

PRÁCTICA DHCP MÁQUINA VIRTUAL

```
    <--> ing service present
h: "/pci@0d/pci-ata@1/ata-400/00:10,\mach_kernel", Waiting on (IO
> IOPathMatch</key><string ID="1">IODeviceTree:/pci@0/pci-ata@1/ata-
tring></dict>
ireWire GUID = 0x50e4ff:0
sent :0
t device = IOService:/GossamerPE/pci@00000000/AppleGracklePCI/p
2PCIBridge/pci-ata@1/CMD646Root/ata-400/CHD646ATA/ATADeviceTree
geDriver/IOATABlockStorageDevice/IOBlockStorageDriver/ST340014P
titions
  - HES Untitled_3@10
  2014-09-14, minor 9
  mounted with uid=0 audit-uid=1
```

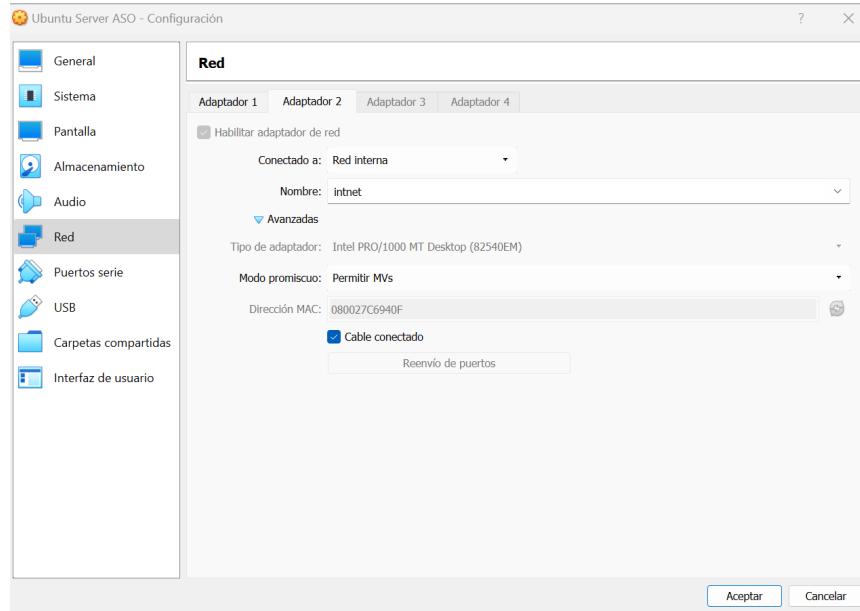
Autor: Fabián Taboada Pérez

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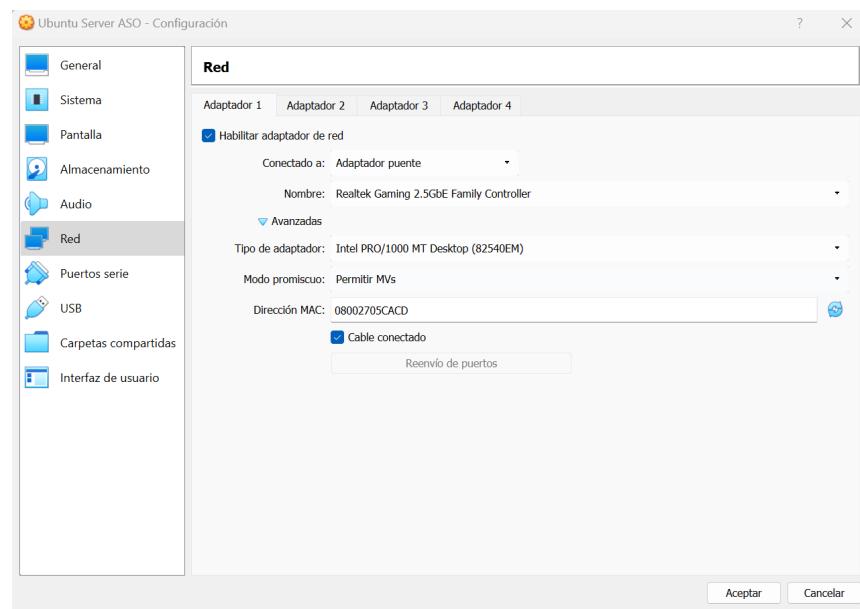
- 1. CONFIGURACIÓN MV**
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- 1. Configuración MV**

Tenemos que configurar una máquina virtual con Ubuntu Server y habilitar 2 adaptadores de red. El primero como adaptador puente y el segundo conectado a Red Interna. Tenemos que permitir la conexión de máquinas virtuales.



