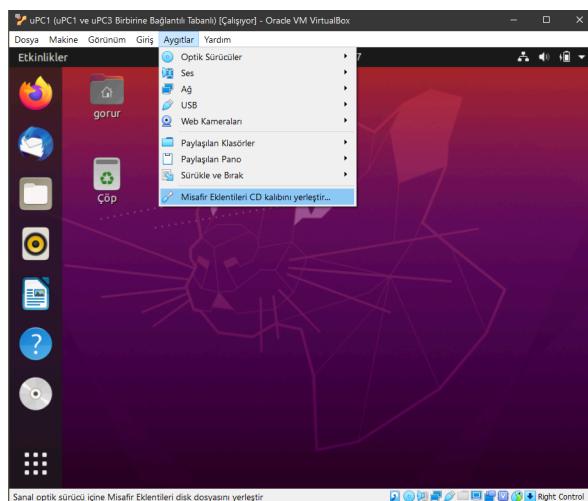
gorur@localhost:~$
```

```
[PS] C:\Windows\system32> ping 10.0.2.15

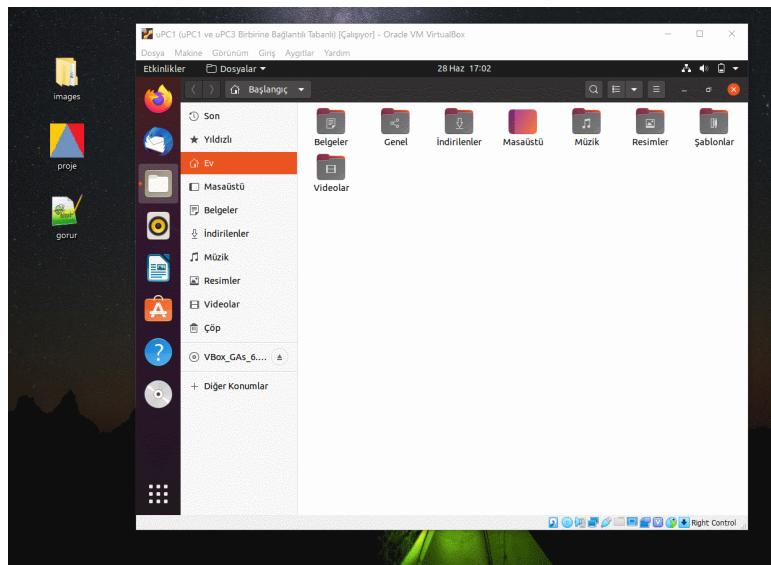
Pinging 10.0.2.15 with 32 bytes of data:
Request timed out.
```

Host(kullandığım) bilgisayardan:
ping ip adresi (10.0.2.15) ssh ile bağlandığım sanal makineye ping yapıp yapmadığımı kontrol ettim, ping yapamadığımı gösterdim.

MİSAFİR EKLENTİLERİ

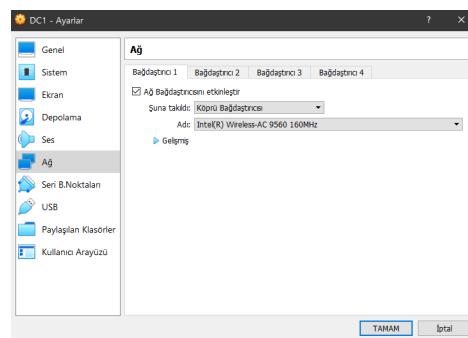


Misafir eklientilerini guest makineye sanal disk takarak yükleyebiliyoruz
bu sayede hosttan gaste veya guestten hosta kopyala yapıştır ve
sürükle bırak yapabiliyoruz.
Host bilgisayardan dosya kopyala-yapıştır yapabilmek için misafir
eklientileri CD kalıbını yerleştiri seçerek vboxguestaddition
yükledim. Paylaşılan pano ve sürüklü,bırak çift yönlü seçtim.



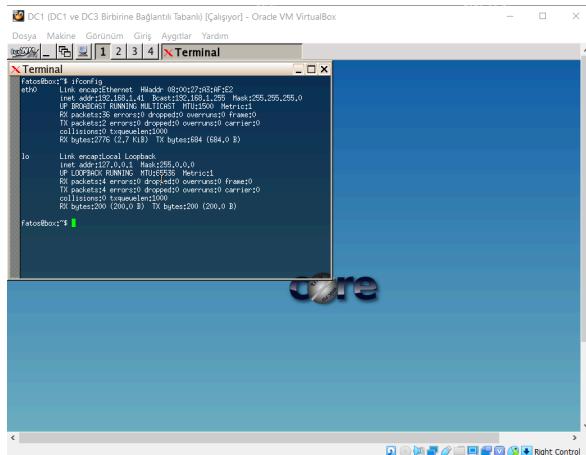
Host bilgisayarımda gorur.txt adında bir metin belgesi oluşturdum.Bu belgeyi sürükle bırak ile upc1 sanal makinenin Dosyalar kısımına bıraktım.

1.2.Köprü Bağdaştırıcı ile Host-Guest TinyCore Bağlantısı



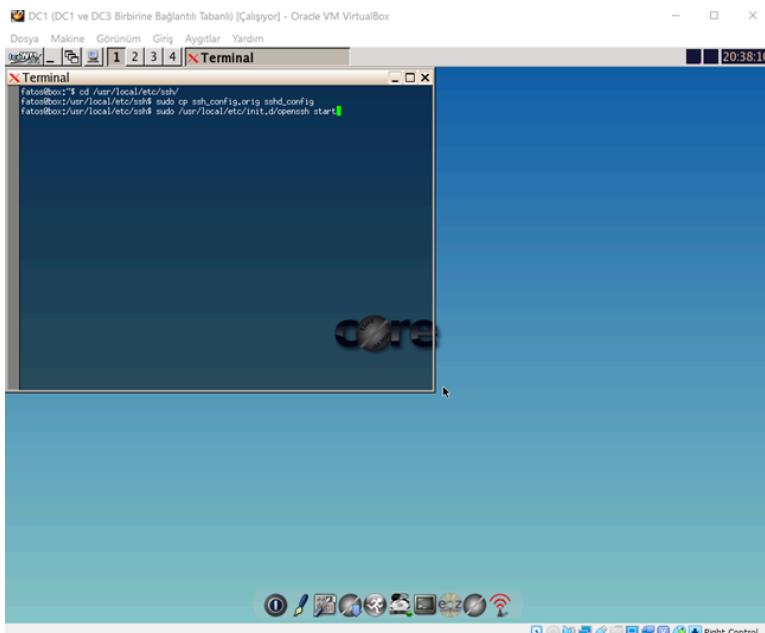
DC1 olarak isimlendirdiğim guest makinenin ağ bağdaştırıcısı ayarlarını Köprü Bağdaştırıcısı olarak ayarladım.

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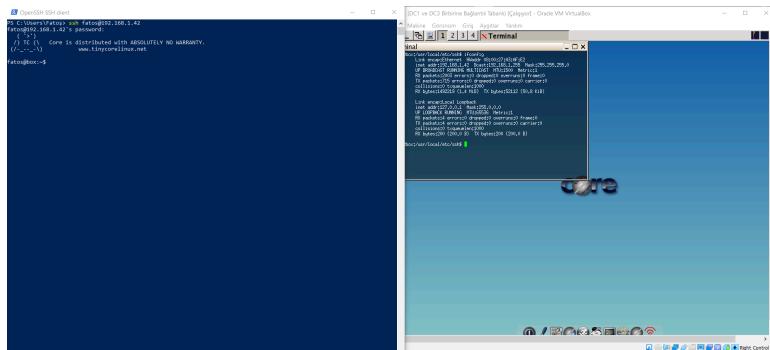
DC1 sanal makinesinin ip adresini bulmak için terminal ekranına \$ ifconfig komutunu yazdım. İp adresini 192.168.1.41 olarak buldum.

SSH



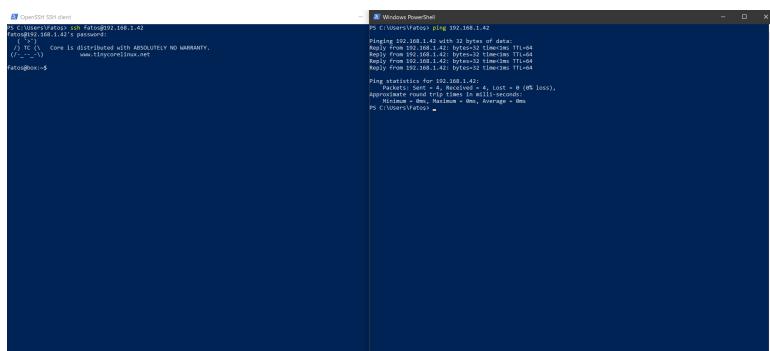
SSH bağlantısı yapabilmek için DC1 terminal ekranında:

