



# **BASTIONADO DE REDES Y SISTEMAS**

## **Tarea 4**

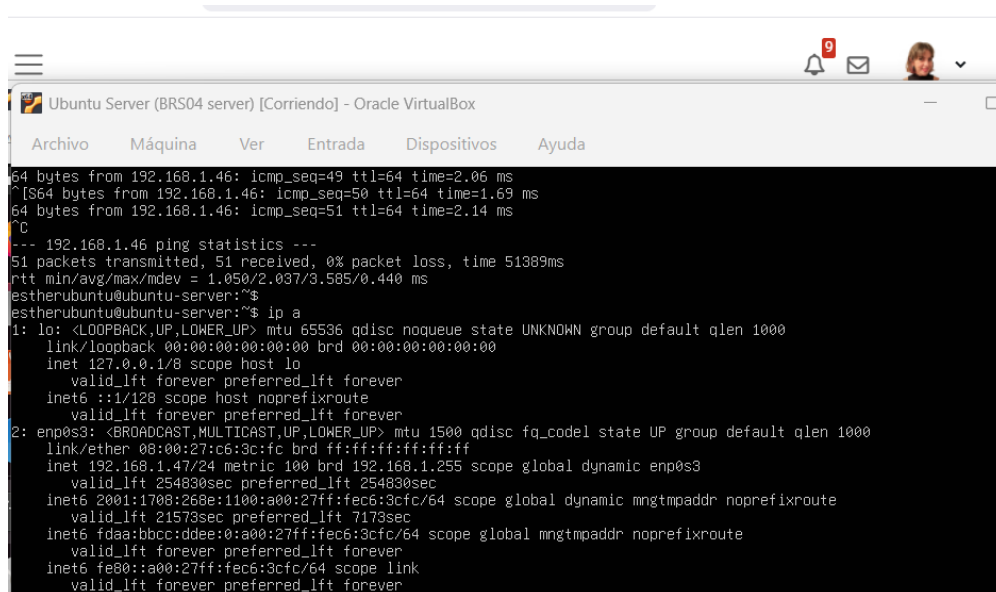
**ESTHER CARRILLO GÁLVEZ**

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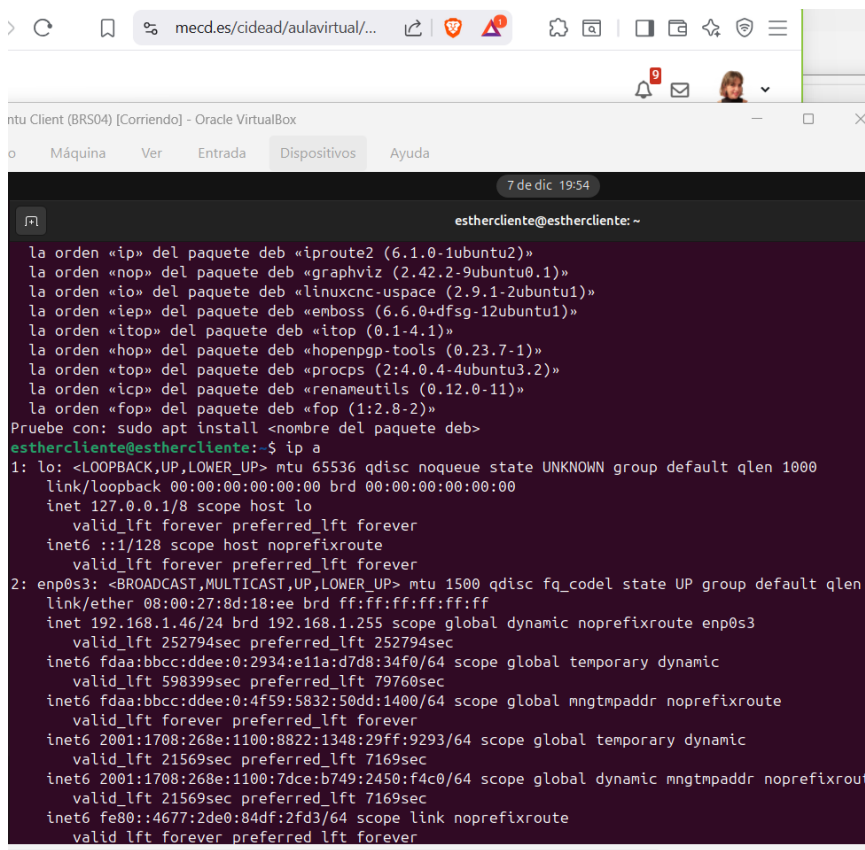
# Comunicación entre máquina servidor y máquina cliente

Antes de comenzar es necesario comprobar las direcciones ip tanto de la máquina servidor como de la máquina cliente. La IP del servidor es 192.168.1.47