Adaptador 1: Adaptador puente



Adaptador 2: Red interna

2. Configuración Ubuntu Server

Una vez instalado Ubuntu Server, nos logueamos con nuestro usuario y contraseña que previamente hemos configurado durante la instalación de nuestro servidor.

Primero hacemos un sudo apt update.

```
[ OK ] Reached target Cloud-init target.  
fabiserveraso login: prueba123  
Password:  
Login incorrect  
fabiserveraso login: fabitaboada  
Password:  
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-88-generic x86_64)  
 * Documentation: https://help.ubuntu.com  
 * Management: https://landscape.canonical.com  
 * Support: https://ubuntu.com/advantage  
 System information as of mié 15 nov 2023 17:52:10 UTC  
 System load: 0.19482421875 Processes: 103  
 Usage of /: 35.9% of 18.97GB Users logged in: 0  
 Memory usage: 2% IPv4 address for enp0s3: 10.0.2.15  
 Swap usage: 0%  
 95 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
fabitaboada@fabiserveraso:~$ sudo apt update
```

sudo apt update

Después vamos a instalar el dhcp. Para ello utilizamos el siguiente comando:

```
Usage of /: 35.9% of 18.97GB Users logged in: 0  
Memory usage: 2% IPv4 address for enp0s3: 10.0.2.15  
Swap usage: 0%  
 95 updates can be applied immediately.  
To see these additional updates run: apt list --upgradable  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
fabitaboada@fabiserveraso:~$ sudo apt update  
[sudo] password for fabitaboada:  
Obj:1 http://es.archive.ubuntu.com/ubuntu Jammy InRelease  
Obj:2 http://es.archive.ubuntu.com/ubuntu jammy-updates InRelease  
Obj:3 http://es.archive.ubuntu.com/ubuntu jammy-backports InRelease  
Obj:4 http://es.archive.ubuntu.com/ubuntu jammy-security InRelease  
Des:5 http://es.archive.ubuntu.com/ubuntu Jammy/main Translation-es [332 kB]  
Des:6 http://es.archive.ubuntu.com/ubuntu Jammy/restricted Translation-es [964 B]  
Des:7 http://es.archive.ubuntu.com/ubuntu Jammy/universe Translation-es [1.356 kB]  
Ign:7 http://es.archive.ubuntu.com/ubuntu Jammy/universe Translation-es  
Des:8 http://es.archive.ubuntu.com/ubuntu Jammy/multiverse Translation-es [68.2 kB]  
Des:7 http://es.archive.ubuntu.com/ubuntu Jammy/universe Translation-es [1.356 kB]  
Descargados 407 kB en 40s (10.2 kB/s)  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
Se pueden actualizar 98 paquetes. Ejecute «apt list --upgradable» para verlos.  
fabitaboada@fabiserveraso:~$ sudo apt install isc-dhcp-server
```

sudo apt install isc-dhcp-server

Deshabilitamos el dispositivo de red enp0s3 para no tener problemas después.

```
fabitaboada@fabiserveraso:~$ sudo ip link set enp0s3 down
```

sudo ip link set enp0s3 down

Vamos a modificar ahora la configuración del archivo 00-installer-config.yaml

```
fabitaboada@fabiserveraso:~$ sudo nano /etc/netplan/00-installer-config.yaml
```

sudo nano/etc/netplan/00-installer.config.yaml

Añadimos en enp0s8 las líneas de código:

addresses: [192.168.0.1/24]