```
$ cd /usr/local/etc/ssh/  
$ sudo cp ssh_config.orig sshd_config  
$ sudo /usr/local/etc/init.d/openssh start yazarak gerekli yüklemeleri  
yaptım.
```



Host bilgisayarın terminal ekranında:
ssh fatos@192.168.1.42 yazarak SSH bağlantısı yapılabildiğini gösterdim.

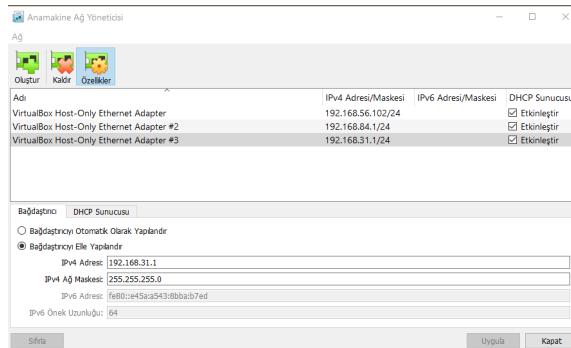
PİNG



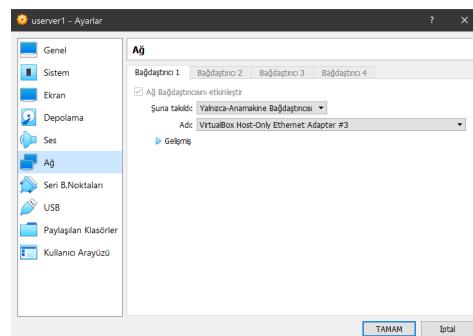
Host bilgisayarın terminal ekranında:
ssh fatos@192.168.1.42 yazarak SSH bağlantısı yapılabildiğini gösterdim.

1.3.Yalnızca Anamakine Bağdaştırıcı ile Host-Guest Ubuntu Server Bağlantısı

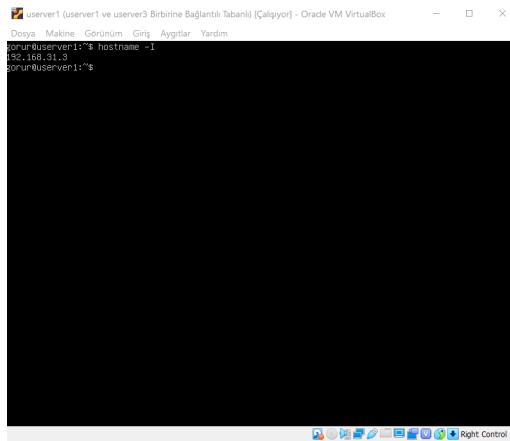
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Yalnızca-anamakine bağdaştırıcı kullanabilmek için öncelikle host network oluşturmak gereklidir. Ana menüden Dosya->Anamakine Ağ Yöneticisi seçip oluştura tıklıyoruz ve network oluşuyor.



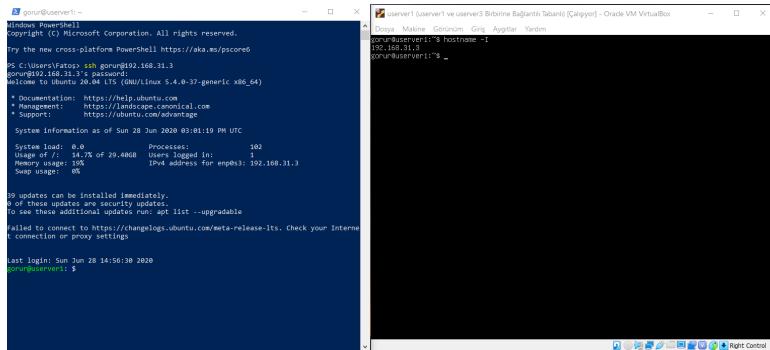
userver1 olarak isimlendirdiğim guest makinenin ağ bağdaştırıcı ayarlarını yalnızca-anamakine bağdaştırıcısı seçip alt seçenekten oluşturduğum host network'ü seçtim.



userver1 terminal ekranında:
hostname -I yazarak IP adresimi buldum.(192.168.31.3)

SSH

Ubuntu Server kurulumu sırasında SSH bağlantısı için gerekli yüklemeleri otomatik olarak yaptıgımdan ayrıca bir yükleme yapmama gerek kalmadı.



Host bilgisayarın terminal ekranında:
ssh gorur@192.168.31.3 yazarak SSH bağlantısı yapılabildiğini gösterdim.

PİNG

The image shows two side-by-side terminal windows. The left window is a Linux terminal (Ubuntu 20.04 LTS) with a black background. It displays system information, including a ping command to 192.168.31.3. The right window is a Windows PowerShell terminal with a dark blue background, also showing a ping command to 192.168.31.3.

```

gorun@userver1: ~
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\gorun> ssh gorungorun@192.168.31.3
Last login: Sun Jun 28 14:56:30 2020
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-37-generic x86_64)

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

System information as of Sun Jun 28 2020 01:01:19 PM UTC

 8.0
Processes: 102
Memory usage: 19%
Swap usage: 0%

0 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable

 102
inet login: Sun Jun 28 14:56:30 2020
gorun@userver1: ~

PS C:\Users\gorun>

```

```

26 C:\Users\fatop> ping 192.168.31.3

Pinging 192.168.31.3 with 32 bytes of data:
Reply from 192.168.31.3: bytes=32 time<1ms TTL=64
Reply from 192.168.31.3: bytes=32 time<1ms TTL=64
Reply from 192.168.31.3: bytes=32 time<1ms TTL=64
Reply from 192.168.31.3: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.31.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\fatop>

```

Host(kullandığım) bilgisayardan:

ping ip adresi (192.168.31.3) komutu ile SSH'la bağlandığım sanal makineye ping yapıp yapamadığımı kontrol ettim, ping yapabildiğimi gösterdim.

2.3. SENARYO 2

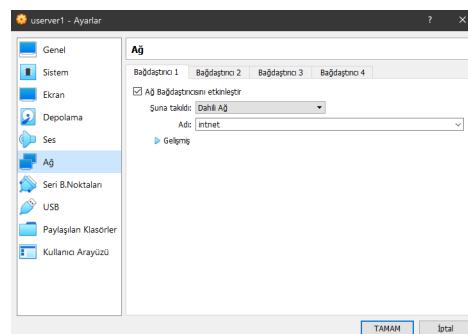
Dahili Ağ Bağdaştırıcı ile Host-Guest, Guest-Guest Bağlantısı

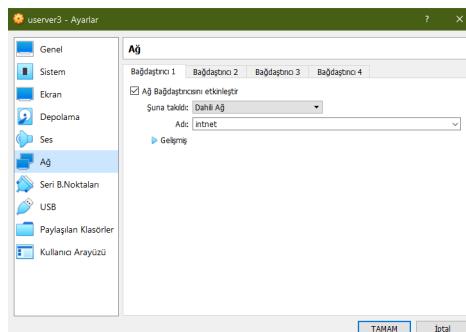
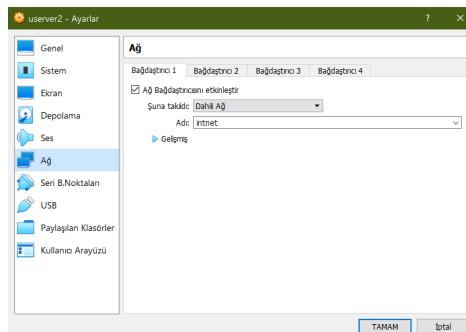
Senaryo gereği Ubuntu Serverların ipleri:

userver1 : 192.168.8.6

userver2 : 192.168.8.7

userver3 : 192.168.8.8



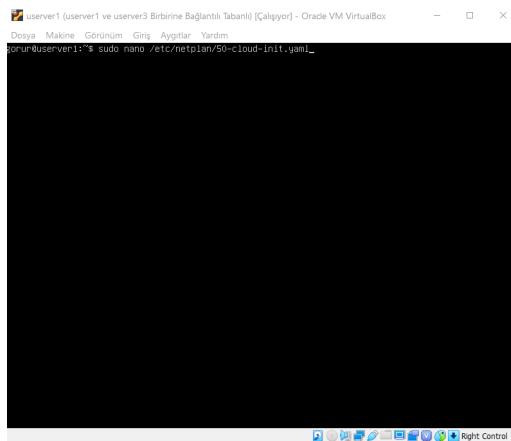


userver1, userver2 ve userver3 guest makinelerim için ağ bağdaştırıcı ayarlarını dahili ağ olarak seçtim.

Netplan Ayarları

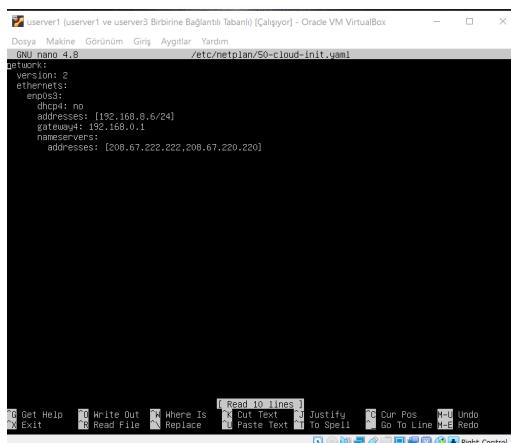
yaml formatındaki /etc/netplan/50-cloud-init.yaml dosyasını dhcp olmadan statik bir IP alıyoruz.

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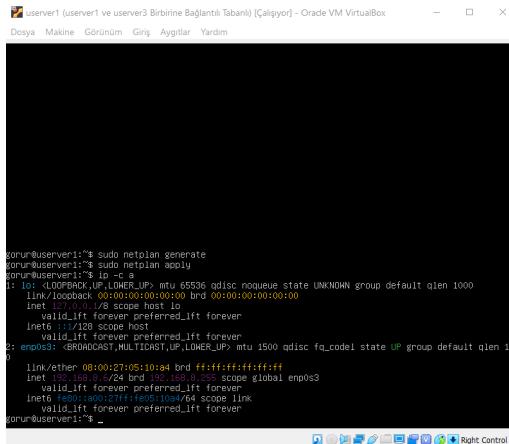
userver1, userver2 ve userver3 terminalinde:

```
$ sudo nano /etc/netplan/50-cloud-init.yaml komutu ile dosyayı açtım.
```



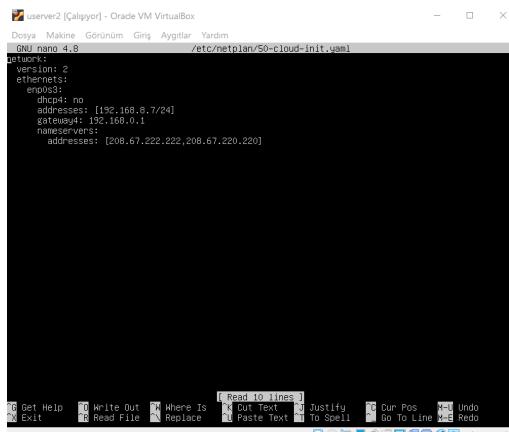
userver1 IP adresini statik olarak verilen koşul gereği 192.168.8.6 olarak ayarladım.

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```
gorur@userver1:~$ sudo netplan generate
gorur@userver1:~$ sudo netplan apply
gorur@userver1:~$ ip link
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 127.255.255.255 scope host lo
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:05:10:44 brd ff:ff:ff:ff:ff:ff
    inet 192.168.8.6/24 brd 192.168.8.255 scope global enp0s3
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fe05:1044/64 scope link
            valid_lft forever preferred_lft forever
gorur@userver1:~$
```

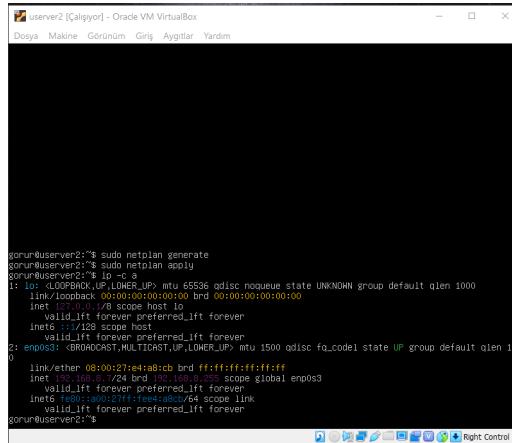
\$ sudo netplan generate komutundan sonra \$ sudo netplan apply ile statik IP atamamı uyguladım ve artık IP adresimin 192.168.8.6 olduğunu gördüm.



```
netplan:
  version: 2
  ethernets:
    enp0s3:
      dhcp4: no
      addresses: [192.168.8.7/24]
      gateway4: 192.168.0.1
      nameservers:
        addresses: [208.67.222.222,208.67.220.220]
```

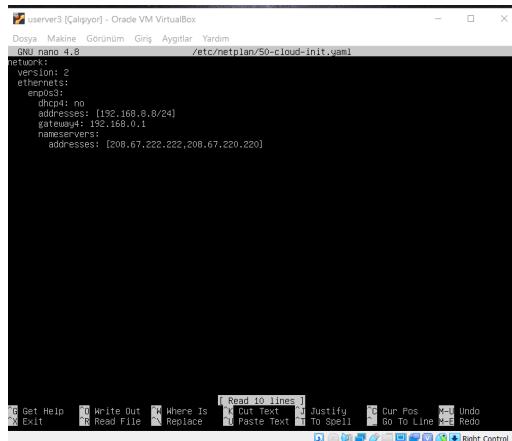
userver2 IP adresini statik olarak verilen koşul gereği 192.168.8.7 olarak ayarladım.