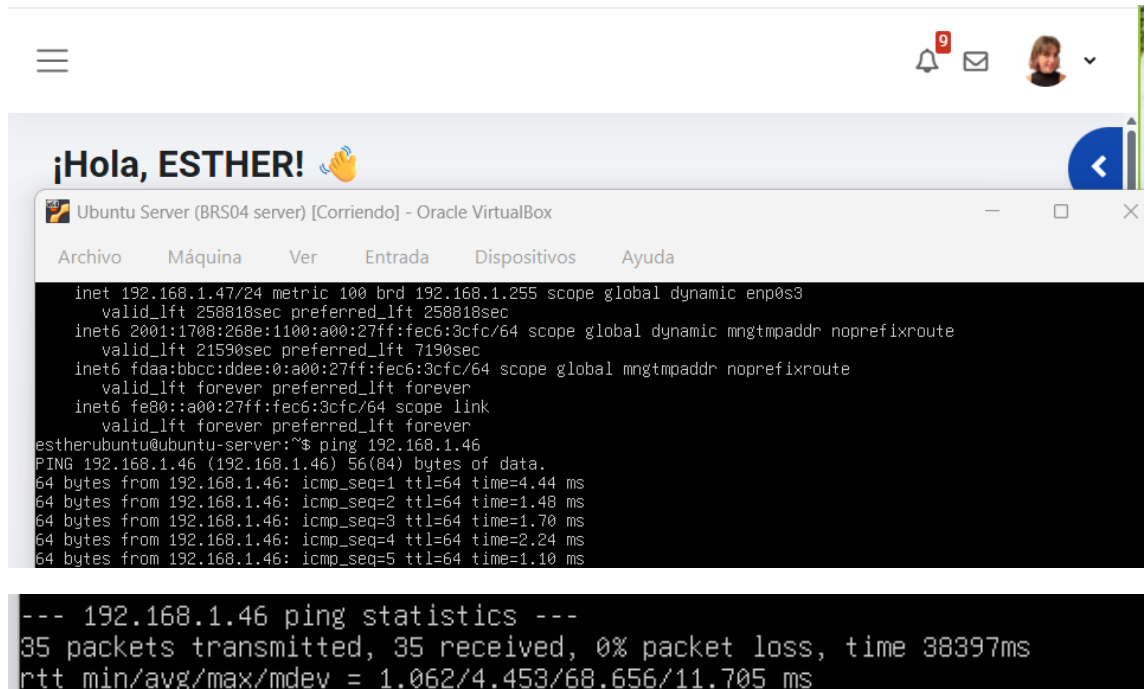
```
64 bytes from 192.168.1.46: icmp_seq=49 ttl=64 time=2.06 ms
^S64 bytes from 192.168.1.46: icmp_seq=50 ttl=64 time=1.69 ms
64 bytes from 192.168.1.46: icmp_seq=51 ttl=64 time=2.14 ms
^C
--- 192.168.1.46 ping statistics ---
51 packets transmitted, 51 received, 0% packet loss, time 51389ms
rtt min/avg/max/mdev = 1.050/2.037/3.585/0.440 ms
estherubuntu@ubuntu-server:~$
estherubuntu@ubuntu-server:~$ 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 noprefixroute
        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:c6:3c:fc brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.47/24 metric 100 brd 192.168.1.255 scope global dynamic enp0s3
        valid_lft 254830sec preferred_lft 254830sec
    inet6 2001:1708:268e:1100:a00:27ff:fec6:3cfc/64 scope global dynamic mngtmpaddr noprefixroute
        valid_lft 21573sec preferred_lft 7173sec
    inet6 fd0a:bbcc:ddee:0:a00:27ff:fec6:3cfc/64 scope global mngtmpaddr noprefixroute
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fec6:3cfc/64 scope link
        valid_lft forever preferred_lft forever
```

La dirección IP de la máquina cliente es 192.168.1.46



```
la orden «ip» del paquete deb «iproute2 (6.1.0-1ubuntu2)»
la orden «nmap» del paquete deb «nmap (2.4.2-9ubuntu1)»
la orden «io» del paquete deb «linuxcnc-usb (2.9.1-2ubuntu1)»
la orden «ie» del paquete deb «emboss (6.6.0+dfsg-12ubuntu1)»
la orden «itop» del paquete deb «itop (0.1.4.1)»
la orden «hop» del paquete deb «hopenpgp-tools (0.23.7-1)»
la orden «top» del paquete deb «procs (2:4.0.4-4ubuntu3.2)»
la orden «icp» del paquete deb «renameutils (0.12.0-11)»
la orden «fop» del paquete deb «fop (1:2.8-2)»
Pruebe con: sudo apt install <nombre del paquete deb>
esthercliente@esthercliente:~$ 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 noprefixroute
        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 08:00:27:8d:18:ee brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.46/24 brd 192.168.1.255 scope global dynamic noprefixroute enp0s3
        valid_lft 252794sec preferred_lft 252794sec
    inet6 fd0a:bbcc:ddee:0:2934:e11a:d7d8:34f0/64 scope global temporary dynamic
        valid_lft 598399sec preferred_lft 79760sec
    inet6 fd0a:bbcc:ddee:0:4f59:5832:50dd:1400/64 scope global mngtmpaddr noprefixroute
        valid_lft forever preferred_lft forever
    inet6 2001:1708:268e:1100:8822:1348:29ff:9293/64 scope global temporary dynamic
        valid_lft 21569sec preferred_lft 7169sec
    inet6 2001:1708:268e:1100:7dce:b749:2450:f4c0/64 scope global dynamic mngtmpaddr noprefixroute
        valid_lft 21569sec preferred_lft 7169sec
    inet6 fe80::4677:2de0:84df:2fd3/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

La dirección correspondiente al servidor es 192.168.1.47 y la de cliente es 192.168.1.46. A continuación, se comprueba la conexión entre las máquinas mediante un *ping*. Primero desde el servidor se comprueba que la conexión es exitosa.



```

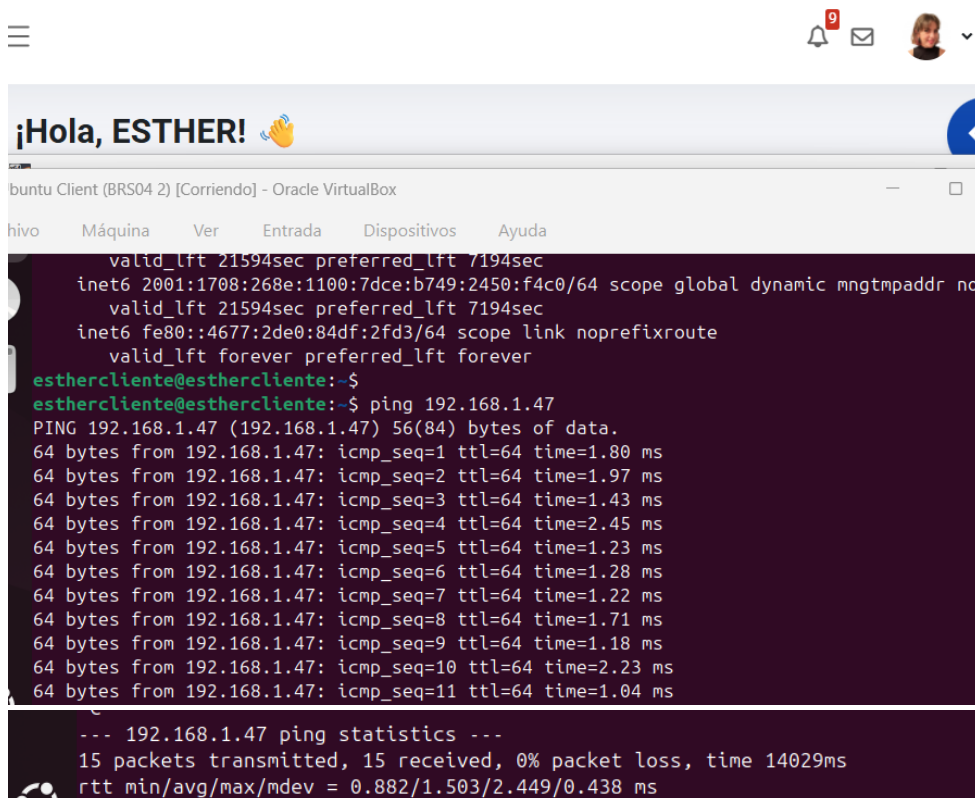
¡Hola, ESTHER! 🙌

Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox
Archivo  Máquina  Ver  Entrada  Dispositivos  Ayuda

