

INSTALACIÓN Y CONFIGURACIÓN DEL SERVICIO DNS

Raúl Arribas Redondo

Servicios de Red e Internet

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2 REQUISITOS PREVIOS

Tener instalado Bind9 y sus dependencias: **sudo apt install bind9 bind9utils bind9-doc**

Conexión a internet

2 máquinas virtuales Ubuntu configuradas de esta forma:

- Máquina1: la configuración está en modo puente y modo interna, y la parte de modo interna tiene un servidor DHCP asignando direcciones IP en el rango 192.168.64.2-192.168.64.30. La configuración de red de esta máquina es:

The screenshot shows the NetworkManager configuration window for a wired connection. The 'Cableada' tab is selected, and the 'IPv4' sub-tab is active. The 'Método IPv4' is set to 'Manual'. The 'Direcciones' section shows a single IP address '192.168.64.1' with a subnet mask of '255.255.255.0' and a gateway of '192.168.64.1'. The 'DNS' section is set to 'Automático' with a toggle switch. The 'Rutas' section is also set to 'Automático' with a toggle switch. The 'Aplicar' button is visible in the top right corner.

- Máquina2: La conexión de red esta configurada en modo interna de forma automática, y el servidor DHCP le asigna en este caso, la primera IP disponible. Tenemos que tener conexión a internet.

The screenshot shows the NetworkManager configuration window for a wired connection. The 'Cableada' tab is selected, and the 'Detalles' sub-tab is active. The 'Velocidad de conexión' is set to '1000 Mb/s'. The 'Dirección IP' is '192.168.64.2', the 'Dirección física' is '08:00:27:DF:6E:3A', and the 'Ruta predeterminada' is '192.168.64.1'. The 'DNS' is set to '8.8.8.8 8.8.4.4 195.235.113.3 195.235.96.90'. The 'Conectar automáticamente' checkbox is checked, and the 'Hacer disponible para otros usuarios' checkbox is also checked. The 'Conexión medida' checkbox is unchecked. The 'Eliminar perfil de conexión...' button is visible at the bottom.

3 CONFIGURACIÓN DE LA ZONA PRIMARIA DE RESOLUCIÓN DIRECTA/INVERSA

3.1 Configuración Maquina 1

Una vez hemos instalado la herramienta Bind9, procedemos con los siguientes pasos.

Vamos a crear la zona primaria de resolución directa y la zona primaria de resolución inversa, para ello seguimos los siguientes pasos en la maquina1 (nuestra maquina se llama PCServer)

- Creamos el archivo de la zona directa:
 - o **cd /var/lib/bind**
 - o **sudo nano db.raularribas.org**
- Agregamos el contenido al fichero creado:

\$TTL 86400

@ IN SOA raul-VirtualBox.raularribas.org. root.raularribas.org. (
2024111501 ; Serial (actualiza el número al realizar cambios)
3600 ; Refresh
1800 ; Retry
1209600 ; Expire
86400) ; Minimum TTL

@ IN NS raul-VirtualBox.raularribas.org.

@ IN NS server2.raularribas.org.

@ IN MX 10 server2.raularribas.org.

raul-VirtualBox IN A 192.168.64.1

server2 IN A 192.168.64.2

pc1 IN A 192.168.64.101

pc2 IN A 192.168.64.102

pc3 IN A 192.168.64.103

pc4 IN A 192.168.64.104

www IN CNAME raul-VirtualBox

ftp IN CNAME raul-VirtualBox

raularribas.org. IN A 192.168.64.1

- Creamos el archivo de la zona inversa:
 - o **cd /var/lib/bind**
 - o **sudo nano 192.168.64-inversa**
- Agregamos el contenido al fichero creado:

\$TTL 86400

@ IN SOA raul-VirtualBox.raularribas.org. root.raularribas.org. (
2024111501 ; Serial (incrementa con cada cambio)
3600 ; Refresh
1800 ; Retry
1209600 ; Expire
86400) ; Minimum TTL

@ IN NS raul-VirtualBox.raularribas.org.

@ IN NS server2.raularribas.org.

1 IN PTR raul-VirtualBox.raularribas.org.

2 IN PTR server2.raularribas.org.

101 IN PTR pc1.raularribas.org.

102 IN PTR pc2.raularribas.org.

103 IN PTR pc3.raularribas.org.

104 IN PTR pc4.raularribas.org.

Abrimos el archivo **/etc/bind/named.conf.local**

- o **Sudo nano /etc/bind/named.conf.local**
- Añadimos la zona primaria directa (raularribas.org)

zone "raularribas.org" {
type master;
file "/var/lib/bind/db.raularribas.org";
};

- Añadimos la zona primaria de resolución inversa para la red 192.168.64.0

```
zone "64.168.192.in-addr.arpa" {
```

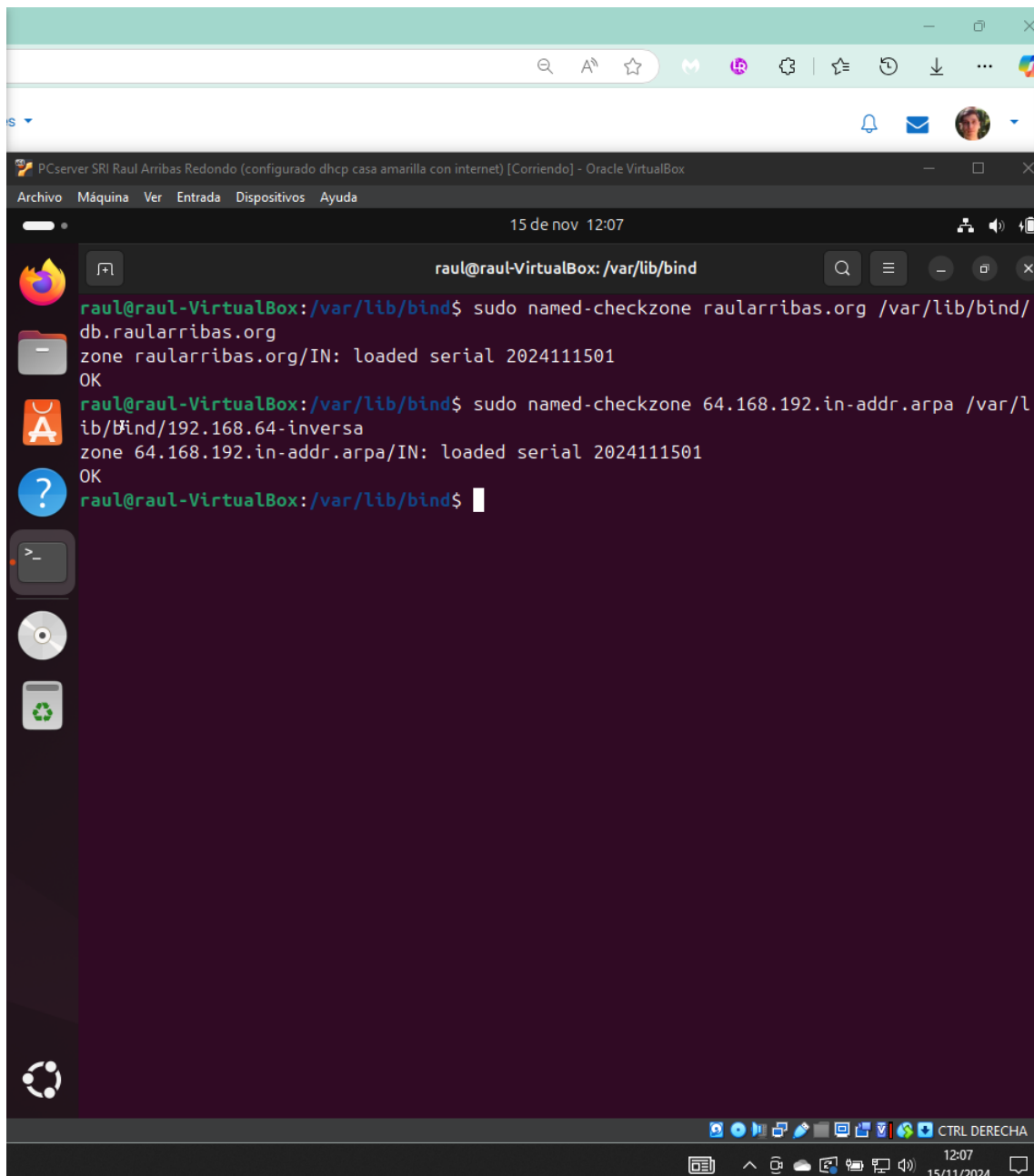
```
type master; file "/var/lib/bind/192.168.64-inversa"; };
```