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```
gorur@userver2:~$ sudo netplan generate
gorur@userver2:~$ sudo netplan apply
gorur@userver2:~$ ip link
1: loopback0: LOWER_UP mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback brd 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 0.0.0.0 scope host lo
        valid_lft forever preferred_lft forever
2: enp0s3: BROADCAST,MULTICAST,UP,LOWER_UP mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e4:a8:c9 brd ff:ff:ff:ff:ff:ff
    inet 192.168.8.1/24 brd 192.168.8.255 scope global enp0s3
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fe4:a8c9/64 scope link
            valid_lft forever preferred_lft forever
gorur@userver2:~$
```

\$ sudo netplan generate komutundan sonra \$ sudo netplan apply ile statik IP atamamı uyguladım ve artık IP adresimin 192.168.8.7 olduğunu gördüm.



```
gorur@user3:~$ cat /etc/netplan/50-cloud-init.yaml
network:
  version: 2
  ethernets:
    ens3:
      dhcp4: no
      addresses: [192.168.8.8/24]
      gateway4: 192.168.0.1
      nameservers:
        addresses: [208.67.222.222,208.67.220.220]
```

userver3 IP adresini statik olarak verilen koşul gereği 192.168.8.8 olarak ayarladım.

```
gorur@userver3:~$ sudo netplan generate
gorur@userver3:~$ sudo netplan apply
done.
[...]
1: loi :LOOPBACK,UP,LOWER_UP: mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link :LOOPBACK,UP,LOWER_UP: brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 00:00:00:00:00:00 scope host lo
        valid_lifeti[...] preferred_lif[...] forever
        valid_lif[...] preferred_lif[...] forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:09:21:46 brd ff:ff:ff:ff:ff:ff
    inet 192.168.8.8/24 brd 192.168.8.255 scope global enp0s3
        valid_lifeti[...] preferred_lif[...] forever
        valid_lif[...] preferred_lif[...] forever
        valid_lif[...] preferred_lif[...] forever
gorur@userver3:~$
```

```
$ sudo netplan generate komutundan sonra $ sudo netplan apply ile statik IP atamamı uyguladım ve artık IP adresimin 192.168.8.8 olduğunu gördüm.
```

SSH

SSH server yüklediğimiz için ve diğer makineler klon olduğu için ayrıca yüklemeye gerek yoktur. Guestler arası SSH bağlantısı yapılmaktadır.

```
gorur@userver1:~$ ssh gorur@192.168.8.8
gorur@192.168.8.8's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-37-generic x86_64)

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

 System information as of Sun 28 Jun 2020 04:23:03 PM UTC

 System load: 0.0               Processes:           101
 Tasks: 144              Users logged in: 1
 Memory usage: 19%             IPv4 address for enp0s3: 192.168.8.0
 Swap usage: 0%
```

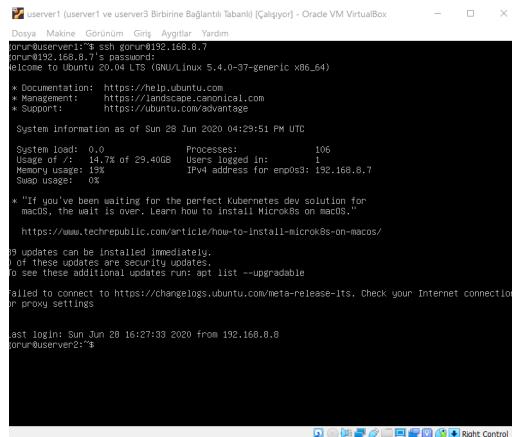
0 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings

```
last login: Sun Jun 28 15:51:05 2020
gorur@userver3:~$
```

```
userver1 sanal makinesinde ssh gorur@192.168.8.8 komutu userver3 ile SSH bağlantısı yaptım.
```

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```
[userver1 (userver1 ve userver3 Birbirine Bağlılanı Tabanlı) [Çalışıyor] - Oracle VM VirtualBox
Dünya Makine Görüntüm Giriş Ayarları Yardım
gorur@userver1:~$ ssh gorur@192.168.8.7
gorur@192.168.8.7's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-37-generic x86_64)

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

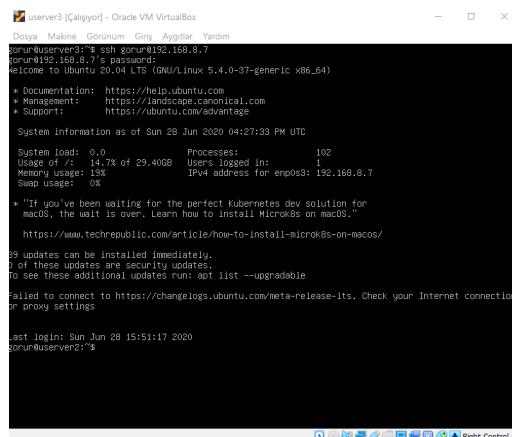
 System information as of Sun 28 Jun 2020 04:29:51 PM UTC

 System load: 0.0          Processes:          106
 Usage of /: 14.7% of 29.40GB  Users logged in: 1
 Memory usage: 19%          IPv4 address for emps0: 192.168.8.7
 Swap usage: 0%
 
 * If you've been waiting for the perfect Kubernetes dev solution for
macOS, the wait is over. Learn how to install Microk8s on macOS.
https://www.techrepublic.com/article/how-to-install-microk8s-on-macos/
99 updates can be installed immediately.
1 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-its. Check your Internet connection
or proxy settings

Last login: Sun Jun 28 16:27:33 2020 from 192.168.8.0
gorur@userver2:~$
```

userver1 sanal makinesinde ssh gorur@192.168.8.7 komutu userver2 ile SSH bağlantısı yaptım.



```
[userver3 [Çalışıyor] - Oracle VM VirtualBox
Dünya Makine Görüntüm Giriş Ayarları Yardım
gorur@userver3:~$ ssh gorur@192.168.8.7
gorur@192.168.8.7's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-37-generic x86_64)

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

 System information as of Sun 28 Jun 2020 04:27:33 PM UTC

 System load: 0.0          Processes:          102
 Usage of /: 14.7% of 29.40GB  Users logged in: 1
 Memory usage: 19%          IPv4 address for emps0: 192.168.8.7
 Swap usage: 0%
 
 * If you've been waiting for the perfect Kubernetes dev solution for
macOS, the wait is over. Learn how to install Microk8s on macOS.
https://www.techrepublic.com/article/how-to-install-microk8s-on-macos/
99 updates can be installed immediately.
1 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Failed to connect to https://changelogs.ubuntu.com/meta-release-its. Check your Internet connection
or proxy settings

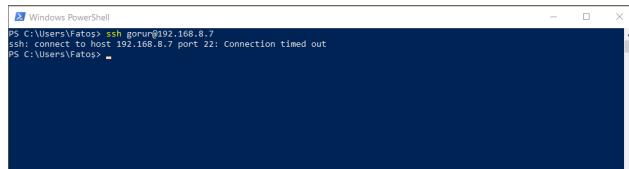
Last login: Sun Jun 28 15:51:17 2020
gorur@userver2:~$
```

userver3 sanal makinesinde ssh gorur@192.168.8.7 komutu userver2 ile SSH bağlantısı yaptım.

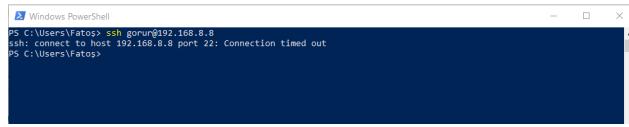
Dahili ağ bağıdaştırıcıda hosttan guestlere SSH bağlantısı yapmak mümkün değildir.



```
[PS C:\Users\Fatoss> ssh gorur@192.168.8.6
ssh: connect to host 192.168.8.6 port 22: Connection timed out
PS C:\Users\Fatoss>
```



```
PS C:\Users\Fatos> ssh gorur@192.168.8.7
ssh: connect to host 192.168.8.7 port 22: Connection timed out
PS C:\Users\Fatos>
```

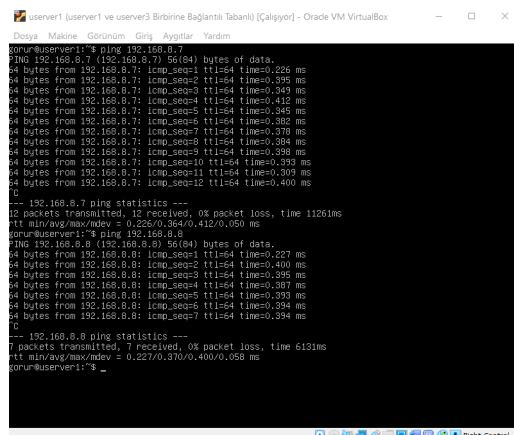


```
PS C:\Users\Fatos> ssh gorur@192.168.8.8
ssh: connect to host 192.168.8.8 port 22: Connection timed out
PS C:\Users\Fatos>
```

Host bilgisayardan userver1,userver2 ve userver3 sanal makinelerine SSH yapamadığımı sırasıyla gösterdim.