inet 192.168.1.47/24 metric 100 brd 192.168.1.255 scope global dynamic enp0s3
    valid_lft 258818sec preferred_lft 258818sec
inet6 2001:1708:268e:1100:a00:27ff:fec6:3cfc/64 scope global dynamic mngtmpaddr noprefixroute
    valid_lft 21590sec preferred_lft 7190sec
inet6 fd00::a00:27ff:fec6:3cfc/64 scope global mngtmpaddr noprefixroute
    valid_lft forever preferred_lft forever
inet6 fe80::a00:27ff:fec6:3cfc/64 scope link
    valid_lft forever preferred_lft forever
estherubuntu@ubuntu-server:~$ ping 192.168.1.46
PING 192.168.1.46 (192.168.1.46) 56(84) bytes of data:
64 bytes from 192.168.1.46: icmp_seq=1 ttl=64 time=4.44 ms
64 bytes from 192.168.1.46: icmp_seq=2 ttl=64 time=1.48 ms
64 bytes from 192.168.1.46: icmp_seq=3 ttl=64 time=1.70 ms
64 bytes from 192.168.1.46: icmp_seq=4 ttl=64 time=2.24 ms
64 bytes from 192.168.1.46: icmp_seq=5 ttl=64 time=1.10 ms

--- 192.168.1.46 ping statistics ---
35 packets transmitted, 35 received, 0% packet loss, time 38397ms
rtt min/avg/max/mdev = 1.062/4.453/68.656/11.705 ms
```

La conexión desde la máquina cliente también es exitosa.



```

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buntu Client (BRS04 2) [Corriendo] - Oracle VirtualBox
hivo  Máquina  Ver  Entrada  Dispositivos  Ayuda

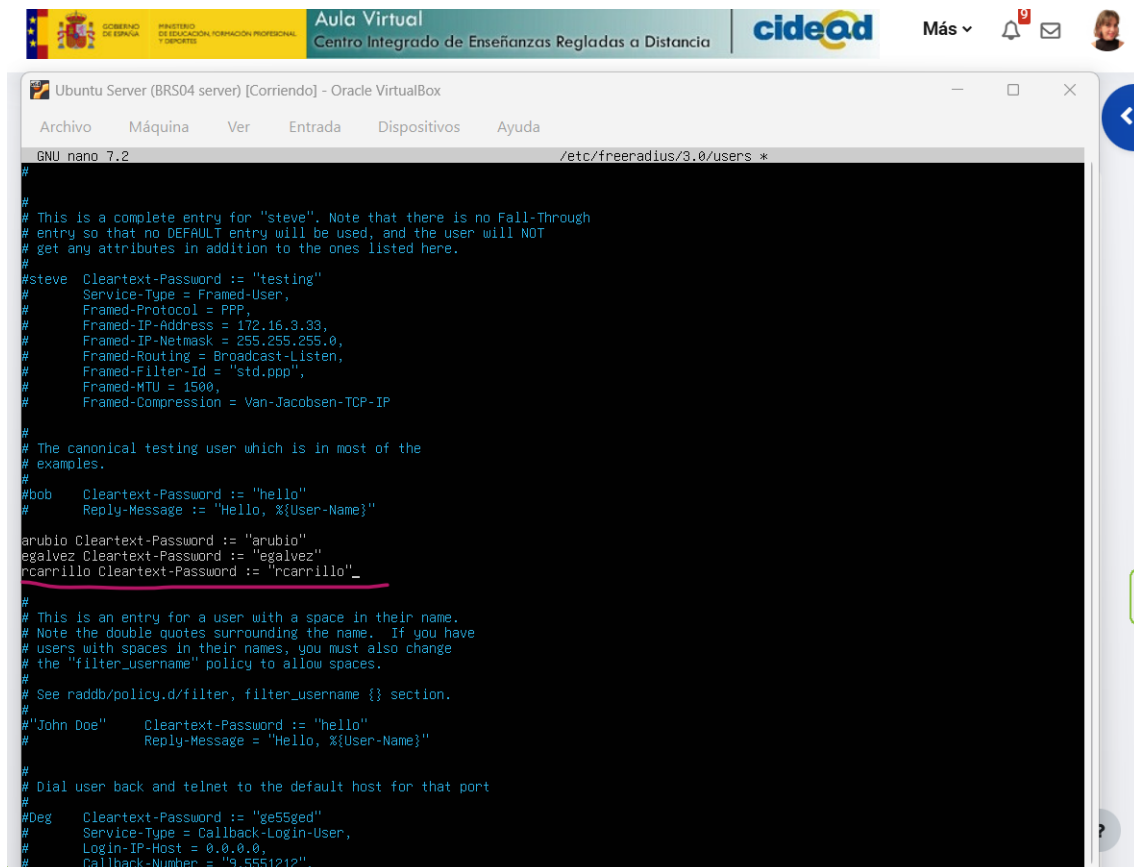
valid_lft 21594sec preferred_lft 7194sec
inet6 2001:1708:268e:1100:7dce:b749:2450:f4c0/64 scope global dynamic mngtmpaddr nop
    valid_lft 21594sec preferred_lft 7194sec
inet6 fe80::4677:2de0:84df:2fd3/64 scope link noprefixroute
    valid_lft forever preferred_lft forever
esthercliente@esthercliente:~$
esthercliente@esthercliente:~$ ping 192.168.1.47
PING 192.168.1.47 (192.168.1.47) 56(84) bytes of data:
64 bytes from 192.168.1.47: icmp_seq=1 ttl=64 time=1.80 ms
64 bytes from 192.168.1.47: icmp_seq=2 ttl=64 time=1.97 ms
64 bytes from 192.168.1.47: icmp_seq=3 ttl=64 time=1.43 ms
64 bytes from 192.168.1.47: icmp_seq=4 ttl=64 time=2.45 ms
64 bytes from 192.168.1.47: icmp_seq=5 ttl=64 time=1.23 ms
64 bytes from 192.168.1.47: icmp_seq=6 ttl=64 time=1.28 ms
64 bytes from 192.168.1.47: icmp_seq=7 ttl=64 time=1.22 ms
64 bytes from 192.168.1.47: icmp_seq=8 ttl=64 time=1.71 ms
64 bytes from 192.168.1.47: icmp_seq=9 ttl=64 time=1.18 ms
64 bytes from 192.168.1.47: icmp_seq=10 ttl=64 time=2.23 ms
64 bytes from 192.168.1.47: icmp_seq=11 ttl=64 time=1.04 ms