- Reiniciamos el servicio de Bind:
 - o **sudo systemctl restart bind9**
- Para comprobar que se han aplicado los cambios correctamente:
 - o Zona directa:

```
sudo named-checkzone raularribas.org /var/lib/bind/db.raularribas.org
```

- o Zona Inversa:

```
sudo named-checkzone 64.168.192.in-addr.arpa /var/lib/bind/192.168.64-inversa
```



Ahora para que al hacer **PING** a nuestro nombre **raularribas.org** nos de respuesta, tenemos que poner en el archivo **/etc/resolv.conf** la ip **127.0.0.1**

- **Sudo nano /etc/resolv.conf**

```
raul@raul-VirtualBox: /var/lib/bind
GNU nano 7.2 /etc/resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resolved(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, but only
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a
# different way, replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

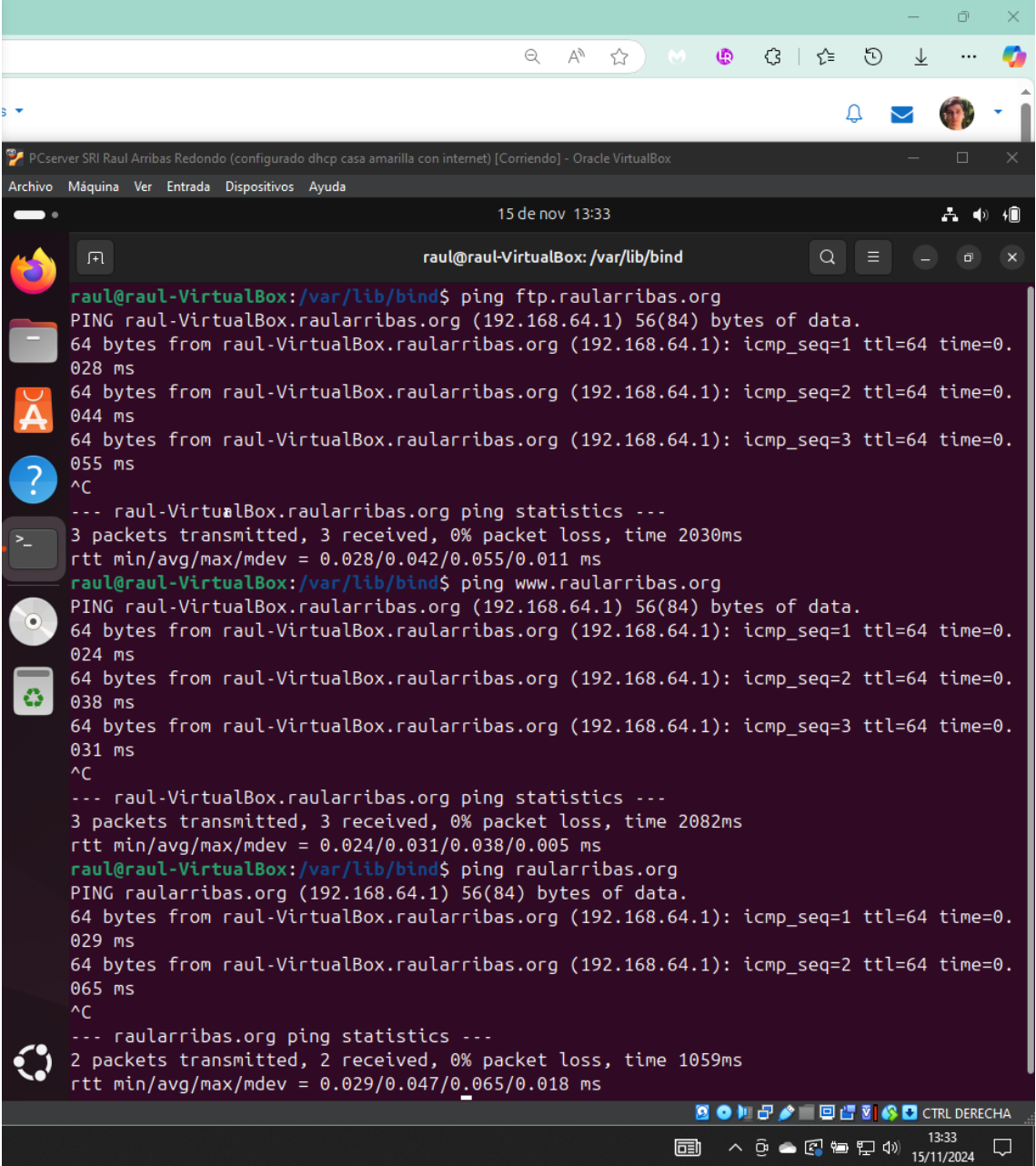
nameserver 127.0.0.1
options edns0 trust-ad
search .

[ El fichero «/etc/resolv.conf» no es de escritura ]

^G Ayuda      ^O Guardar    ^W Buscar    ^K Cortar    ^T Ejecutar  ^C Ubicación
^X Salir      ^R Leer fich.^_ Reemplazar ^U Pegar     ^J Justificar ^_ Ir a línea
```