PİNG

Guestler birbirine ulaşabildiği için birbirine ping yapabilmeleri mümkündür.



```
gorur@userver1:~$ ping 192.168.8.7
PING 192.168.8.7 (192.168.8.7) 56(84) bytes of data.
64 bytes from 192.168.8.7: icmp_seq=1 ttl=64 time=0.226 ms
64 bytes from 192.168.8.7: icmp_seq=2 ttl=64 time=0.295 ms
64 bytes from 192.168.8.7: icmp_seq=3 ttl=64 time=0.349 ms
64 bytes from 192.168.8.7: icmp_seq=4 ttl=64 time=0.412 ms
64 bytes from 192.168.8.7: icmp_seq=5 ttl=64 time=0.345 ms
64 bytes from 192.168.8.7: icmp_seq=6 ttl=64 time=0.382 ms
64 bytes from 192.168.8.7: icmp_seq=7 ttl=64 time=0.378 ms
64 bytes from 192.168.8.7: icmp_seq=8 ttl=64 time=0.384 ms
64 bytes from 192.168.8.7: icmp_seq=9 ttl=64 time=0.358 ms
64 bytes from 192.168.8.7: icmp_seq=10 ttl=64 time=0.393 ms
64 bytes from 192.168.8.7: icmp_seq=11 ttl=64 time=0.309 ms
64 bytes from 192.168.8.7: icmp_seq=12 ttl=64 time=0.400 ms
...
--- 192.168.8.7 ping statistics ---
12 packets transmitted, 12 received, 0% packet loss, time 1126ms
rtt min/avg/max/mdev = 0.227/0.370/0.400/0.050 ms
gorur@userver1:~$ ping 192.168.8.8
PING 192.168.8.8 (192.168.8.8) 56(84) bytes of data.
64 bytes from 192.168.8.8: icmp_seq=1 ttl=64 time=0.257 ms
64 bytes from 192.168.8.8: icmp_seq=2 ttl=64 time=0.260 ms
64 bytes from 192.168.8.8: icmp_seq=3 ttl=64 time=0.295 ms
64 bytes from 192.168.8.8: icmp_seq=4 ttl=64 time=0.387 ms
64 bytes from 192.168.8.8: icmp_seq=5 ttl=64 time=0.399 ms
64 bytes from 192.168.8.8: icmp_seq=6 ttl=64 time=0.333 ms
64 bytes from 192.168.8.8: icmp_seq=7 ttl=64 time=0.394 ms
...
--- 192.168.8.8 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6131ms
rtt min/avg/max/mdev = 0.227/0.370/0.400/0.058 ms
gorur@userver1:~$
```

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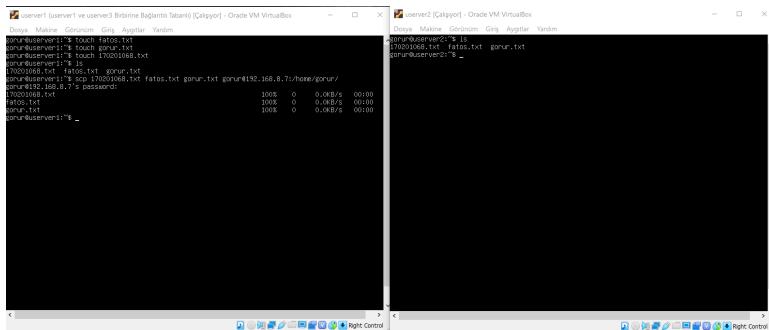
```
user2 [Çalışıyor] - Oracle VM VirtualBox
Dosya Makine Görünüm Giriş Ayarlar Yardım
sorur@userver2:~$ ping 192.168.8.6
PING 192.168.8.6 (192.168.8.6) 56(84) bytes of data.
64 bytes from 192.168.8.6: icmp_seq=1 ttl=64 time=0.163 ms
64 bytes from 192.168.8.6: icmp_seq=2 ttl=64 time=0.385 ms
64 bytes from 192.168.8.6: icmp_seq=3 ttl=64 time=0.349 ms
64 bytes from 192.168.8.6: icmp_seq=4 ttl=64 time=0.388 ms
64 bytes from 192.168.8.6: icmp_seq=5 ttl=64 time=0.394 ms
64 bytes from 192.168.8.6: icmp_seq=6 ttl=64 time=0.390 ms
64 bytes from 192.168.8.6: icmp_seq=7 ttl=64 time=0.398 ms
...
C
--- 192.168.8.6 ping statistics ---
6 packets transmitted, 0 received, 0% packet loss, time 6100ms
rtt min/avg/max/mdev = 0.349/0.561/1.625/0.434 ms
sorur@userver2:~$ ping 192.168.8.6
PING 192.168.8.6 (192.168.8.6) 56(84) bytes of data.
64 bytes from 192.168.8.6: icmp_seq=1 ttl=64 time=0.409 ms
64 bytes from 192.168.8.6: icmp_seq=2 ttl=64 time=0.427 ms
64 bytes from 192.168.8.6: icmp_seq=3 ttl=64 time=0.427 ms
64 bytes from 192.168.8.6: icmp_seq=4 ttl=64 time=0.419 ms
64 bytes from 192.168.8.6: icmp_seq=5 ttl=64 time=0.389 ms
64 bytes from 192.168.8.6: icmp_seq=6 ttl=64 time=0.394 ms
64 bytes from 192.168.8.6: icmp_seq=7 ttl=64 time=0.380 ms
64 bytes from 192.168.8.6: icmp_seq=8 ttl=64 time=0.413 ms
...
C
--- 192.168.8.6 ping statistics ---
6 packets transmitted, 0 received, 0% packet loss, time 8192ms
rtt min/avg/max/mdev = 0.345/0.397/0.427/0.024 ms
sorur@userver2:~$
```

```
user3 [Çalışıyor] - Oracle VM VirtualBox
Dosya Makine Görünüm Giriş Ayarlar Yardım
sorur@userver3:~$ ping 192.168.8.6
PING 192.168.8.6 (192.168.8.6) 56(84) bytes of data.
64 bytes from 192.168.8.6: icmp_seq=1 ttl=64 time=0.466 ms
64 bytes from 192.168.8.6: icmp_seq=2 ttl=64 time=0.419 ms
64 bytes from 192.168.8.6: icmp_seq=3 ttl=64 time=0.411 ms
64 bytes from 192.168.8.6: icmp_seq=4 ttl=64 time=0.495 ms
64 bytes from 192.168.8.6: icmp_seq=5 ttl=64 time=0.342 ms
64 bytes from 192.168.8.6: icmp_seq=6 ttl=64 time=0.395 ms
...
--- 192.168.8.6 ping statistics ---
6 packets transmitted, 0 received, 0% packet loss, time 5126ms
rtt min/avg/max/mdev = 0.245/0.466/0.507 ms
sorur@userver3:~$ ping 192.168.8.7
PING 192.168.8.7 (192.168.8.7) 56(84) bytes of data.
64 bytes from 192.168.8.7: icmp_seq=1 ttl=64 time=0.245 ms
64 bytes from 192.168.8.7: icmp_seq=2 ttl=64 time=0.417 ms
64 bytes from 192.168.8.7: icmp_seq=3 ttl=64 time=0.516 ms
64 bytes from 192.168.8.7: icmp_seq=4 ttl=64 time=0.395 ms
64 bytes from 192.168.8.7: icmp_seq=5 ttl=64 time=0.390 ms
64 bytes from 192.168.8.7: icmp_seq=6 ttl=64 time=0.398 ms
64 bytes from 192.168.8.7: icmp_seq=7 ttl=64 time=0.377 ms
64 bytes from 192.168.8.7: icmp_seq=8 ttl=64 time=0.425 ms
...
C
--- 192.168.8.7 ping statistics ---
8 packets transmitted, 0 received, 0% packet loss, time 7164ms
rtt min/avg/max/mdev = 0.245/0.396/0.516/0.069 ms
sorur@userver3:~$
```

SCP ile Dosya Gönderimi

```
user1 (userver1 ve userver3 Birbirine Bağlılanı Tabanı) [Çalışıyor] - Oracle VM VirtualBox
Dosya Makine Görünüm Giriş Ayarlar Yardım
sorur@userver1:~$ touch fotos.txt
sorur@userver1:~$ touch gorur.txt
sorur@userver1:~$ touch 170201068.txt
sorur@userver1:~$ touch 170201068.txt
170201068.txt fotos.txt gorur.txt
sorur@userver1:~$
```

userver1 bilgisayarında \$ touch komutu ile dosya ismi fotos.txt, gorur.txt ve 170201068.txt şeklinde olan dosyalar oluştururdum ve dosyaların varlığını kontrol etmek için \$ ls komutunu kullandım.



\$ scp 170201068.txt fotos.txt gorur.txt gorur@192.168.8.7:/home/gorur/ ile oluşturduğum dosyaları SCP protokolünü kullanarak userver2 bilgisayarına gönderdim.

userver2 bilgisayarına dosya gönderim işlemi gerçekleşmiş mi diye kontrol etmek için \$ ls komutunu kullandım ve gönderimin başarılı bir şekilde gerçekleştiğini gördüm.

2.4. SENARYO 3

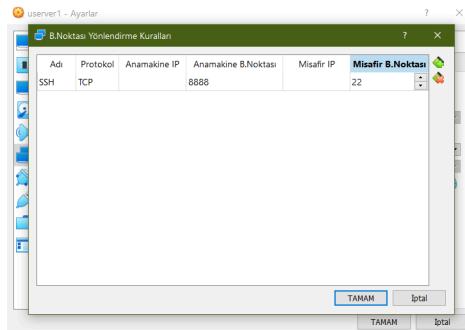
IP:

uPC1: NAT(10.0.2.15) dahili1(192.168.1.1)

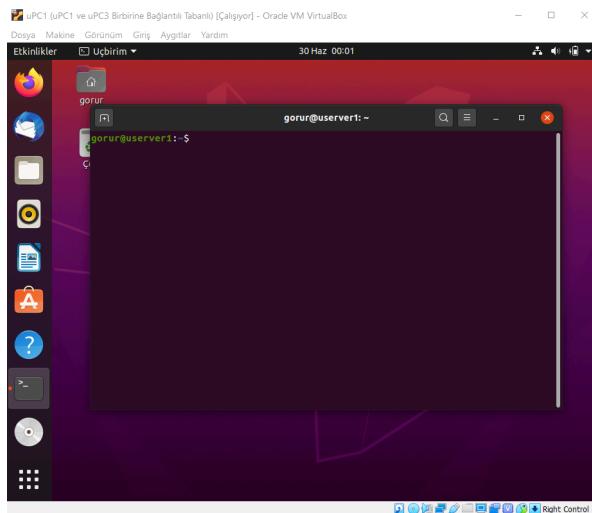
uPC2: NAT(10.0.2.15) dahili2(192.168.2.1)

userver1: NAT(10.0.2.15) dahili1(192.168.1.254) dahili3(192.168.100.1)

userver2: NAT(10.0.2.15) dahili1(192.168.2.254) dahili3(192.168.100.2)



userver1 olarak isimlendirdiği Ubuntu Server sanal makinesine,Ubuntu desktopla NAT bağlantı ile erişebilmek için gerekli port yönlendirmesini yaptım.Anamakine b.noktasını 8888,misafir b.noktasını 22 olarak ayarladım.



ssh localhost -p 8888 -l gorur komutu ile Ubuntu Desktop ile Ubuntu Server sanal makineme bağlandım.(Amacım daha kolay kopyala-yapıtır işlevlerini yapabilmek.)