--- 192.168.1.47 ping statistics ---
15 packets transmitted, 15 received, 0% packet loss, time 14029ms
rtt min/avg/max/mdev = 0.882/1.503/2.449/0.438 ms
```



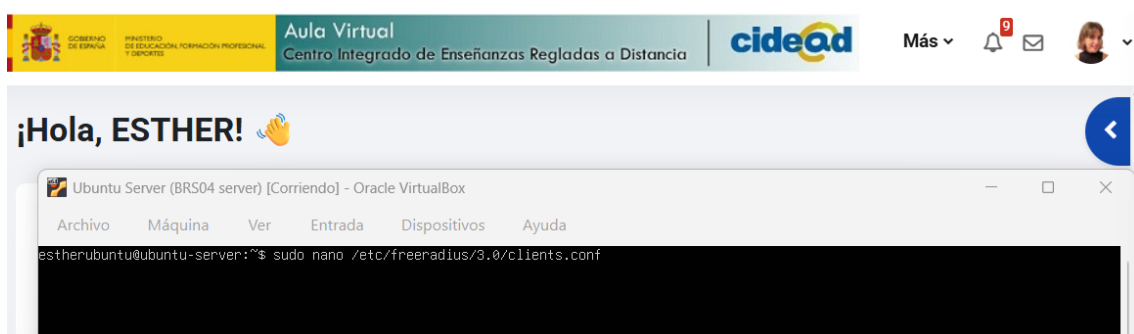
# Configuración FreeRADIUS en máquina servidor

Se configura el archivo `sudo nano /etc/freeradius/3.0/users` con los clientes que añadiremos. Se añaden los clientes en el archivo de configuración y se guarda `ctrl+o`, `enter` y se cierra con `ctrl+x`.



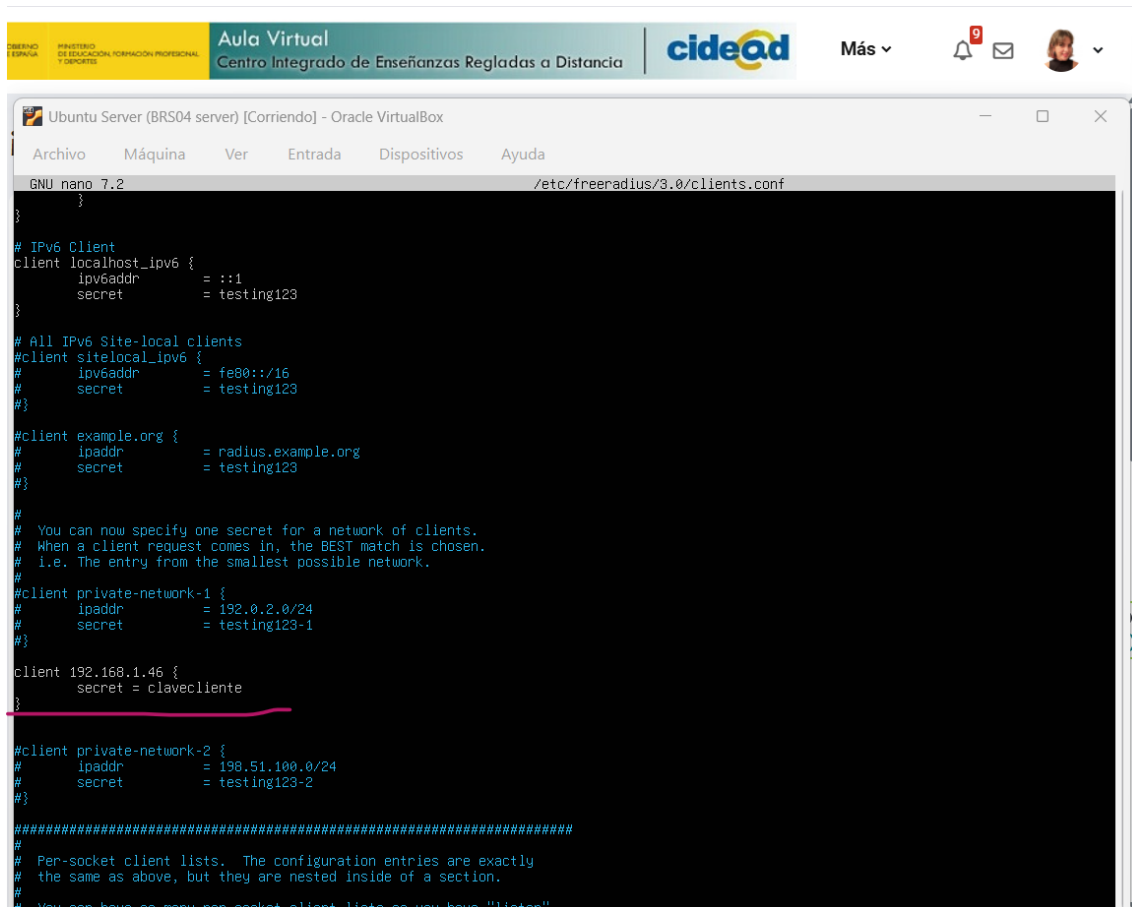
```
GNU nano 7.2 /etc/freeradius/3.0/users *
#
# This is a complete entry for "steve". Note that there is no Fall-Through
# entry so that no DEFAULT entry will be used, and the user will NOT
# get any attributes in addition to the ones listed here.
#
#steve Cleartext-Password := "testing"
#      Service-Type = Framed-User,
#      Framed-Protocol = PPP,
#      Framed-IP-Address = 172.16.3.33,
#      Framed-IP-Netmask = 255.255.255.0,
#      Framed-Routing = Broadcast-Listen,
#      Framed-Filter-Id = "std.ppp",
#      Framed-MTU = 1500,
#      Framed-Compression = Van-Jacobson-TCP-IP
#
# The canonical testing user which is in most of the
# examples.
#bob   Cleartext-Password := "hello"
#      Reply-Message := "Hello, %{User-Name}"
#
arubio Cleartext-Password := "arubio"
egalvez Cleartext-Password := "egalvez"
rcarrillo Cleartext-Password := "rcarrillo"
#
# This is an entry for a user with a space in their name.
# Note the double quotes surrounding the name. If you have
# users with spaces in their names, you must also change
# the "filter_username" policy to allow spaces.
#
# See raddb/policy.d/filter, filter_username {} section.
#
#"John Doe"   Cleartext-Password := "hello"
#             Reply-Message := "Hello, %{User-Name}"
#
# Dial user back and telnet to the default host for that port
#
#Deg   Cleartext-Password := "ge55ged"
#      Service-Type = Callback-Login-User,
#      Login-IP-Host = 0.0.0.0,
#      Callback-Number = "9.5551212",
```

Ahora se añaden los clientes al archivo con el comando `sudo nano /etc/freeradius/3.0/clients.conf`