3.2 Comprobamos que funcione todo con algunos comandos

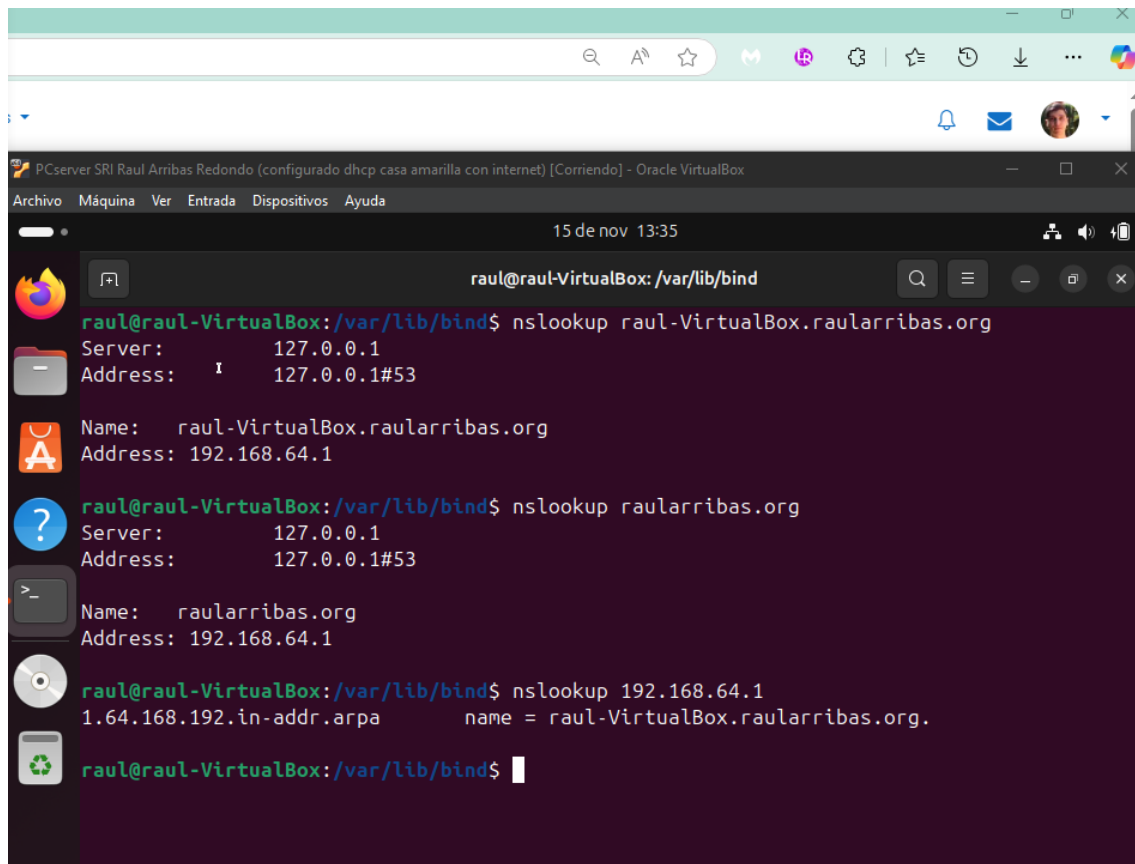
Hacemos Ping para ver que nuestra maquina nos responde correctamente.



The screenshot shows a terminal window titled "raul@raul-VirtualBox: /var/lib/bind". The terminal output shows three ping tests:

```
raul@raul-VirtualBox:/var/lib/bind$ ping ftp.raularribas.org
PING raul-VirtualBox.raularribas.org (192.168.64.1) 56(84) bytes of data.
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=1 ttl=64 time=0.028 ms
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=2 ttl=64 time=0.044 ms
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=3 ttl=64 time=0.055 ms
^C
--- raul-VirtualBox.raularribas.org ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2030ms
rtt min/avg/max/mdev = 0.028/0.042/0.055/0.011 ms
raul@raul-VirtualBox:/var/lib/bind$ ping www.raularribas.org
PING raul-VirtualBox.raularribas.org (192.168.64.1) 56(84) bytes of data.
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=1 ttl=64 time=0.024 ms
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=2 ttl=64 time=0.038 ms
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=3 ttl=64 time=0.031 ms
^C
--- raul-VirtualBox.raularribas.org ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2082ms
rtt min/avg/max/mdev = 0.024/0.031/0.038/0.005 ms
raul@raul-VirtualBox:/var/lib/bind$ ping raularribas.org
PING raularribas.org (192.168.64.1) 56(84) bytes of data.
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=1 ttl=64 time=0.029 ms
64 bytes from raul-VirtualBox.raularribas.org (192.168.64.1): icmp_seq=2 ttl=64 time=0.065 ms
^C
--- raularribas.org ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1059ms
rtt min/avg/max/mdev = 0.029/0.047/0.065/0.018 ms
```

Hacemos Nslookup:



The screenshot shows a terminal window titled "raul@raul-VirtualBox: /var/lib/bind" with a search bar and menu icons. The terminal output is as follows:

```
raul@raul-VirtualBox:/var/lib/bind$ nslookup raul-VirtualBox.raularribas.org
Server:      127.0.0.1
Address:     127.0.0.1#53

Name:   raul-VirtualBox.raularribas.org
Address: 192.168.64.1

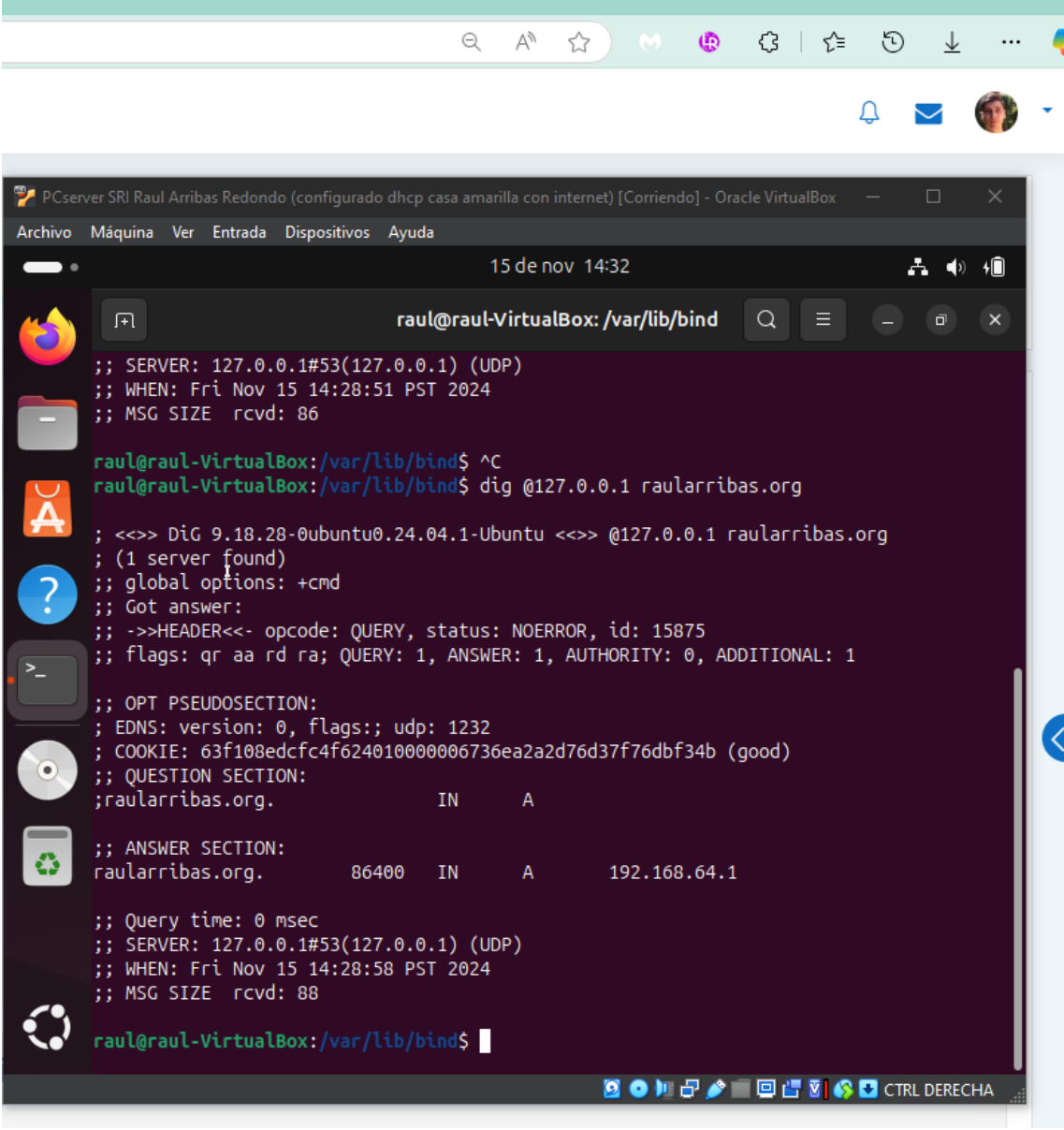
raul@raul-VirtualBox:/var/lib/bind$ nslookup raularribas.org
Server:      127.0.0.1
Address:     127.0.0.1#53

Name:   raularribas.org
Address: 192.168.64.1

raul@raul-VirtualBox:/var/lib/bind$ nslookup 192.168.64.1
1.64.168.192.in-addr.arpa      name = raul-VirtualBox.raularribas.org.

raul@raul-VirtualBox:/var/lib/bind$
```