QUAGGA KULLANARAK LİNÜX YÖNLENDİRİCİ AĞI

QUAGGA YÜKLEME

```
#!/bin/bash  
# quagga installer
```

```
if [ "$EUID" -ne 0 ]
then echo "Please run as root"
exit
fi

sudo apt install quagga quagga-doc
sudo cat > /etc/quagga/daemons << EOF
zebra=yes
bgpd=no
ospfd=yes
ospf6d=no
ripd=no
ripngd=no
isisd=no
babeld=no
EOF

sudo echo "net.ipv4.ip_forward=1" >> /etc/sysctl.conf

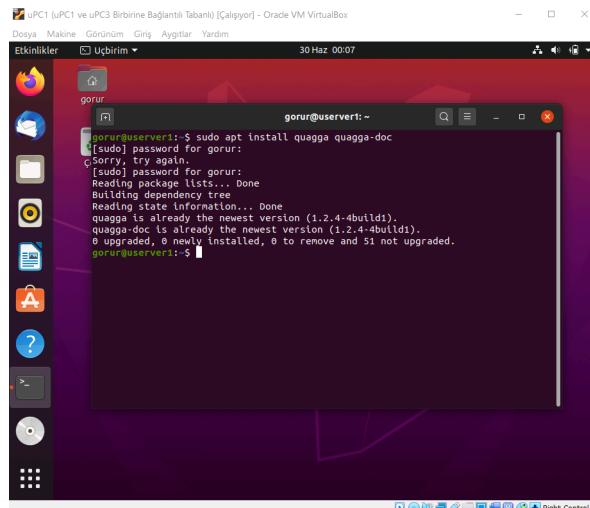
sudo cp /usr/share/doc/quagga-core/examples/vtysh.conf.sample /etc/
quagga/vtysh.conf
sudo cp /usr/share/doc/quagga-core/examples/zebra.conf.sample /etc/
quagga/zebra.conf
sudo cp /usr/share/doc/quagga-core/examples/bgpd.conf.sample /etc/
quagga/bgpd.conf
sudo chown quagga:quagga /etc/quagga/*.conf
sudo chown quagga:quaggavty /etc/quagga/vtysh.conf
sudo chmod 640 /etc/quagga/*.conf

sudo service zebra start
sudo service bgpd start

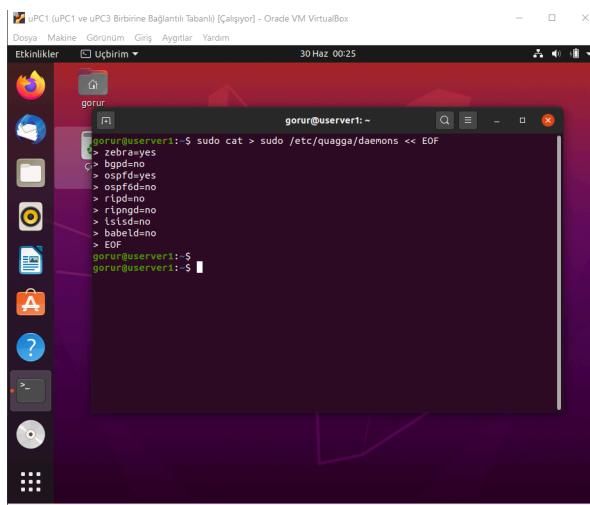
sudo systemctl enable zebra.service
sudo systemctl enable bgpd.service

sudo echo 'VTYSH_PAGER=more' >>/etc/environment
sudo echo 'export VTYSH_PAGER=more' >>/etc/bash.bashrc
```

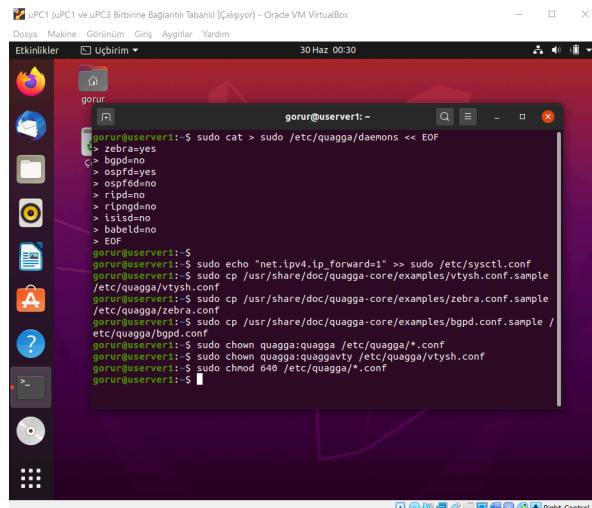
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Quagga paketini kurdum.

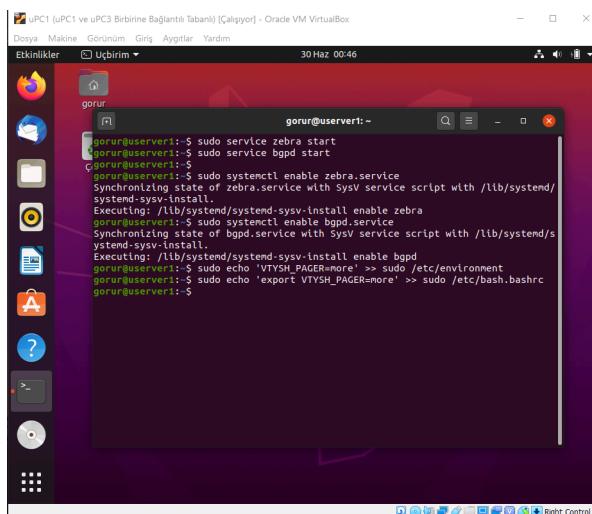


/etc/quagga/daemons dosyasını düzenledim.



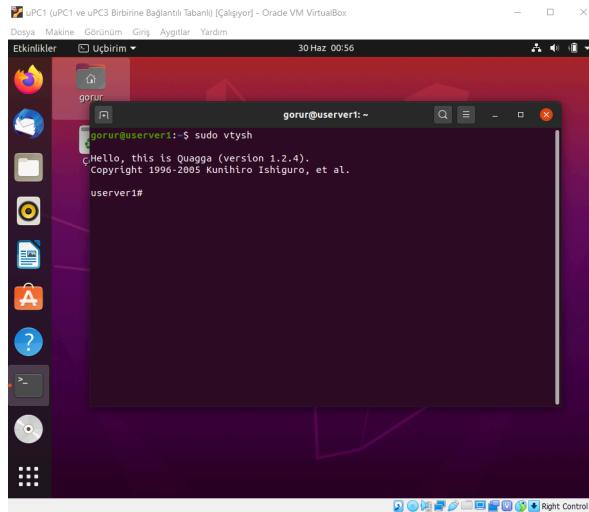
```
gorur@server1:~$ sudo cat > sudo /etc/quagga/daemons << EOF
> zebra=yes
> bpd=no
> ospfd=yes
> ospf6d=no
> ripd=no
> ripngd=no
> isisd=no
> babeld=no
> EOF
gorur@server1:~$ sudo echo "net.ipv4.ip_forward=1" >> sudo /etc/sysctl.conf
gorur@server1:~$ sudo cp /usr/share/doc/quagga-core/examples/vtysh.conf.sample
/etc/quagga/vtysh.conf
gorur@server1:~$ sudo cp /usr/share/doc/quagga-core/examples/zebra.conf.sample
/etc/quagga/zebra.conf
gorur@server1:~$ sudo cp /usr/share/doc/quagga-core/examples/bgpd.conf.sample
/etc/quagga/bgpd.conf
gorur@server1:~$ sudo chown quagga:quagga /etc/quagga/*.conf
gorur@server1:~$ sudo chmod 640 /etc/quagga/*.conf
gorur@server1:~$
```

zebra ve ospfd için yapılandırma dosyaları oluşturdum.



```
gorur@server1:~$ sudo service zebra start
gorur@server1:~$ sudo service bgpd start
gorur@server1:~$ sudo systemctl enable zebra.service
Synchronizing state of zebra.service with SysV service script with /lib/systemd/
systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable zebra
gorur@server1:~$ sudo systemctl enable bgpd.service
Synchronizing state of bgpd.service with SysV service script with /lib/systemd/s
ystemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable bgpd
gorur@server1:~$ sudo echo 'VTYSH_PAGER=more' >> sudo /etc/environment
gorur@server1:~$ sudo echo 'export VTYSH_PAGER=more' >> sudo /etc/bashrc
gorur@server1:~$
```

Vtysh END probleminden kaçınmak için ortam değişkenlerini ayarladım.



```
$sudo vtysh komutu ile quagga'yı başlattım.
```

ROUTER YAPILANDIRMA

Oluşturulacak routerlar için yapılandırma ayarları:

```
#!/bin/bash

if [ "$EUID" -ne 0 ]
then echo "Please run as root"
exit
fi

cat >> /etc/quagga/ospfd.conf << EOF
interface enp0s8
interface enp0s9
interface lo
router ospf
passive-interface enp0s8
network 192.168.1.0/24 area 0.0.0.0
network 192.168.100.0/24 area 0.0.0.0
line vty
EOF

cat >> /etc/quagga/zebra.conf << EOF
interface enp0s8
ip address 192.168.1.254/24
```

```
ipv6 nd suppress-ra
interface enp0s9
ip address 192.168.100.1/24
ipv6 nd suppress-ra
interface lo
ip forwarding
line vty
EOF
```

```
sudo service zebra restart
sudo service bgpd restart
```

The screenshot shows a terminal window titled "gorur" running as root on a server. The terminal displays the configuration of OSPF and Zebra services. The user has entered several commands to define interfaces, set IP addresses, and enable OSPF and Zebra services.