```
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Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox
Archivo  Máquina  Ver  Entrada  Dispositivos  Ayuda
estherubuntu@ubuntu-server:~$ sudo nano /etc/freeradius/3.0/clients.conf
```

Se ha configurado la máquina cliente que se conectará al servidor RADIUS con la dirección IP 192.168.1.46. Y se ha asignado la clave *clavecliente* a ese cliente. Se guardan los cambios.



```
GNU nano 7.2 /etc/freeradius/3.0/clients.conf

# IPv6 Client
client localhost_ipv6 {
    ipv6addr    = ::1
    secret      = testing123
}

# All IPv6 Site-local clients
#client sitelocal_ipv6 {
#    ipv6addr    = fe00::/16
#    secret      = testing123
#}

#client example.org {
#    ipaddr      = radius.example.org
#    secret      = testing123
#}

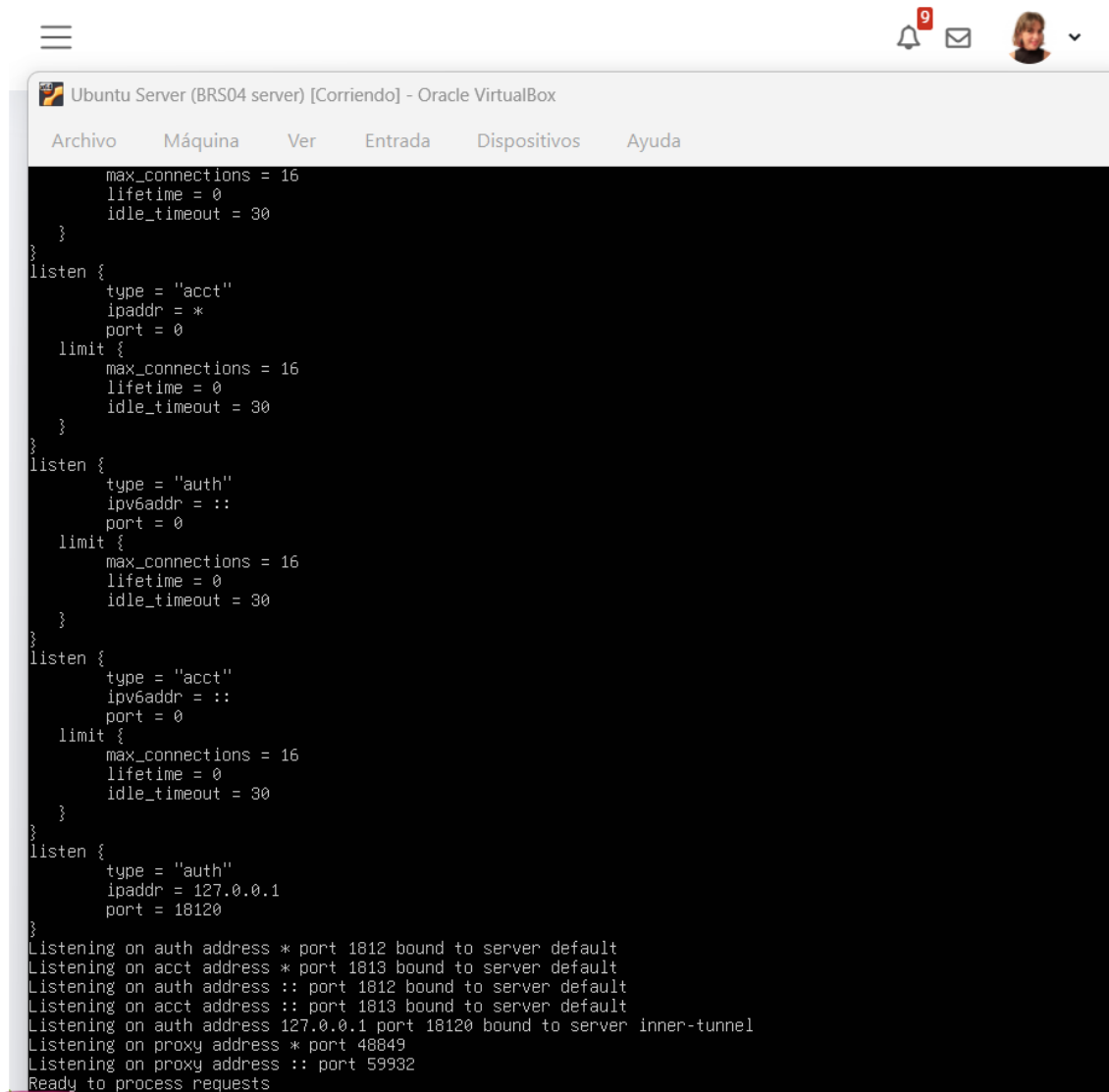
# You can now specify one secret for a network of clients.
# When a client request comes in, the BEST match is chosen.
# i.e. The entry from the smallest possible network.
#
#client private-network-1 {
#    ipaddr      = 192.0.2.0/24
#    secret      = testing123-1
#}

client 192.168.1.46 {
    secret = clavecliente
}

#client private-network-2 {
#    ipaddr      = 198.51.100.0/24
#    secret      = testing123-2
#}