Comprobación de zona directa y zona inversa:



The screenshot shows a terminal window titled "PCserver SRI Raul Arribas Redondo (configurado dhcp casa amarilla con internet) [Corriendo] - Oracle VirtualBox". The terminal is running a dig command to check the DNS for raularribas.org. The output shows a successful query to 127.0.0.1#53, returning an A record for 192.168.64.1. The terminal also shows the command history and the current directory is /var/lib/bind.

```
raul@raul-VirtualBox: /var/lib/bind
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Fri Nov 15 14:28:51 PST 2024
;; MSG SIZE rcvd: 86

raul@raul-VirtualBox:/var/lib/bind$ ^C
raul@raul-VirtualBox:/var/lib/bind$ dig @127.0.0.1 raularribas.org

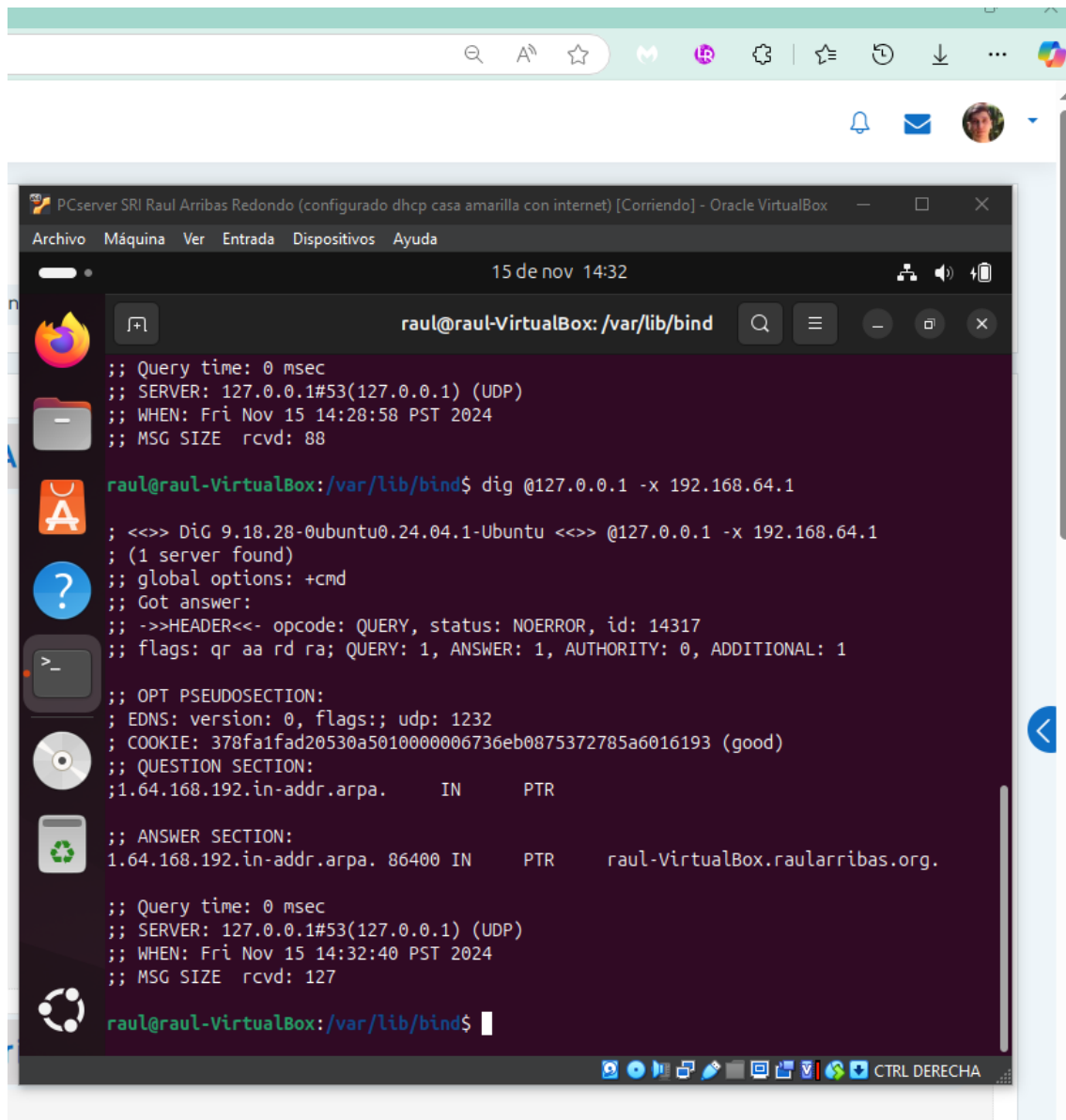
; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @127.0.0.1 raularribas.org
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15875
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1232
;; COOKIE: 63f108edcfc4f624010000006736ea2a2d76d37f76dbf34b (good)
;; QUESTION SECTION:
;raularribas.org.                IN      A

;; ANSWER SECTION:
raularribas.org.                86400   IN      A      192.168.64.1

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Fri Nov 15 14:28:58 PST 2024
;; MSG SIZE rcvd: 88

raul@raul-VirtualBox:/var/lib/bind$
```