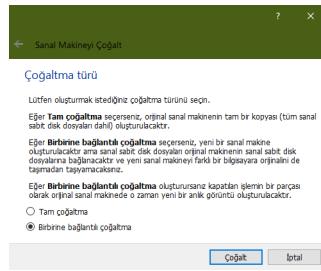
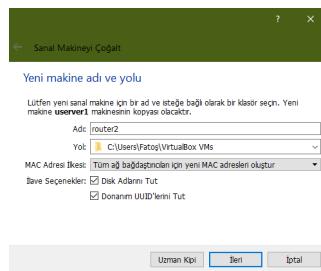
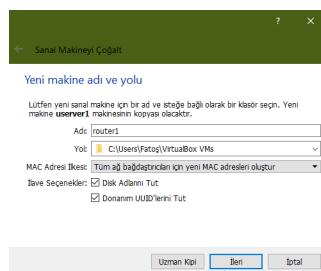
```
root@userver1:/home/gorur# cat >> /etc/quagga/ospfd.conf << EOF
< interface enp0s8
> interface enp0s9
> interface lo
> router ospf
> passive-interface enp0s8
> network 192.168.1.0/24 area 0.0.0.0
> network 192.168.100.0/24 area 0.0.0.0
> line vty
> EOF
root@userver1:/home/gorur# cat >> /etc/quagga/zebra.conf << EOF
> interface enp0s9
> ip address 192.168.1.254/24
> ipv6 nd suppress-ra
> interface enp0s8
> ip address 192.168.100.1/24
> ipv6 nd suppress-ra
> interface lo
> ip forwarding
> line vty
> EOF
root@userver1:/home/gorur#
```

The screenshot shows a terminal window titled "gorur" running as root on a server. The terminal displays the execution of service restart commands. The user has run "service zebra restart" and "service bgpd restart" to apply the changes made in the previous terminal session.

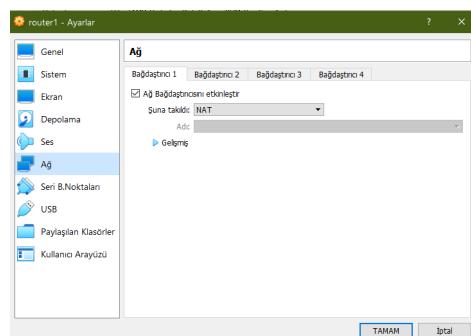
```
> interface enp0s8
> interface enp0s9
> interface lo
> router ospf
> passive-interface enp0s8
> network 192.168.1.0/24 area 0.0.0.0
> network 192.168.100.0/24 area 0.0.0.0
> line vty
> EOF
root@userver1:/home/gorur# cat >> /etc/quagga/zebra.conf << EOF
> interface enp0s9
> ip address 192.168.1.254/24
> ipv6 nd suppress-ra
> interface enp0s8
> ip address 192.168.100.1/24
> ipv6 nd suppress-ra
> interface lo
> ip forwarding
> line vty
> EOF
root@userver1:/home/gorur# service zebra restart
root@userver1:/home/gorur# service bgpd restart
root@userver1:/home/gorur#
```

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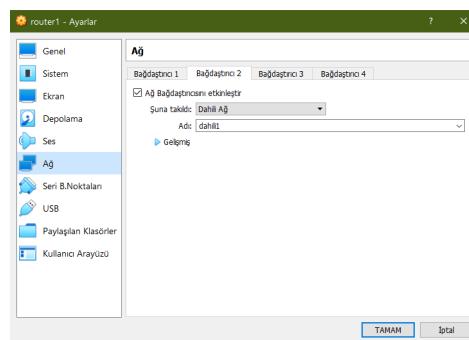
Klonlanacak routerlar için gerekli config ayarlamalarını yapmış oldum.



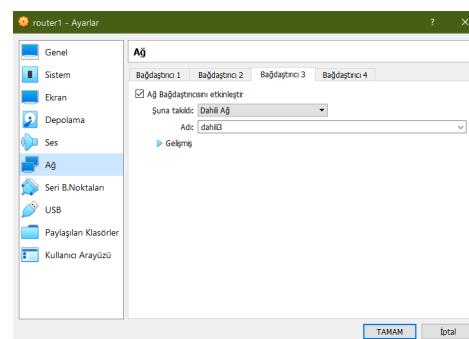
Ubuntu Serverdan birbirine bağlıintlî çoğaltma ile router1 ve router2 adında iki yönlendirici klonladım.



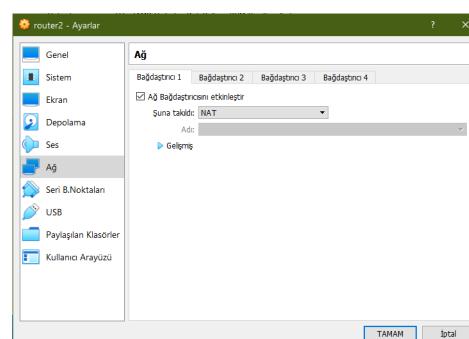
Senaryo gereği bağıdaştırıcı 1'i NAT olarak ayarladım.



Senaryo gereği bağıdaştırıcı 2'yi Dahili Ağ yapıp dahili1 olarak isimlendirdim.

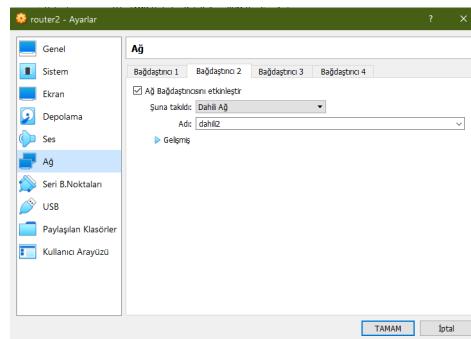


Senaryo gereği bağıdaştırıcı 3'ü Dahili Ağ yapıp dahili3 olarak isimlendirdim.

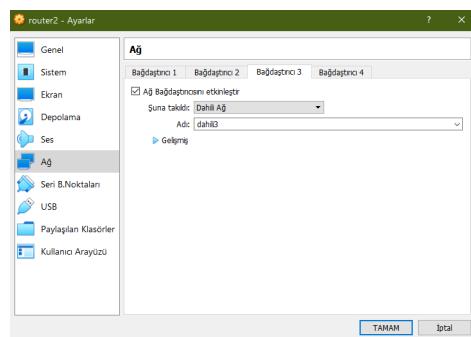


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Senaryo gereği bağıdaştırıcı 1'i NAT olarak ayarladım.



Senaryo gereği bağıdaştırıcı 2'yi Dahili Ağ yapıp dahili2 olarak isimlendirdim.



Senaryo gereği bağıdaştırıcı 3'ü Dahili Ağ yapıp dahili3 olarak isimlendirdim.

router2 için yapılandırma ayarları:

```
#!/bin/bash

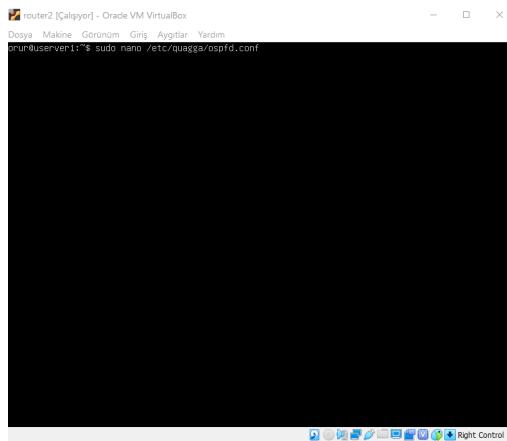
if [ "$EUID" -ne 0 ]
then echo "Please run as root"
exit
```

```
fi

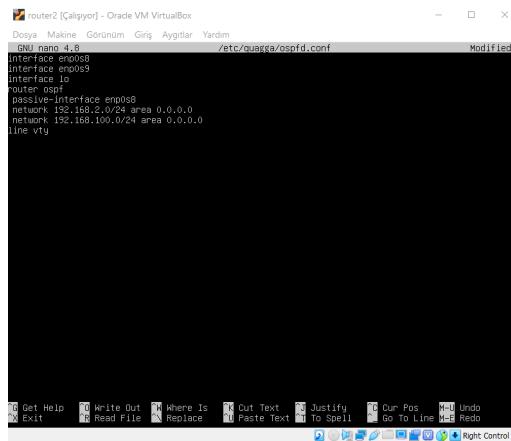
cat >> /etc/quagga/ospfd.conf << EOF
interface enp0s8
interface enp0s9
interface lo
router ospf
passive-interface enp0s8
network 192.168.2.0/24 area 0.0.0.0
network 192.168.100.0/24 area 0.0.0.0
line vty
EOF

cat >> /etc/quagga/zebra.conf << EOF
interface enp0s8
ip address 192.168.2.254/24
ipv6 nd suppress-ra
interface enp0s9
ip address 192.168.100.2/24
ipv6 nd suppress-ra
interface lo
ip forwarding
line vty
EOF

sudo service zebra restart
sudo service bgpd restart
```



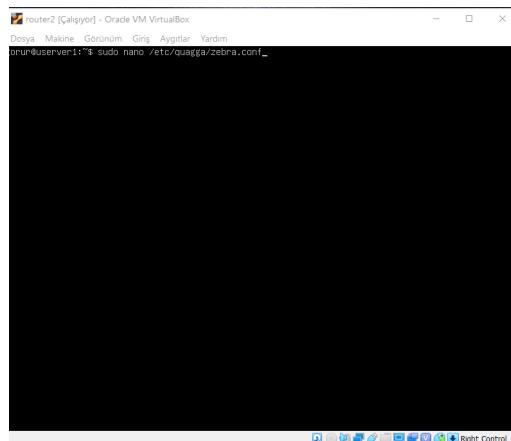
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```
router2 [Çalışıyor] - Oracle VM VirtualBox
Dosya Makine Görünüm Giriş Aygıtlar Yardım
GNU nano 4.8                               /etc/quagga/ospfd.conf
Modified
Interface eng0s8
Interface eng0s9
Interface vty0
Router ospf
Passive-Interface eng0s8
Network 192.168.2.0/24 area 0.0.0.0
Network 192.168.100.0/24 area 0.0.0.0
Line vty
```

The screenshot shows a terminal window titled "router2 [Çalışıyor] - Oracle VM VirtualBox". The window title bar includes menu options: Dosya, Makine, Görünüm, Giriş, Aygıtlar, Yardım. The main area displays the contents of the file "/etc/quagga/ospfd.conf" using the GNU nano 4.8 editor. The configuration includes interfaces eng0s8 and eng0s9, a Router ospf section, and two Network statements for areas 0.0.0.0. At the bottom, there is a toolbar with various icons for file operations like Get Help, Write Out, Read File, Replace, Cut Text, Paste Text, Justify, To Spell, Cur Pos, Go To Line, Undo, Redo, Exit, and Right Control.

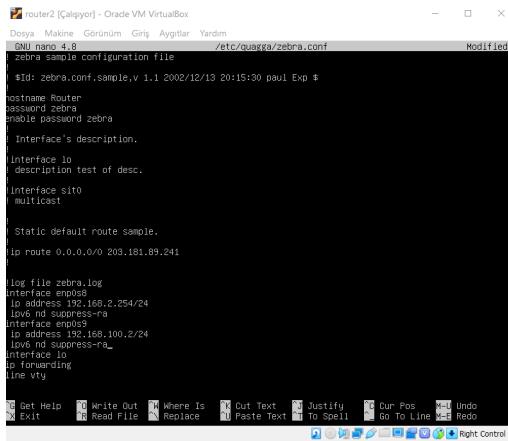
/etc/quagga/ospfd.conf dosyasının içini router2'ye göre düzenleyip kaydettim.