#####
#
# Per-socket client lists. The configuration entries are exactly
# the same as above, but they are nested inside of a section.
#
# You can have as many per-socket client lists as you have "listen"
```

Comprobación del servidor radius con **sudo freeradius -X**. El estado actual es que el servidor RADIUS está listo para ejecutarse.



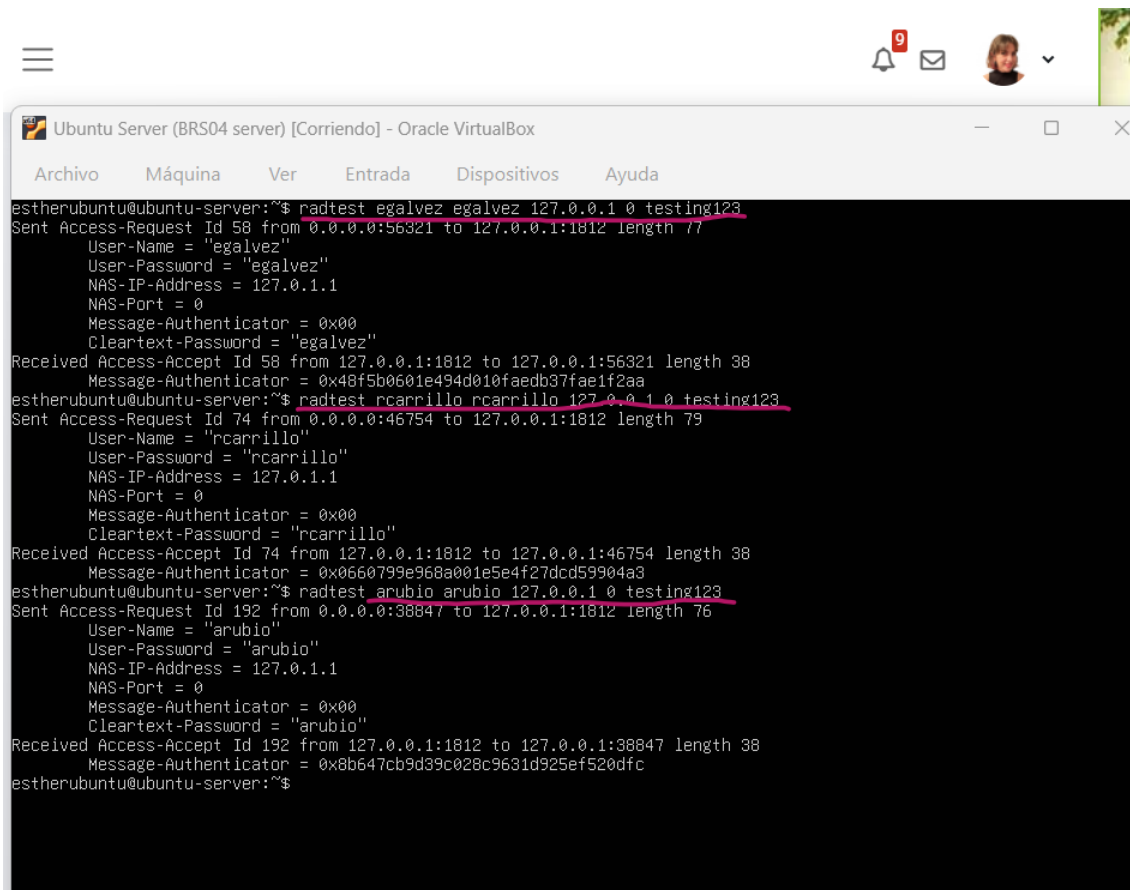
```
max_connections = 16
lifetime = 0
idle_timeout = 30
}
}
listen {
    type = "acct"
    ipaddr = *
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "auth"
    ipv6addr = ::
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "acct"
    ipv6addr = ::
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "auth"
    ipaddr = 127.0.0.1
    port = 18120
}
Listening on auth address * port 1812 bound to server default
Listening on acct address * port 1813 bound to server default
Listening on auth address :: port 1812 bound to server default
Listening on acct address :: port 1813 bound to server default
Listening on auth address 127.0.0.1 port 18120 bound to server inner-tunnel
Listening on proxy address * port 48849
Listening on proxy address :: port 59932
Ready to process requests
```

## Configuración clientes

A continuación, se realiza el test con los 3 clientes que ya se han añadido antes en el archivo de clientes.

- 1) radtest egalvez 127.0.0.1 0 testing123
- 2) radtest rcarrillo 127.0.0.1 0 testing123
- 3) arubio arubio 127.0.0.1 0 testing123



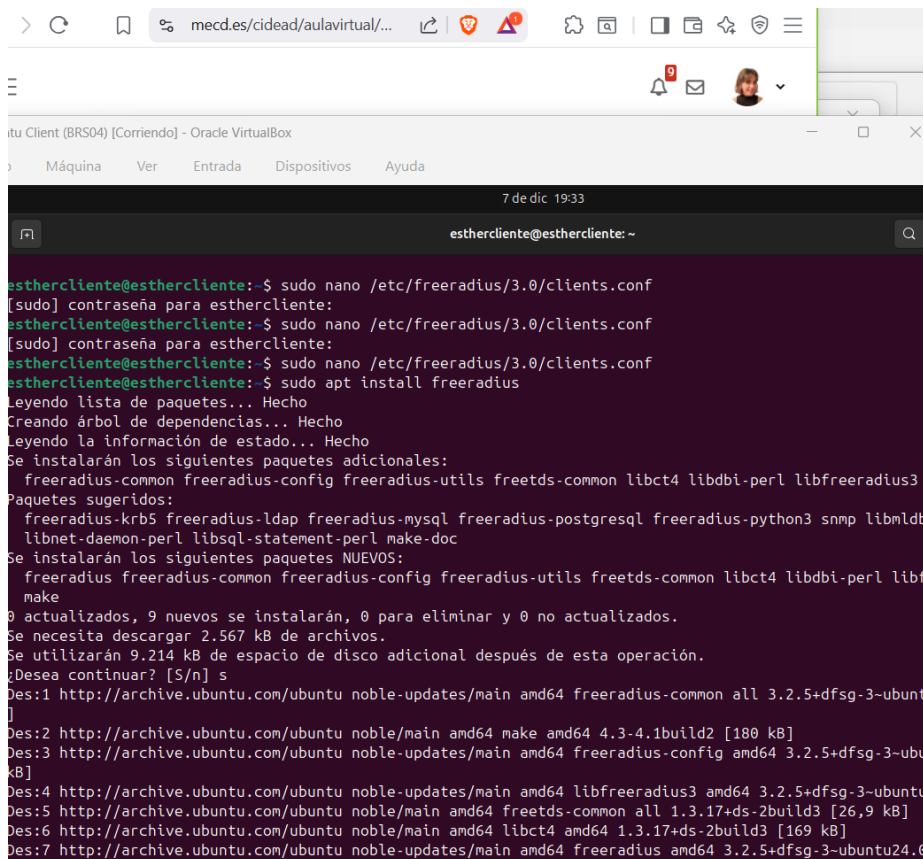


The screenshot shows a terminal window titled "Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox". The terminal output displays three successful RADIUS authentication tests performed using the `radtest` command. Each test shows the sent Access-Request packet details (ID, source IP, destination IP, length) and the received Access-Accept packet details (ID, source IP, destination IP, length). The tests are for users `egalvez`, `rcarrillo`, and `arubio`, all with password `testing123`. The terminal also shows the clear-text password being sent in each request.