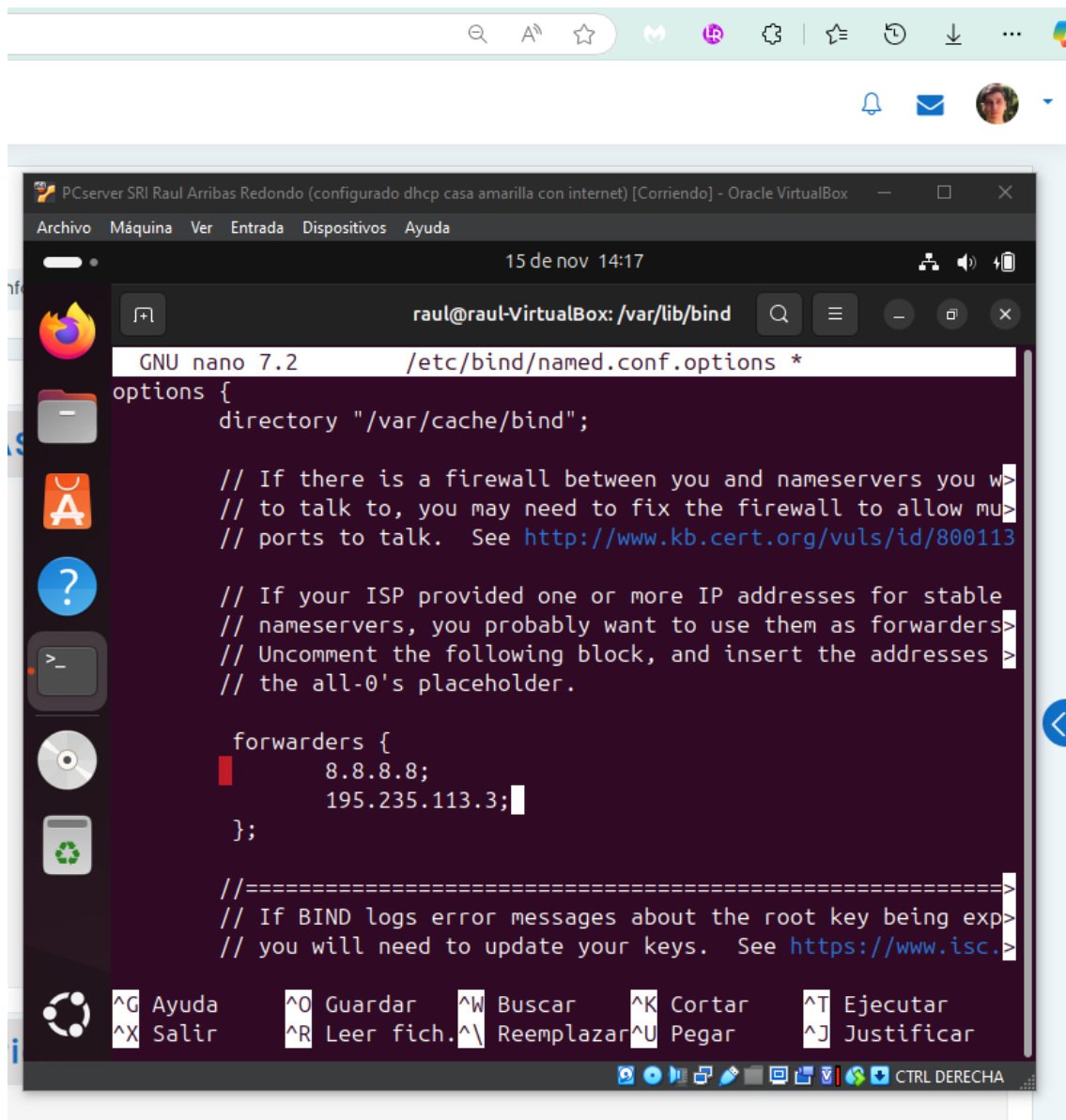
Directiva para usar reenviadores

Con esta configuración, cualquier consulta que no pueda resolver **maquina1** se reenviará a los servidores especificados en la directiva forwarders:

- **sudo nano /etc/bind/named.conf.options**
 - o Añadimos al fichero:


```

options {
    forwarders {
        8.8.8.8;
        195.235.113.3;
    };
};
          
```



Reiniciamos el servicio de Bind: **sudo systemctl restart bind9**

3.3 Configuración Maquina 2

Una vez hemos instalado la herramienta Bind9, procedemos con los siguientes pasos.

Para esta maquina que actuará como servidor secundario de DNS, tenemos que editar el fichero **/etc/bind/named.conf.local**

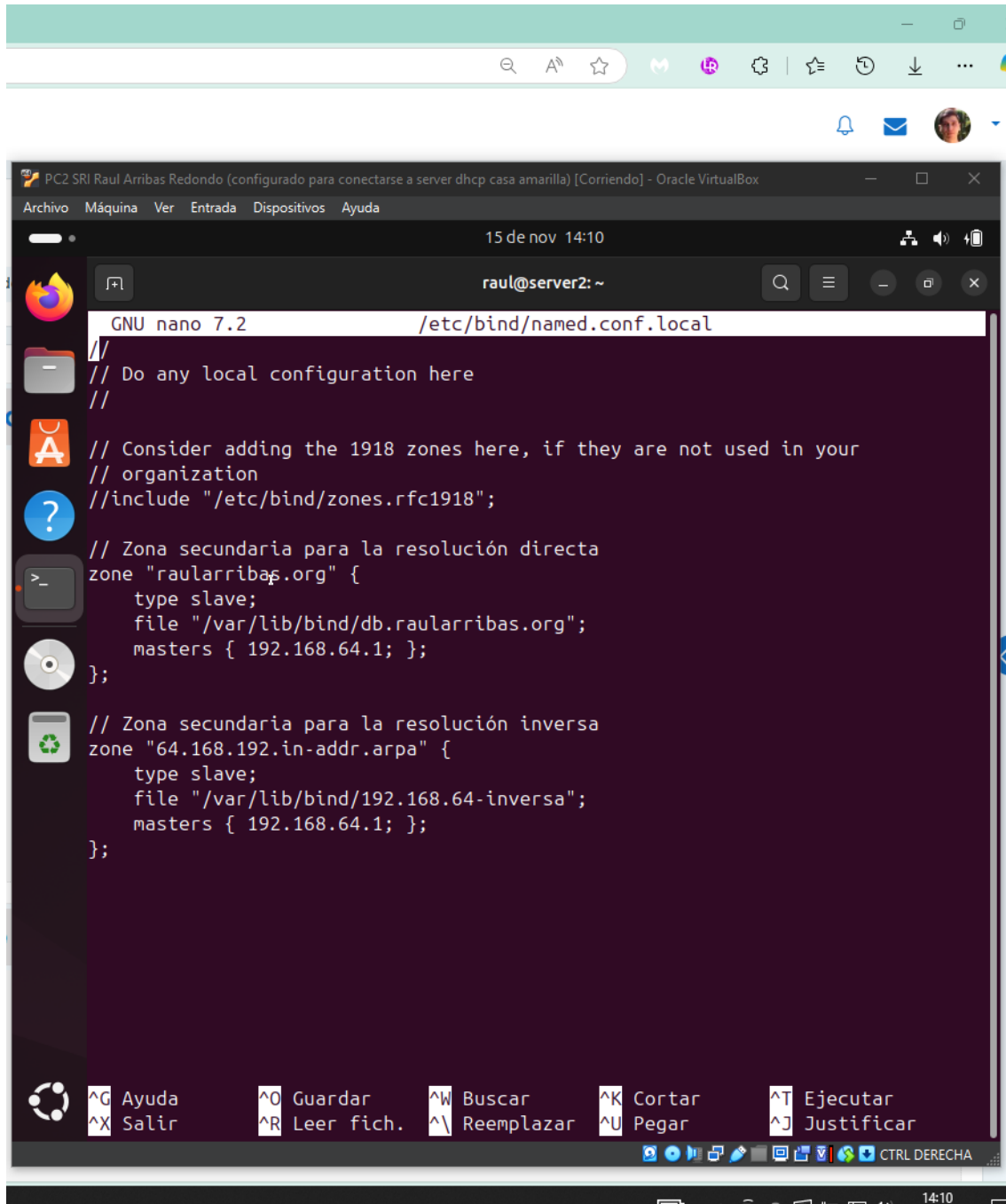
- **sudo nano /etc/bind/named.conf.local**
 - o Y añadimos:


```
// Zona secundaria para la resolución directa

zone "raularribas.org" {

    type slave;
    file "/var/lib/bind/db.raularribas.org";
    masters { 192.168.64.1; };
};
```