```
router2 [Çalışıyor] - Oracle VM VirtualBox
Dosya Makine Görünüm Giriş Aygıtlar Yardım
prur@userver17:~$ sudo nano /etc/quagga/zebra.conf
```

The screenshot shows a terminal window titled "router2 [Çalışıyor] - Oracle VM VirtualBox". The window title bar includes menu options: Dosya, Makine, Görünüm, Giriş, Aygıtlar, Yardım. The main area displays the command "prur@userver17:~\$ sudo nano /etc/quagga/zebra.conf" in the terminal. At the bottom, there is a toolbar with various icons for file operations like Get Help, Write Out, Read File, Replace, Cut Text, Paste Text, Justify, To Spell, Cur Pos, Go To Line, Undo, Redo, Exit, and Right Control.

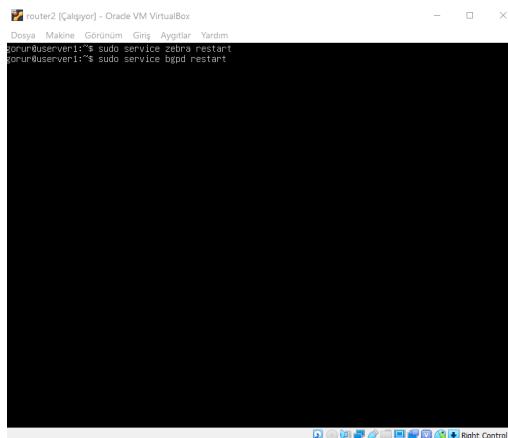
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```
router2 [Çalışıyor] - Oracle VM VirtualBox
Dünya Makine Görünüm Giriş Aygıtlar Yardım
GNU nano 4.8                               /etc/quagga/zebra.conf                         Modified
: zebra sample configuration file
: $Id: zebra.conf.sample,v 1.1 2002/12/13 20:15:30 paul Exp $
: hostname Router
: password zebra
: enable password zebra
: Interface's description.
: Interface lo
:   description test of desc.
: interface_s1t0
:   broadcast
:   multicast
:   Static default route sample.
:   ip route 0.0.0.0/0 203.181.89.241
:
: log file zebra.log
Interface enp0s8
ip address 192.168.2.254/24
log nd suppress-rd
Interface enp0s9
ip address 192.168.100.2/24
log nd suppress-rd
Interface enp0s10
ip forwarding
line vtu

Get Help  Write Out  Where Is  Cut Text  Justify  Cur Pos  Undo
Exit  Read File  Replace  Paste Text  To Spell  Go To Line  Redo
Right Control
```

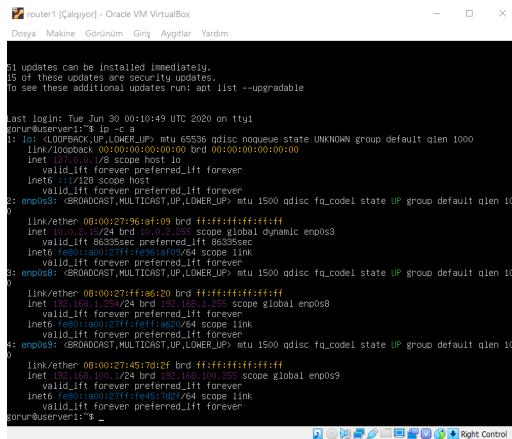
/etc/quagga/zebra.conf dosyasının içini router2'ye göre düzenleyip kaydettim.



```
router2 [Çalışıyor] - Oracle VM VirtualBox
Dünya Makine Görünüm Giriş Aygıtlar Yardım
ben@benuservm1:~$ sudo service zebra restart
ben@benuservm1:~$ sudo service zmed restart
```

Yapılan ayarlamaları yeniden başlattım.

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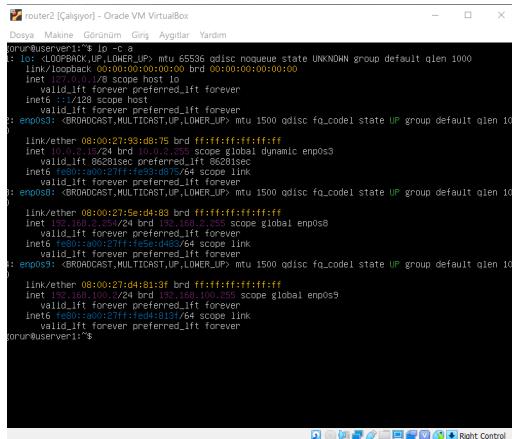


```
router1 [Çalşıyor] - Oracle VM VirtualBox
Dosya Makine Görüntüm Giriş Aygıtlar Yardım

51 updates can be installed immediately.
15 of these updates are security updates.
To see these additional updates run: apt list --upgradable

Last login: Tue Jun 30 00:10:49 UTC 2020 on ttys1
root@userver1:~$ ifconfig
lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 127.255.255.255 scope host lo
        valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
            inet6 fe80::1%lo0/64 scope link
                valid_lft forever preferred_lft forever
eno0: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:96:a0:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.100/24 brd 192.168.1.255 scope global eno0
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fea0:0/64 scope link
            valid_lft forever preferred_lft forever
eno0s3: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:ff:a0:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.101/24 brd 192.168.1.255 scope global eno0s3
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:feff:a00/64 scope link
            valid_lft forever preferred_lft forever
eno0s5: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:45:7d:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.102/24 brd 192.168.1.255 scope global eno0s5
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fe45:7d00/64 scope link
            valid_lft forever preferred_lft forever
root@userver1:~$ _
```

Yaptığım düzenlemeler sonrası router1 ip'sini kontrol ettim.



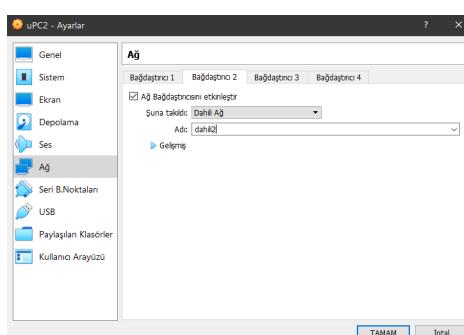
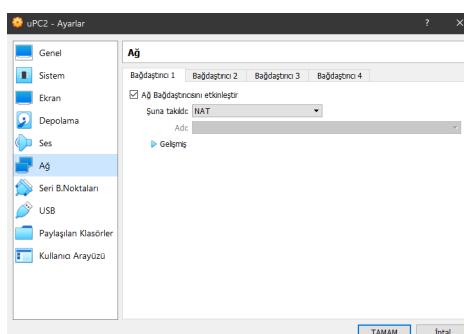
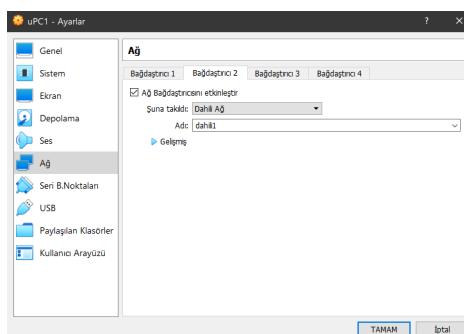
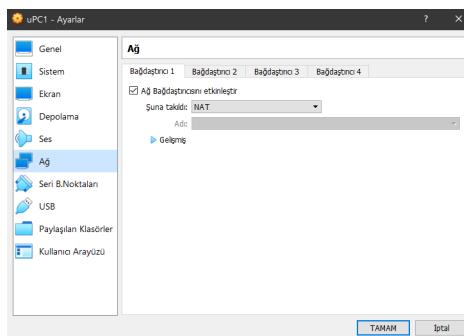
```
router2 [Çalşıyor] - Oracle VM VirtualBox
Dosya Makine Görüntüm Giriş Aygıtlar Yardım

root@userver1:~$ ifconfig
lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 127.255.255.255 scope host lo
        valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
            inet6 fe80::1%lo0/64 scope link
                valid_lft forever preferred_lft forever
eno0: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:93:d4:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.100/24 brd 192.168.1.255 scope global eno0
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fe93:d400/64 scope link
            valid_lft forever preferred_lft forever
eno0s3: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:5e:d6:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.101/24 brd 192.168.1.255 scope global eno0s3
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fe5e:d600/64 scope link
            valid_lft forever preferred_lft forever
eno0s5: <NOQUEUE,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:d4:18:00 brd ffffff:ffff:ffff:ffff
    inet 192.168.1.102/24 brd 192.168.1.255 scope global eno0s5
        valid_lft forever preferred_lft forever
        inet6 fe80::a00:27ff:fed4:1800/64 scope link
            valid_lft forever preferred_lft forever
root@userver1:~$ _
```

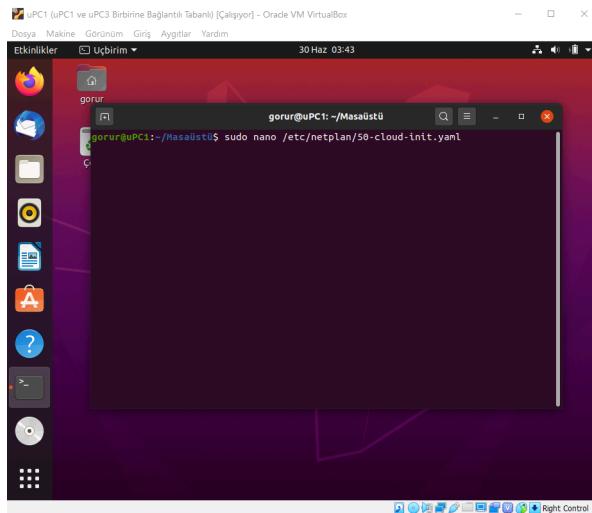
Yaptığım düzenlemeler sonrası router2 ip'sini kontrol ettim.

Netplan Ayarları

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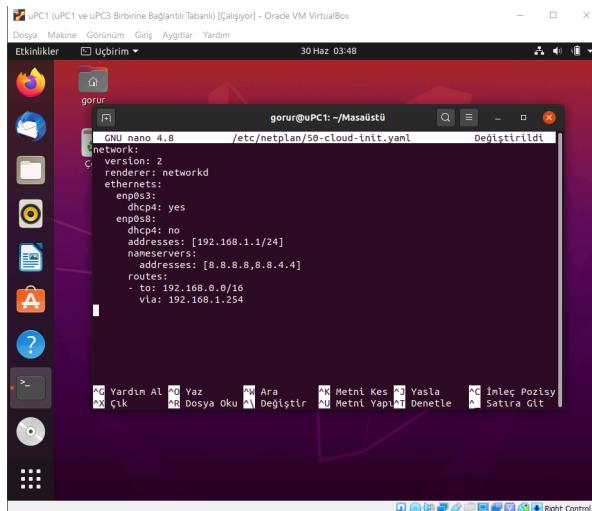


yaml formatındaki /etc/netplan/50-cloud-init.yaml dosyasını dhcp olmadan statik bir IP alıyoruz.