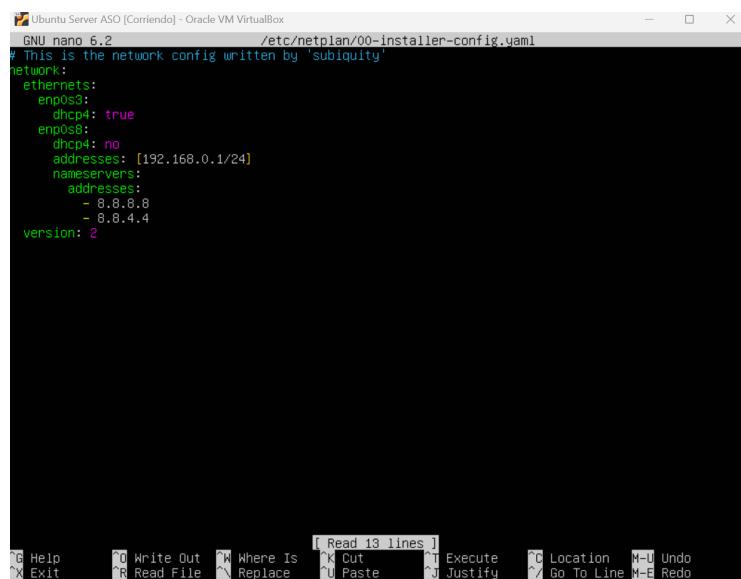
nameservers:

addresses:

-8.8.8.8

-8.8.4.4

Cambiamos también la opción de dhcp del adaptador a no.



```
GNU nano 6.2          /etc/netplan/00-installer-config.yaml
# This is the network config written by 'subiquity'
network:
  ethernets:
    enp0s3:
      dhcp4: true
    enp0s8:
      dhcp4: no
      addresses: [192.168.0.1/24]
      nameservers:
        addresses:
          - 8.8.8.8
          - 8.8.4.4
  version: 2
```

Archivo configuración 00-installer.config.yaml

Aplicamos la configuración con el siguiente comando:

```
fabitaboada@fabiserveraso:~$ sudo netplan apply
```

sudo netplan apply

Ahora vamos a proceder a modificar el archivo de configuración del dhcp.

Para ello usamos el comando:

```
fabitaboada@fabiserveraso:~$ sudo netplan apply
fabitaboada@fabiserveraso:~$ sudo nano /etc/dhcp/dhcpd.conf
```

sudo nano /etc/dhcp/dhcpd.conf

En este archivo, tenemos que descomentar la linea que pone `#authoritative` .

```
GNU nano 6.2                               /etc/dhcp/dhcpd.conf
# dhcpd.conf
#
# Sample configuration file for ISC dhcpcd
#
# Attention: If /etc/ltsp/dhcpd.conf exists, that will be used as
# configuration file instead of this file.
#
# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 7200;

# The ddns-updates-style parameter controls whether or not the server will
# attempt to do a DNS update when a lease is confirmed. We default to the
# behavior of the version 2 packages ('none', since DHCP v2 didn't
# have support for DDNS.)
ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;

# Use this to send dhcp log messages to a different log file (you also
# have to hack syslog.conf to complete the redirection).
#log-facility local7;

# No service will be given on this subnet, but declaring it helps the
# DHCP server to understand the network topology.

#subnet 10.152.187.0 netmask 255.255.255.0 {
[ Read 111 lines ]
^G Help      ^O Write Out  ^W Where Is  ^K Cut        ^T Execute   ^C Location  M-U Undo
^X Exit      ^R Read File  ^V Replace   ^U Paste     ^J Justify   ^Z Go To Line M-E Redo
```

Archivo dhcp.conf

```
# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
authoritative;
```

Descomentar línea código authoritative

También tenemos que configurar nuestra subred, para ello añadimos las siguientes líneas de código al archivo de configuración, para poder después usar nuestro cliente. Aquí tenemos la ip de nuestra red: 192.168.0.1 .

```
subnet 192.168.0.0 netmask 255.255.255.0 {
    range 192.168.0.2 192.168.0.200;
    option subnet-mask 255.255.255.0;
    option broadcast-address 192.168.0.255;
    option routers 192.168.0.1;
    option domain-name-servers 8.8.8.8, 8.8.4.4;
    option domain-name "FabiServer";
}
```

Creación subred

Una vez terminado, guardamos el archivo y cerramos el editor de texto.