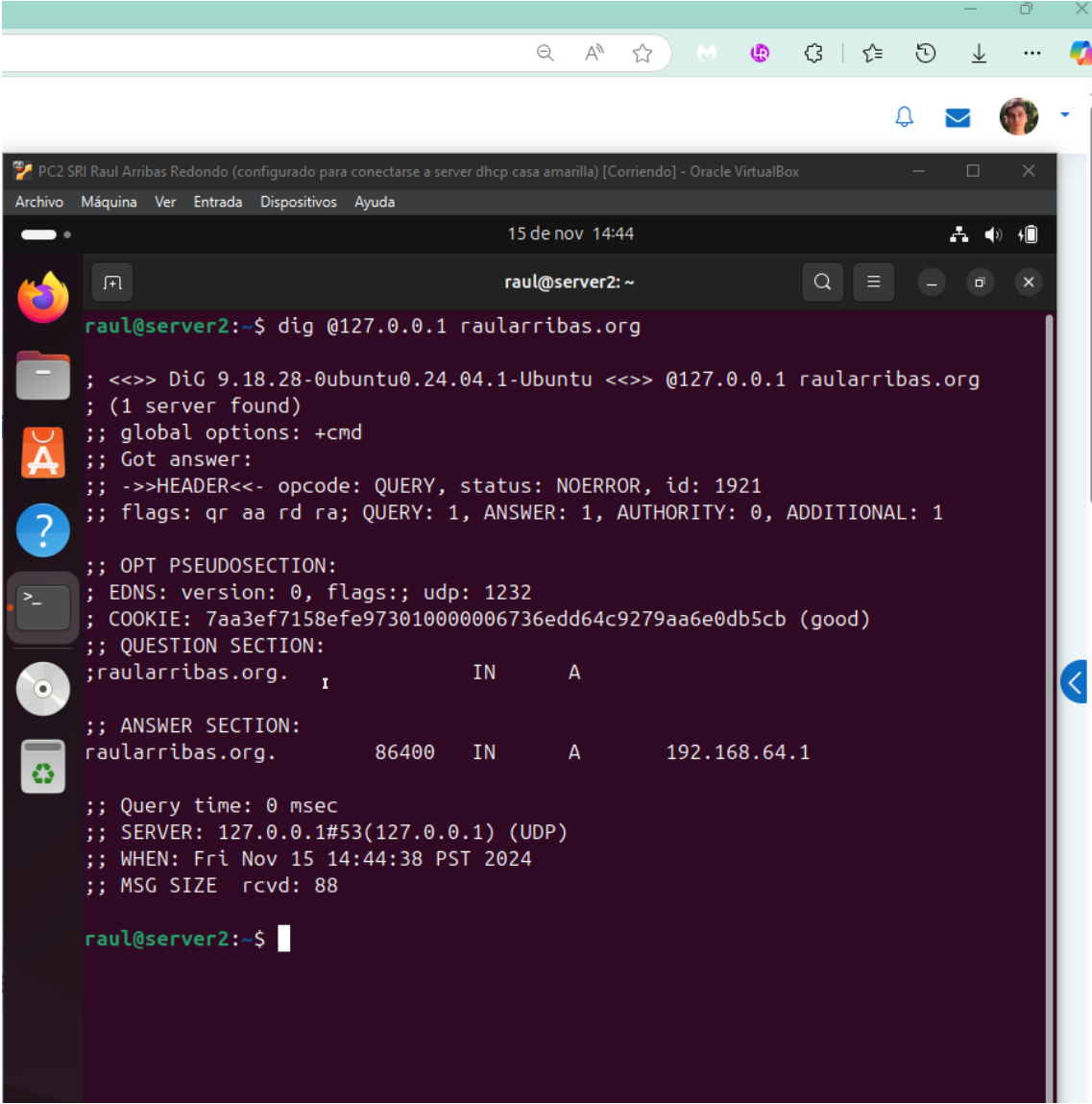
```
// Zona secundaria para la resolución inversa
zone "64.168.192.in-addr.arpa" {
    type slave;
    file "/var/lib/bind/192.168.64-inversa";
    masters { 192.168.64.1; };
};
```



Hacemos un reinicio de Bind: **sudo systemctl restart bind9**

3.4 Comprobamos la zona del servidor DNS secundario directa e inversa:

Directa:

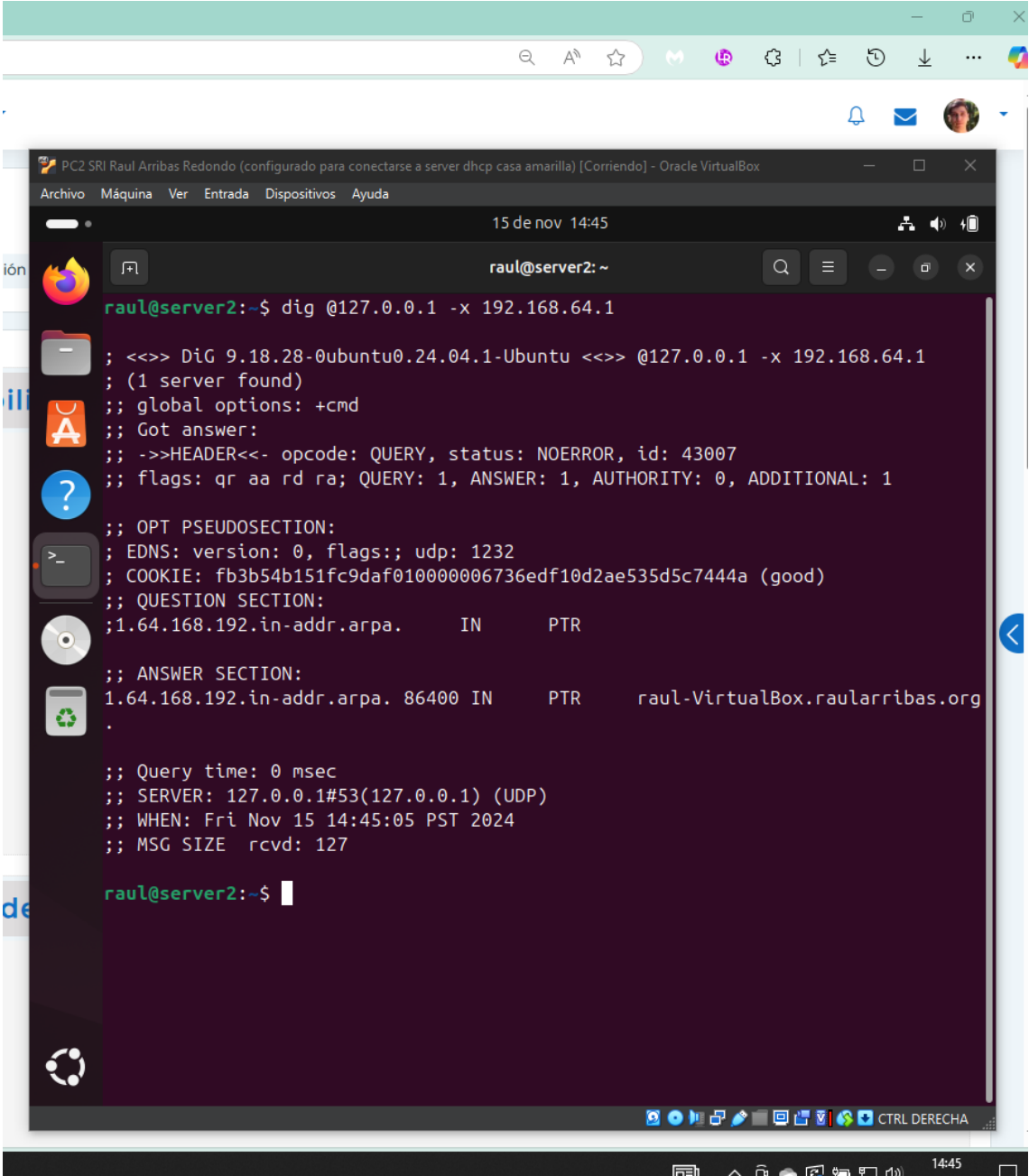


The screenshot shows a terminal window titled "PC2 SRI Raul Arribas Redondo (configurado para conectarse a server dhcp casa amarilla) [Corriendo] - Oracle VirtualBox". The terminal is running a command to perform a direct DNS lookup. The output shows the query details, including the server found, global options, and the answer section which maps the domain to the IP address 192.168.64.1.

```
raul@server2:~$ dig @127.0.0.1 raularribas.org
; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @127.0.0.1 raularribas.org
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 1921
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 7aa3ef7158efe973010000006736edd64c9279aa6e0db5cb (good)
;; QUESTION SECTION:
;raularribas.org.      IN      A
;; ANSWER SECTION:
raularribas.org.      86400   IN      A      192.168.64.1
;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Fri Nov 15 14:44:38 PST 2024
;; MSG SIZE rcvd: 88

raul@server2:~$
```