```
estherubuntu@ubuntu-server:~$ radtest egalvez egalvez 127.0.0.1 0 testing123
Sent Access-Request Id 58 from 0.0.0.0:56321 to 127.0.0.1:1812 length 77
  User-Name = "egalvez"
  User-Password = "egalvez"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "egalvez"
Received Access-Accept Id 58 from 127.0.0.1:1812 to 127.0.0.1:56321 length 38
  Message-Authenticator = 0x48f5b0601e494d010faedb37fae1f2aa
estherubuntu@ubuntu-server:~$ radtest rcarrillo rcarrillo 127.0.0.1 0 testing123
Sent Access-Request Id 74 from 0.0.0.0:46754 to 127.0.0.1:1812 length 79
  User-Name = "rcarrillo"
  User-Password = "rcarrillo"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "rcarrillo"
Received Access-Accept Id 74 from 127.0.0.1:1812 to 127.0.0.1:46754 length 38
  Message-Authenticator = 0x0660799e968a001e5e4f27dcd59904a3
estherubuntu@ubuntu-server:~$ radtest arubio arubio 127.0.0.1 0 testing123
Sent Access-Request Id 192 from 0.0.0.0:38847 to 127.0.0.1:1812 length 76
  User-Name = "arubio"
  User-Password = "arubio"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "arubio"
Received Access-Accept Id 192 from 127.0.0.1:1812 to 127.0.0.1:38847 length 38
  Message-Authenticator = 0x8b647cb9d39c028c9631d925ef520dfc
estherubuntu@ubuntu-server:~$
```

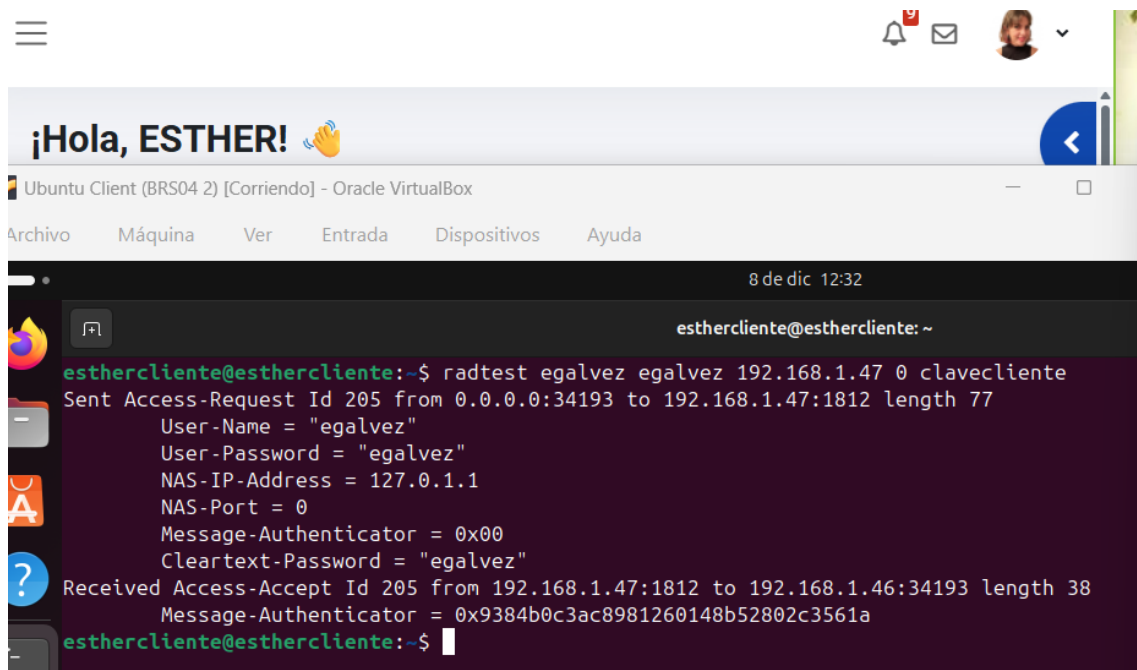
## Instalación FreeRADIUS en máquina cliente

Para configurar el cliente, en primer lugar, se debe instalar FreeRADIUS en la máquina cliente con el comando: **`sudo apt install freeradius`**.



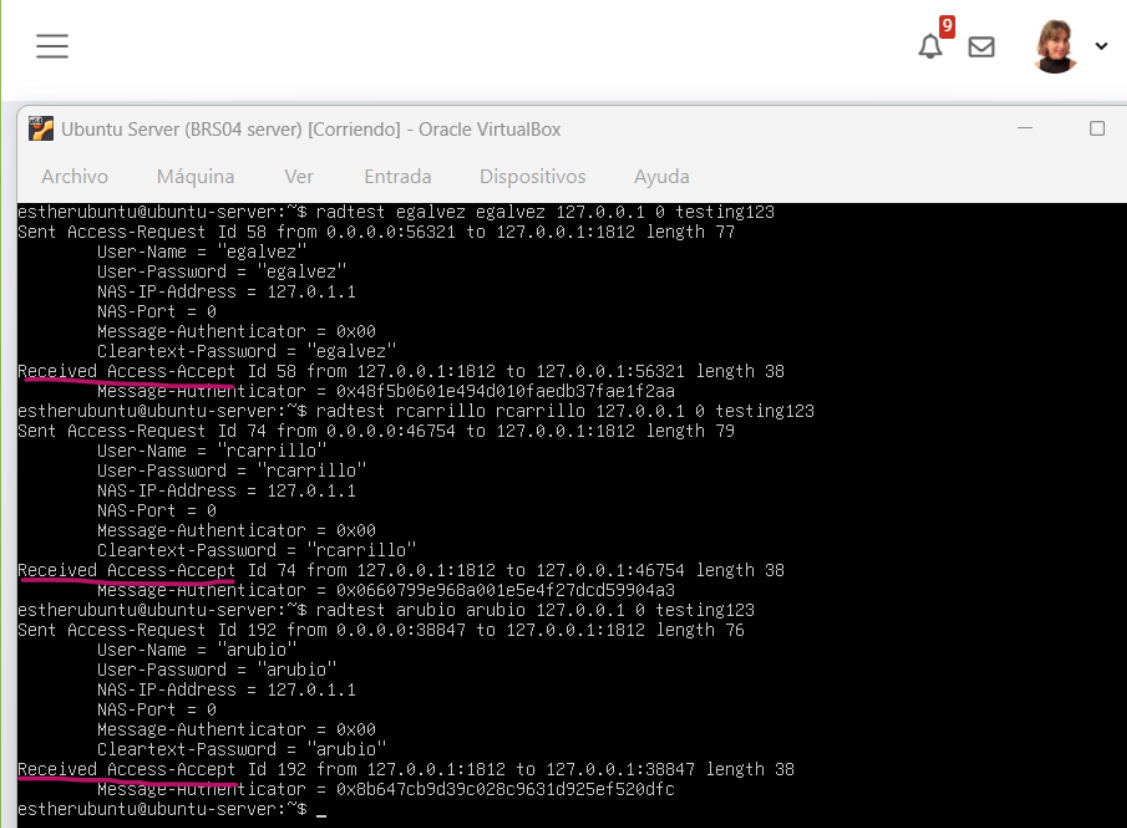
```
esthercliente@esthercliente:~$ sudo nano /etc/freeradius/3.0/clients.conf
[sudo] contraseña para esthercliente:
esthercliente@esthercliente:~$ sudo nano /etc/freeradius/3.0/clients.conf
[sudo] contraseña para esthercliente:
esthercliente@esthercliente:~$ sudo apt install freeradius
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se instalarán los siguientes paquetes adicionales:
  freeradius-common freeradius-config freeradius-utils freetds-common libct4 libdbi-perl libfreeradius3
Paquetes sugeridos:
  freeradius-krb5 freeradius-ldap freeradius-mysql freeradius-postgresql freeradius-python3 snmp libnldb
  libnet-daemon-perl libsql-statement-perl make-doc
Se instalarán los siguientes paquetes NUEVOS:
  freeradius freeradius-common freeradius-config freeradius-utils freetds-common libct4 libdbi-perl libf
  make
0 actualizados, 9 nuevos se instalarán, 0 para eliminar y 0 no actualizados.
Se necesita descargar 2.567 kB de archivos.
Se utilizarán 9.214 kB de espacio de disco adicional después de esta operación.
¿Desea continuar? [S/n] s
Des:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius-common all 3.2.5+dfsg-3-ubuntu
Des:2 http://archive.ubuntu.com/ubuntu noble/main amd64 make amd64 4.3-4.1build2 [180 kB]
Des:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius-config amd64 3.2.5+dfsg-3-ubu
  kB]
Des:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libfreeradius3 amd64 3.2.5+dfsg-3-ubuntu
Des:5 http://archive.ubuntu.com/ubuntu noble/main amd64 freetds-common all 1.3.17+ds-2build3 [26,9 kB]
Des:6 http://archive.ubuntu.com/ubuntu noble/main amd64 libct4 amd64 1.3.17+ds-2build3 [169 kB]
Des:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius amd64 3.2.5+dfsg-3-ubuntu24.0
```

Se ha realizado una prueba de autenticación con la herramienta *radtest* desde la máquina cliente, enviando las credenciales *egalvez* / *egalvez* al servidor RADIUS y recibiendo una respuesta exitosa