Vamos a configurar otro archivo de configuración de dhcp. Para acceder a él utilizamos el siguiente comando:

```
fabitaboada@fabiserveraso:~$ sudo nano /etc/default/isc-dhcp-server
```

sudo nano /etc/default/isc-dhcp-server

Tenemos que modificar las dos últimas líneas de código.

```
GNU nano 6.2                               /etc/default/isc-dhcp-server
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpcd's config file (default: /etc/dhcp/dhcpcd.conf).
#DHCPDV4_CONF=/etc/dhcp/dhcpcd.conf
#DHCPDV6_CONF=/etc/dhcp/dhcpcd6.conf

# Path to dhcpcd's PID file (default: /var/run/dhcpcd.pid).
#DHCPDV4_PID=/var/run/dhcpcd.pid
#DHCPDV6_PID=/var/run/dhcpcd6.pid

# Additional options to start dhcpcd with.
#       Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpcd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4=""
INTERFACESv6=""
```

```
^G Help   ^O Write Out  ^W Where Is  [ Read 18 lines ]
^X Exit   ^R Read File  ^E Replace  ^K Cut
          ^U Paste   ^T Execute  ^C Location M-U Undo
          ^V Go To Line M-E Redo
```

Archivo isc-dhcp-server

Añadimos enp0s8 en la primera interfaz.

```
INTERFACESv4="enp0s8"
INTERFACESv6=""
```

Configuración isc-dhcp-server

Reiniciamos el servicio dhcp.

```
Last login: Wed Nov 29 17:39:45 UTC 2023 on ttys1
fabitaboada@fabiserveraso:~$ sudo service isc-dhcp-server restart
```

sudo service isc-dhcp-server restart

Comprobamos que su estado está activo con el siguiente comando:

```

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
  just raised the bar for easy, resilient and secure K8s cluster deployment.
  https://ubuntu.com/engage/secure-kubernetes-at-the-edge

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

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Wed Nov 29 17:44:17 UTC 2023 on ttys000
fabitaboad@fabitaboad:~$ sudo service isc-dhcp-server status
[sudo] password for fabitaboad:
● isc-dhcp-server.service - ISC DHCP IPv4 server
  Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
    Active: active (running) since Wed 2023-11-29 17:49:23 UTC; 17s ago
      Docs: man:dhcpcd(8)
     Main PID: 628 (dhcpcd)
        Tasks: 4 (limit: 14128)
       Memory: 6.0M
          CPU: 22ms
         CGroup: /system.slice/isc-dhcp-server.service
                 └─628 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/dhcpcd.pid -cf /etc/dhc

nov 29 17:49:23 fabitaboad@fabitaboad:~$ Wrote 1 leases to leases file.
nov 29 17:49:23 fabitaboad@fabitaboad:~$ Listening on LPF/epn0s0/08:00:27:c6:94:0f/192.168.0.0/24
nov 29 17:49:23 fabitaboad@fabitaboad:~$ Listening on LPF/epn0s8/08:00:27:c6:94:0f/192.168.0.0/24
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Sending on   LPF/epn0s8/08:00:27:c6:94:0f/192.168.0.0/24
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Sending on   LPF/epn0s8/08:00:27:c6:94:0f/192.168.0.0/24
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Sending on   Socket/fallback/fallback-net
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Sending on   Socket/fallback/fallback-net
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Can't create PID file /run/dhcp-server/dhcpcd.pid: No such file or directory
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Can't create PID file /run/dhcp-server/dhcpcd.pid: No such file or directory
nov 29 17:49:23 fabitaboad@fabitaboad:~$ dhcpcd[628]: Server starting service.
lines 1-21/21 (END)

```

sudo service isc-dhcp-server status

Nos queda modificar el archivo de configuración sysctl.conf. Tenemos que acceder a él y descomentar la linea: net.ipv4.ip_forward=1.

```

GNU nano 6.2                               /etc/sysctl.conf
#
# /etc/sysctl.conf - Configuration file for setting system variables
# See /etc/sysctl.d/ for additional system variables.
# See sysctl.conf (5) for information.
#
#kernel.domainname = example.com
#
# Uncomment the following to stop low-level messages on console
#kernel.printk = 3 4 1 3
#####
# Functions previously found in netbase
#
#
# Uncomment the next two lines to enable Spoof protection (reverse-path filter)
# Turn on Source Address Verification in all interfaces to
# prevent some spoofing attacks
#net.ipv4.conf.default.rp_filter=1
#net.ipv4.conf.all.rp_filter=1
#
# Uncomment the next line to enable TCP/IP SYN cookies
# See http://lwn.net/Articles/277146/
# Note: This may impact IPv6 TCP sessions too
#net.ipv4.tcp_syncookies=1
#
# Uncomment the next line to enable packet forwarding for IPv4
net.ipv4.ip_forward=1
#
# Uncomment the next line to enable packet forwarding for IPv6
# Enabling this option disables Stateless Address Autoconfiguration
# based on Router Advertisements for this host
#net.ipv6.conf.all.forwarding=1