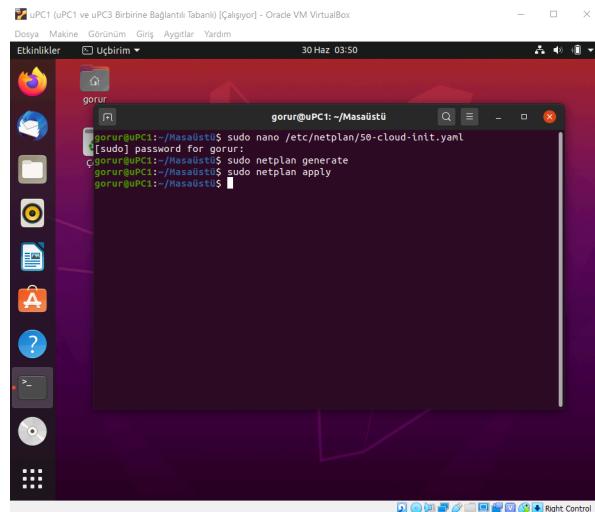


uPC1 sanal makinesinde:

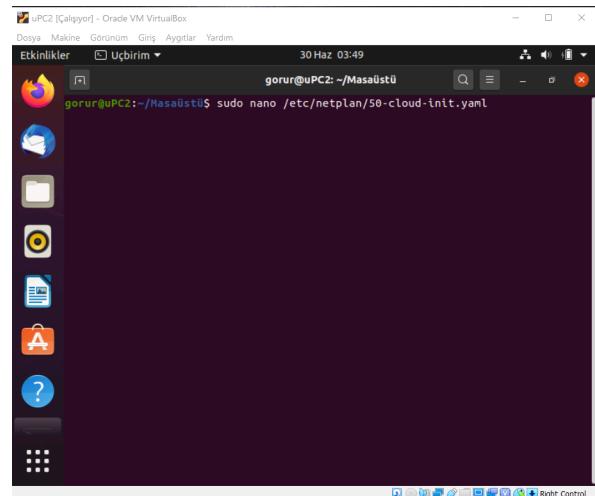
```
$ sudo nano /etc/netplan/50-cloud-init.yaml komutu ile dosyayı açtım.
```



uPC1 IP adresini statik olarak belirlediğim koşula göre ayarladım.



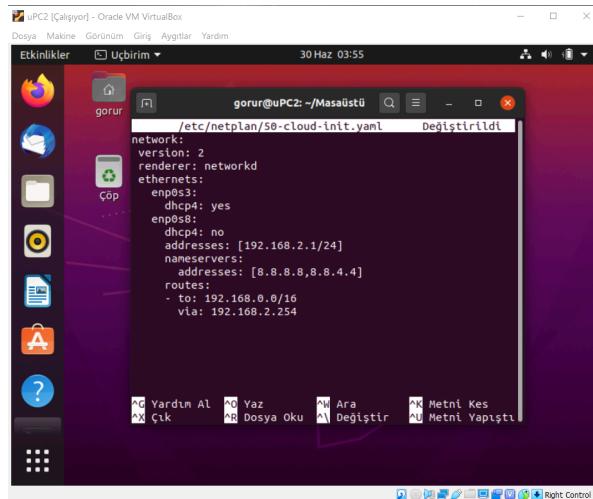
\$ sudo netplan generate komutundan sonra \$ sudo netplan apply ile statik IP atamamı uyguladım.



uPC2 sanal makinesinde:

\$ sudo nano /etc/netplan/50-cloud-init.yaml komutu ile dosyayı açtım.

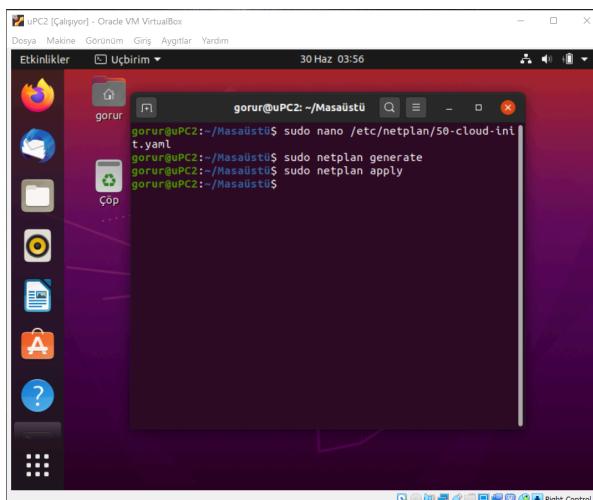
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A screenshot of a Linux desktop environment (Ubuntu) running in Oracle VM VirtualBox. The desktop has a purple theme. On the left is a dock with icons for Dash, Home, Applications, and others. A terminal window titled 'gorur@uPC2: ~/Masaüstü' is open, displaying the contents of the file '/etc/netplan/50-cloud-init.yaml'. The configuration shows a static IP assignment for the 'eth0' interface:

```
network:
  version: 2
  renderer: networkd
  ethernets:
    eth0:
      dhcp4: yes
      enp8S8:
        dhcp4: no
        addresses: [192.168.2.1/24]
        nameservers:
          addresses: [8.8.8.8,8.8.4.4]
        routes:
          - to: 192.168.0.0/16
            via: 192.168.0.254
```

uPC2 IP adresini statik olarak belirlediğim koşula göre ayarladım.



A screenshot of a Linux desktop environment (Ubuntu) running in Oracle VM VirtualBox. The desktop has a purple theme. On the left is a dock with icons for Dash, Home, Applications, and others. A terminal window titled 'gorur@uPC2: ~/Masaüstü' is open, showing the user executing the following commands:

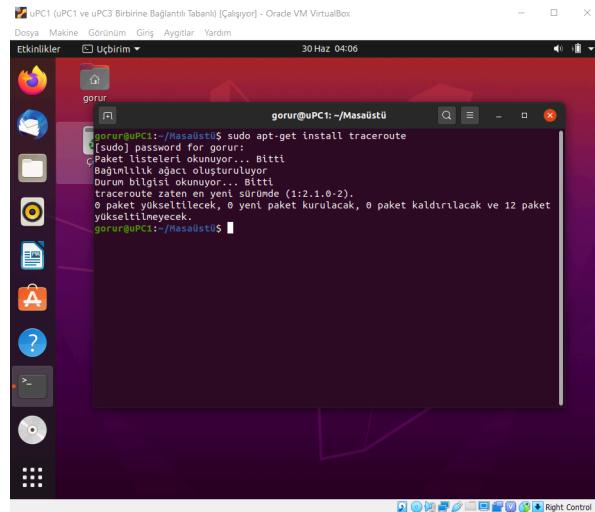
```
gorur@uPC2:~/Masaüstü$ sudo nano /etc/netplan/50-cloud-init.yaml
gorur@uPC2:~/Masaüstü$ sudo netplan generate
gorur@uPC2:~/Masaüstü$ sudo netplan apply
gorur@uPC2:~/Masaüstü$
```

\$ sudo netplan generate komutundan sonra \$ sudo netplan apply ile statik IP atamamı uyguladım.

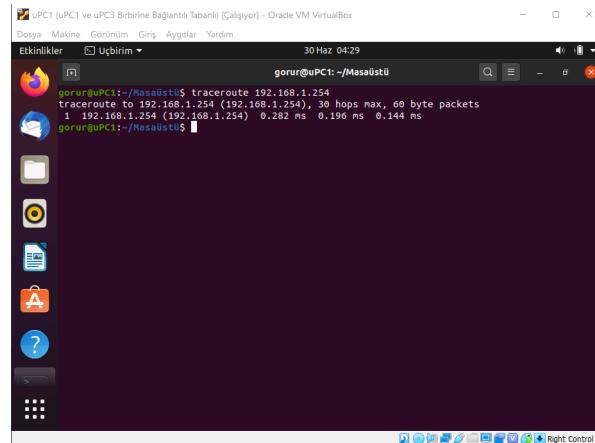
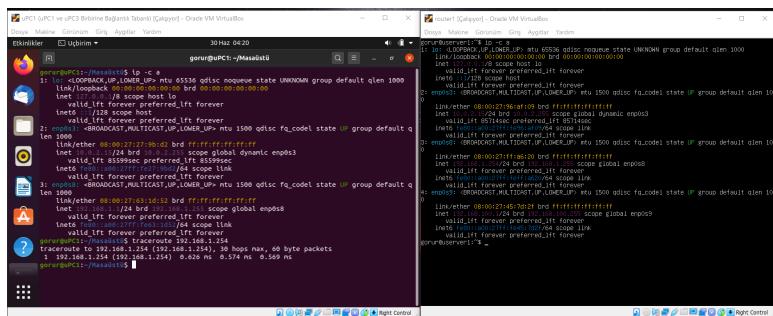
TRACEROUTE

Traceroute komutu ile paketlerin izlediği yolun takibini yapabiliriz.

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```
$ sudo apt-get install traceroute ile traceroute yükledim.
```



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uPC1 -----> router1

uPC1 (uPC1 ve uPC3 Birbirine Bağlıaltı Tabanlı) [Çalışıyor] - Oracle VM VirtualBox

Dosya Makine Görüntüm Giriş Aygıtlar Yardım

Etkinlikler Uçburum 30 Haz 04:30

gorur@uPC1: ~/Masası Ü

```
gorur@uPC1: ~$ traceroute 192.168.2.254
traceroute to 192.168.2.254 (192.168.2.254), 30 hops max, 60 byte packets
 1  192.168.1.254 (192.168.1.254)  0.339 ms  0.254 ms  0.282 ms
 2  192.168.2.254 (192.168.2.254)  0.487 ms  0.438 ms  0.389 ms
gorur@uPC1: ~$
```

uPC1 -----> router2

The screenshot shows a terminal window titled "gorur@uPC1: ~/Masaüstü". The command "traceroute 192.168.2.1" was run, displaying the following output:

```
traceroute to 192.168.2.1 (192.168.2.1), 30 hops max, 60 byte packets
 1  192.168.1.254 (192.168.1.254)  0.311 ms  0.199 ms  0.143 ms
 2  192.168.100.2 (192.168.100.2)  0.490 ms  0.444 ms  0.505 ms
 3  192.168.2.1 (192.168.2.1)  1.021 ms  0.974 ms  0.924 ms
```

uPC1 ----> uPC2

NETWORK AĞ GRAFİĞİ