```
esthercliente@esthercliente:~$ radtest egalvez egalvez 192.168.1.47 0 clavecliente
Sent Access-Request Id 205 from 0.0.0.0:34193 to 192.168.1.47:1812 length 77
  User-Name = "egalvez"
  User-Password = "egalvez"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "egalvez"
Received Access-Accept Id 205 from 192.168.1.47:1812 to 192.168.1.46:34193 length 38
  Message-Authenticator = 0x9384b0c3ac8981260148b52802c3561a
esthercliente@esthercliente:~$
```

Se comprueba la conexión en la máquina servidor. La respuesta *Access-Accept* enviada por el servidor es la señal que la máquina cliente recibe para confirmar que la conexión y la autenticación han sido exitosas. El servidor RADIUS está configurado correctamente.



```
estherubuntu@ubuntu-server:~$ radtest egalvez egalvez 127.0.0.1 0 testing123
Sent Access-Request Id 58 from 0.0.0.0:56321 to 127.0.0.1:1812 length 77
  User-Name = "egalvez"
  User-Password = "egalvez"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "egalvez"
Received Access-Accept Id 58 from 127.0.0.1:1812 to 127.0.0.1:56321 length 38
  Message-Authenticator = 0x48f5b0601e494d010faedb37fae1f2aa
estherubuntu@ubuntu-server:~$ radtest rcarrillo rcarrillo 127.0.0.1 0 testing123
Sent Access-Request Id 74 from 0.0.0.0:46754 to 127.0.0.1:1812 length 79
  User-Name = "rcarrillo"
  User-Password = "rcarrillo"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "rcarrillo"
Received Access-Accept Id 74 from 127.0.0.1:1812 to 127.0.0.1:46754 length 38
  Message-Authenticator = 0x0660799e968a001e5e4f27dcd59904a3
estherubuntu@ubuntu-server:~$ radtest arubio arubio 127.0.0.1 0 testing123
Sent Access-Request Id 192 from 0.0.0.0:38847 to 127.0.0.1:1812 length 76
  User-Name = "arubio"
  User-Password = "arubio"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "arubio"
Received Access-Accept Id 192 from 127.0.0.1:1812 to 127.0.0.1:38847 length 38
  Message-Authenticator = 0x8b647cb9d39c028c9631d925ef520dfc
estherubuntu@ubuntu-server:~$ _
```

## Bibliografía

The FreeRADIUS project. (s.f.). *FreeRADIUS Documentation*. Recuperado de <https://www.freeradius.org/documentation/>

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