```

Archivo de configuración sysctl.conf

3. Creación Script

Pasamos a la creación del script enrutado.sh. Este archivo no existe, por lo que primero tenemos que crearlo. Lo vamos a mantener oculto, así que para ello usamos:

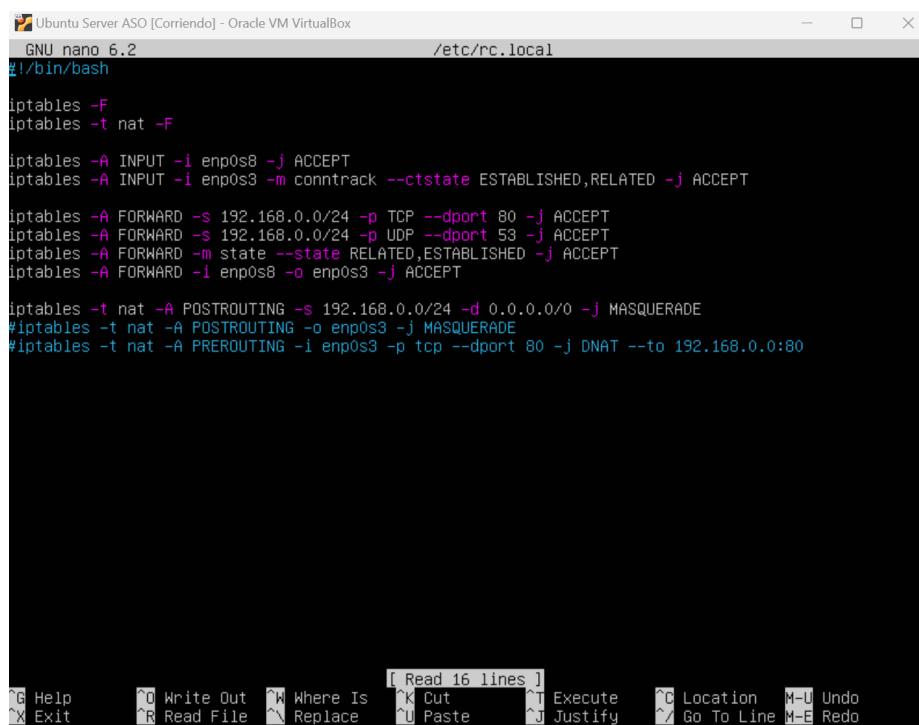
```
fabitaboada@fabiserveraso:/etc$ cd /etc  
fabitaboada@fabiserveraso:/etc$ sudo touch .enrutado.sh
```

sudo touch .enrutado.sh

```
fabitaboada@fabiserveraso:/etc$ sudo nano .enrutado.sh
```

sudo nano .enrutado.sh

Tenemos que añadir el siguiente código a nuestro archivo vacío.



```
Ubuntu Server ASO [Corriendo] - Oracle VM VirtualBox  
GNU nano 6.2                               /etc/rc.local  
#!/bin/bash  
  
iptables -F  
iptables -t nat -F  
  
iptables -A INPUT -i enp0s8 -j ACCEPT  
iptables -A INPUT -i enp0s3 -m conntrack --ctstate ESTABLISHED,RELATED -j ACCEPT  
  
iptables -A FORWARD -s 192.168.0.0/24 -p TCP --dport 80 -j ACCEPT  
iptables -A FORWARD -s 192.168.0.0/24 -p UDP --dport 53 -j ACCEPT  
iptables -A FORWARD -m state --state RELATED,ESTABLISHED -j ACCEPT  
iptables -A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT  
  
iptables -t nat -A POSTROUTING -s 192.168.0.0/24 -d 0.0.0.0/0 -j MASQUERADE  
#iptables -t nat -A POSTROUTING -o enp0s3 -j MASQUERADE  
#iptables -t nat -A PREROUTING -i enp0s3 -p tcp --dport 80 -j DNAT --to 192.168.0.0:80  
  
[ Read 16 lines ]  
^G Help      ^O Write Out  ^W Where Is  ^K Cut        ^I Execute  ^C Location  M-U Undo  
^X Exit      ^R Read File  ^H Replace   ^U Paste     ^J Justify  ^Y Go To Line M-E Redo
```

Archivo script creado

Una vez lo tenemos creado, procedemos a cambiar su nombre:

```
fabitaboada@fabiserveraso:/etc$ sudo mv .enrutado.sh rc.local
```

Cambio nombre archivo creado

El último paso antes de acceder al cliente sería el siguiente. Tenemos que acceder a la carpet /etc y ejecutar el comando crontab:

```
fabitaboada@fabiserveraso:/etc$ sudo crontab -e
no crontab for root - using an empty one

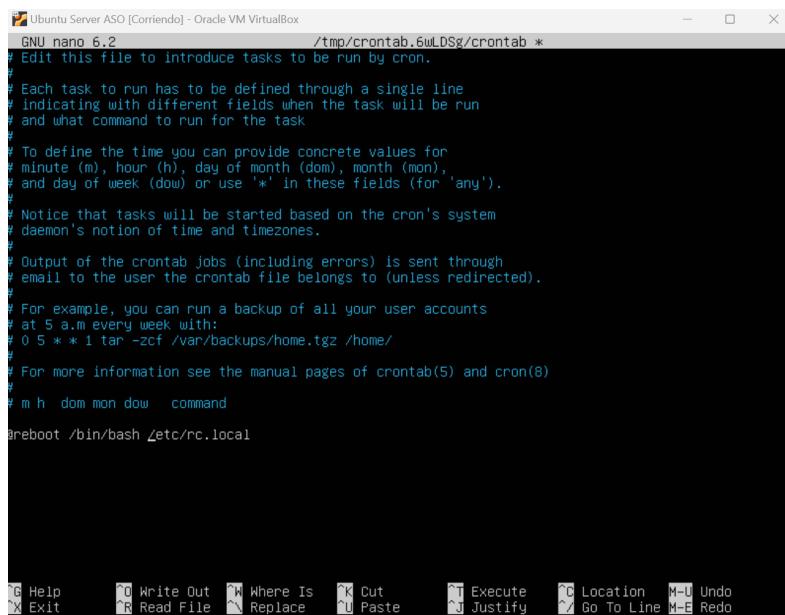
Select an editor. To change later, run 'select-editor'.
 1. /bin/nano      <---- easiest
 2. /usr/bin/vim.basic
 3. /usr/bin/vim.tiny
 4. /bin/ed

Choose 1-4 [1]:
```

sudo crontab -e

Seleccionamos la primera opción.

Una vez en él, añadimos la última línea en la configuración para que el script se ejecute cuando iniciamos nuestro Ubuntu server:

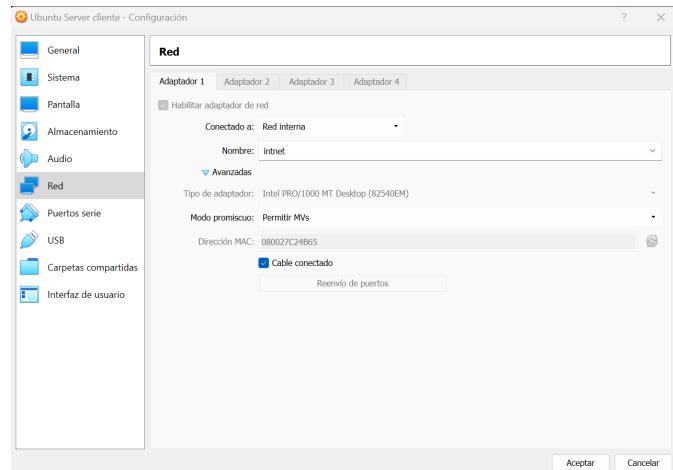


```
Ubuntu Server ASO [Corriendo] - Oracle VM VirtualBox
GNU nano 6.2          /tmp/crontab.6uLDSg/crontab *
# Edit this file to introduce tasks to be run by cron.
#
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').
#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h dom mon dow   command
reboot /bin/bash <etc>/rc.local
```

Crontab

4. Configuración cliente

Configuramos una máquina virtual con Ubuntu y nos aseguramos de que sólo tenemos activado un adaptador de red en modo red interna.



Máquina virtual configurada solo con red interna

5. Pruebas con el cliente

Comprobamos primero que tenemos una ip asignada dentro de la red. Para ello utilizamos el comando: ip a

```
fabi@fabiusbuntu: ~$ ip a
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 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        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:c2:4b:65 brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.2/24 brd 192.168.0.255 scope global dynamic noprefixroute enp0s3
        valid_lft 523sec preferred_lft 523sec
    inet6 fe80::244e:88c6:9195:8e36/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:f5:9e:81:75 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0
        valid_lft forever preferred_lft forever
4: br-8a135ddca052: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:38:31:e6:ed brd ff:ff:ff:ff:ff:ff
    inet 10.1.0.1/16 brd 10.1.255.255 scope global br-8a135ddca052
        valid_lft forever preferred_lft forever
```

Comprobación ip

Ahora probamos a hacer ping a una ip externa:

```
fabi@fabiusbuntu: ~$ ping 142.251.133.78
PING 142.251.133.78 (142.251.133.78) 56(84) bytes of data.
64 bytes from 142.251.133.78: icmp_seq=1 ttl=111 time=235 ms
64 bytes from 142.251.133.78: icmp_seq=2 ttl=111 time=234 ms
64 bytes from 142.251.133.78: icmp_seq=3 ttl=111 time=234 ms
64 bytes from 142.251.133.78: icmp_seq=4 ttl=111 time=235 ms
64 bytes from 142.251.133.78: icmp_seq=5 ttl=111 time=235 ms
```

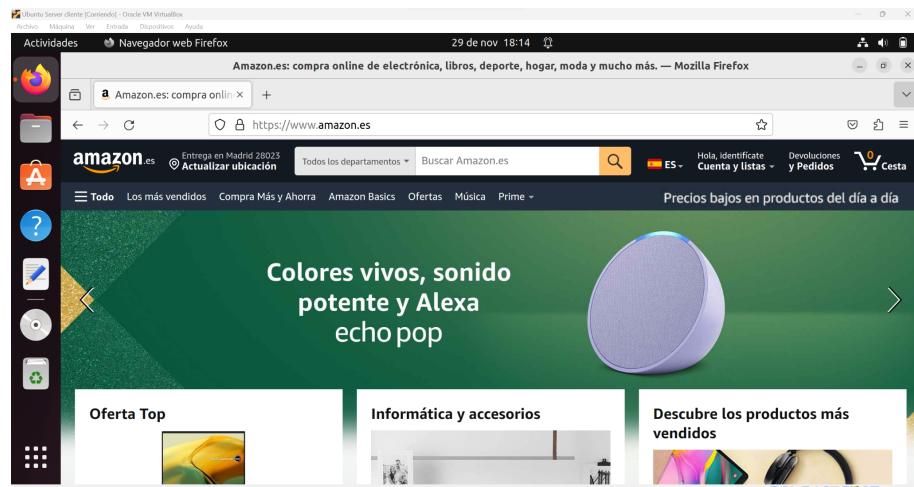
ping 142.251.133.78

Después probamos que podemos hacer ping a una dirección externa:

```
fabi@fabiubuntu:~$ ping www.google.es
PING www.google.es (142.250.200.131) 56(84) bytes of data.
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=1 ttl=118 time=13.3 ms
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=2 ttl=118 time=13.0 ms
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=3 ttl=118 time=12.7 ms
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=4 ttl=118 time=13.3 ms
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=5 ttl=118 time=13.0 ms
64 bytes from mad41s14-in-f3.1e100.net (142.250.200.131): icmp_seq=6 ttl=118 time=13.4 ms
```

ping www.google.es

Probamos a navegar por la red y comprobamos que la red funciona correctamente.



Comprobar navegando