Inversa:



The screenshot shows a terminal window titled "PC2 SRI Raul Arribas Redondo (configurado para conectarse a server dhcp casa amarilla) [Corriendo] - Oracle VirtualBox". The terminal is running a command prompt with the user "raul@server2". The command executed is "dig @127.0.0.1 -x 192.168.64.1". The output shows a successful DNS query for the PTR record of 192.168.64.1, returning the domain "raul-VirtualBox.raularribas.org". The terminal also displays system icons on the left and a taskbar at the bottom.

```
raul@server2:~$ dig @127.0.0.1 -x 192.168.64.1

; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @127.0.0.1 -x 192.168.64.1
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 43007
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1232
;; COOKIE: fb3b54b151fc9daf010000006736edf10d2ae535d5c7444a (good)
;; QUESTION SECTION:
;1.64.168.192.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
1.64.168.192.in-addr.arpa. 86400 IN      PTR      raul-VirtualBox.raularribas.org
.

;; Query time: 0 msec
;; SERVER: 127.0.0.1#53(127.0.0.1) (UDP)
;; WHEN: Fri Nov 15 14:45:05 PST 2024
;; MSG SIZE rcvd: 127

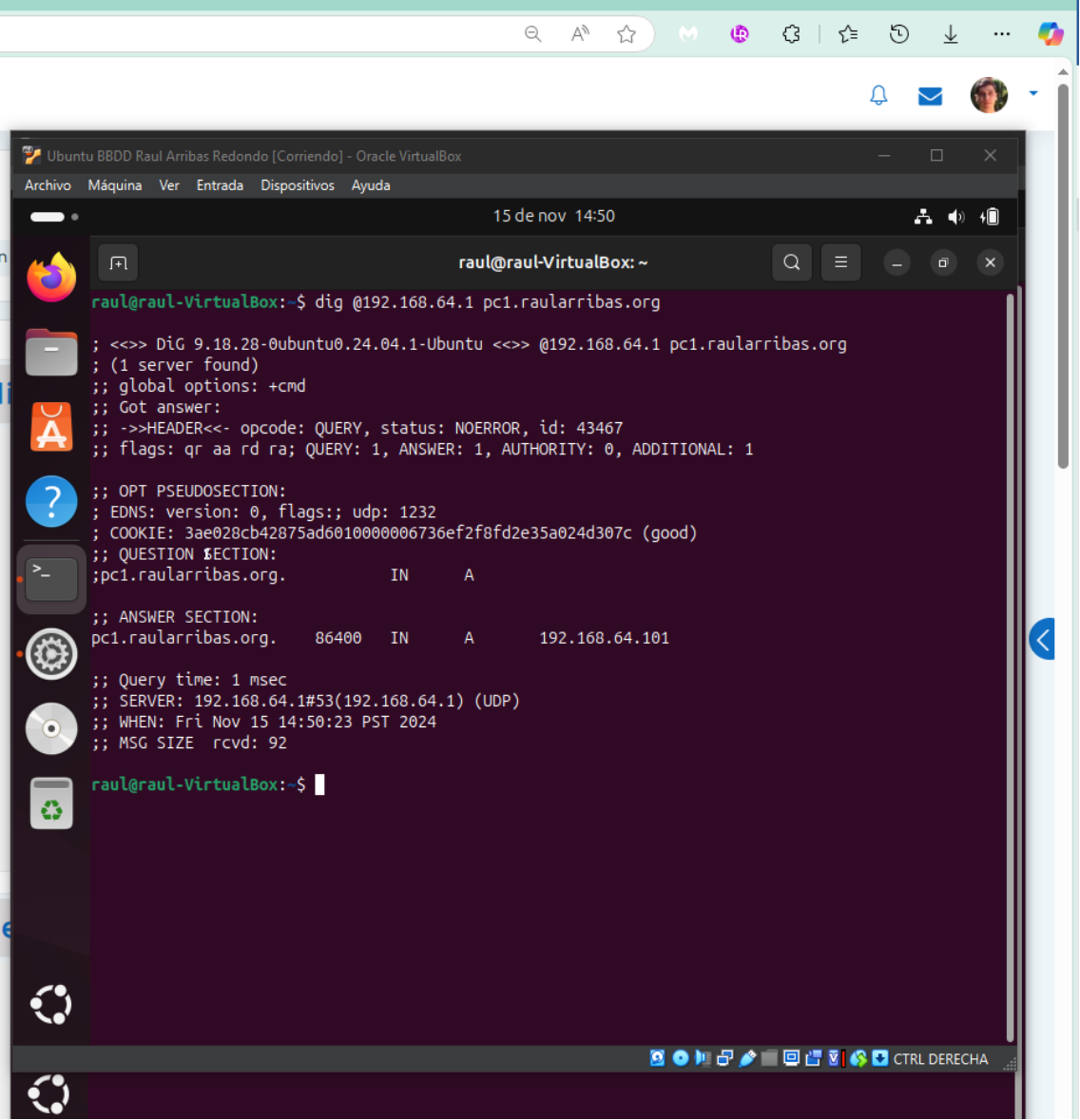
raul@server2:~$
```

4 COMPROBACIONES DESDE UN CLIENTE

Para hacer las comprobaciones las haremos desde un cliente, con red interna, y conectado a nuestro servidor DHCP que nos asigna la IP: 192.168.64.3.

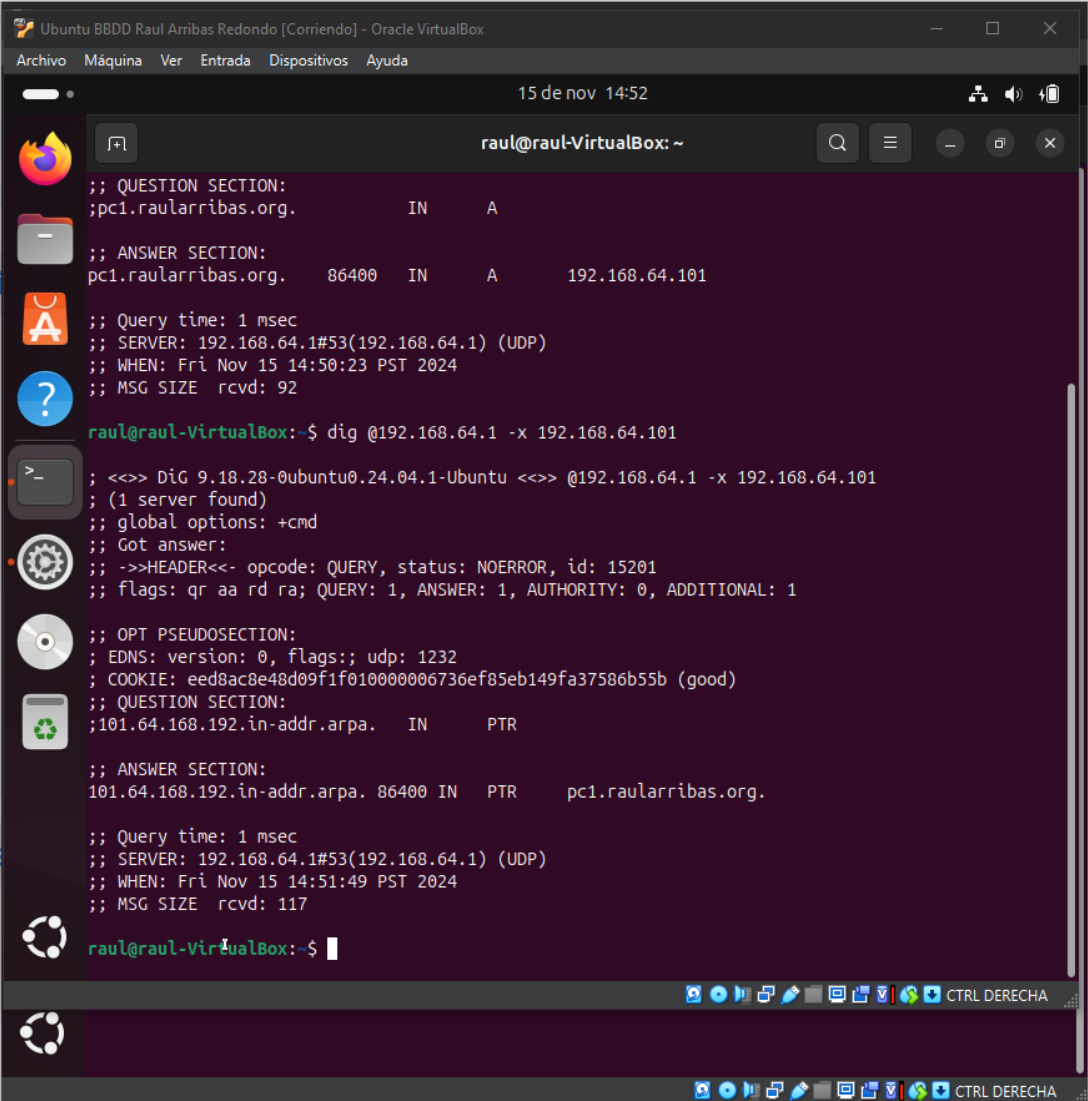
Verificamos que podemos resolver correctamente los nombres de los equipos, de forma directa e inversa:

- Directa
 - o **dig @192.168.64.1 pc1.raularribas.org**



```
raul@raul-VirtualBox: ~  
raul@raul-VirtualBox:~$ dig @192.168.64.1 pc1.raularribas.org  
; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @192.168.64.1 pc1.raularribas.org  
; (1 server found)  
;; global options: +cmd  
;; Got answer:  
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 43467  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1232  
; COOKIE: 3ae028cb42875ad6010000006736ef2f8fd2e35a024d307c (good)  
;; QUESTION SECTION:  
;pc1.raularribas.org.          IN      A  
  
;; ANSWER SECTION:  
pc1.raularribas.org.  86400   IN      A      192.168.64.101  
  
;; Query time: 1 msec  
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)  
;; WHEN: Fri Nov 15 14:50:23 PST 2024  
;; MSG SIZE rcvd: 92  
  
raul@raul-VirtualBox:~$
```

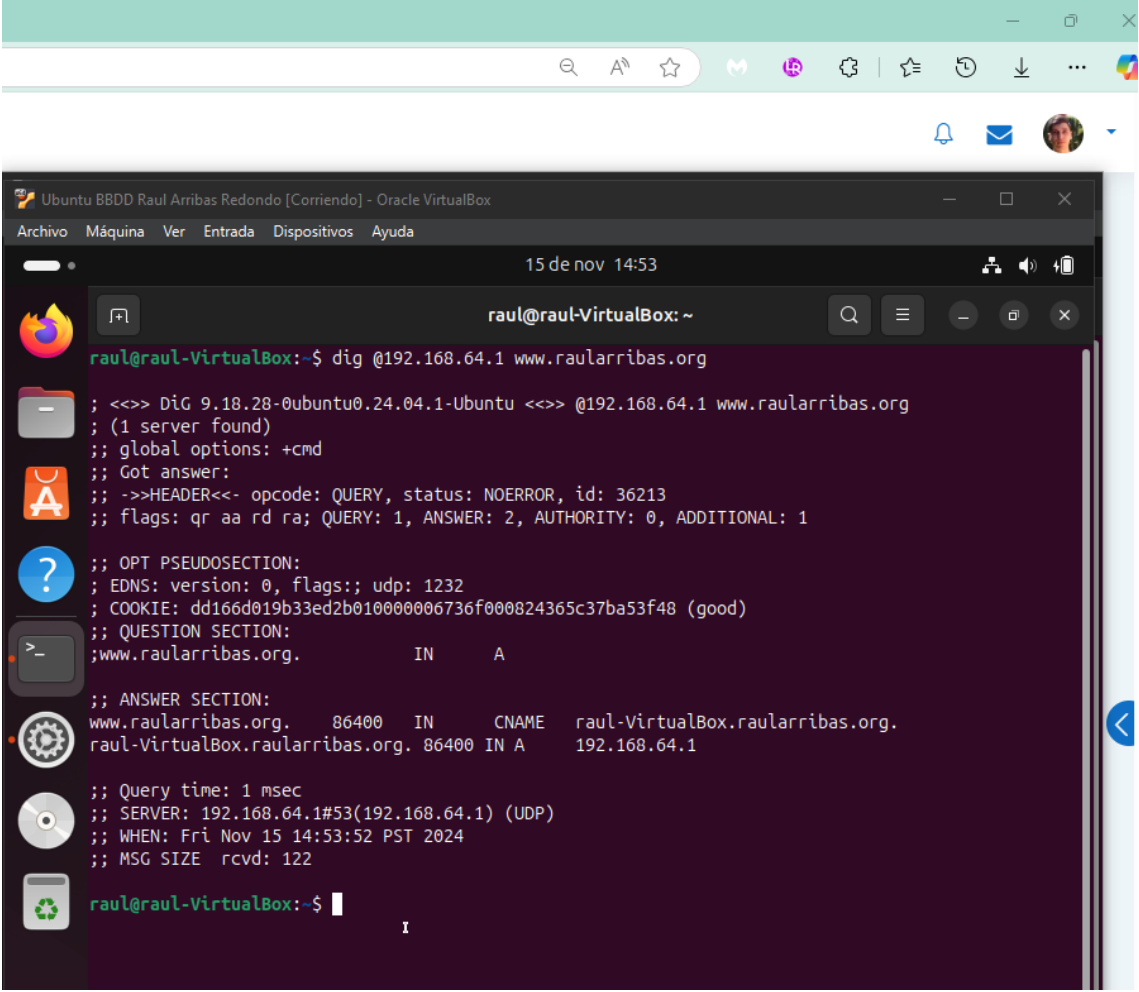
- Inversa
 - o **dig @192.168.64.1 -x 192.168.64.101**



The screenshot shows a terminal window titled "Ubuntu BBDD Raul Arribas Redondo [Corriendo] - Oracle VirtualBox". The terminal output displays the results of a DNS query for "pc1.raularribas.org". The first query is an A record lookup, and the second is a PTR record lookup. Both queries were successful and returned the expected IP address and domain name.

```
raul@raul-VirtualBox: ~  
;; QUESTION SECTION:  
;pc1.raularribas.org.      IN      A  
  
;; ANSWER SECTION:  
pc1.raularribas.org.      86400   IN      A      192.168.64.101  
  
;; Query time: 1 msec  
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)  
;; WHEN: Fri Nov 15 14:50:23 PST 2024  
;; MSG SIZE   rcvd: 92  
  
raul@raul-VirtualBox:~$ dig @192.168.64.1 -x 192.168.64.101  
  
;<<> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<> @192.168.64.1 -x 192.168.64.101  
; (1 server found)  
;; global options: +cmd  
;; Got answer:  
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 15201  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1232  
; COOKIE: eed8ac8e48d09f1f010000006736ef85eb149fa37586b55b (good)  
;; QUESTION SECTION:  
;101.64.168.192.in-addr.arpa.  IN      PTR  
  
;; ANSWER SECTION:  
101.64.168.192.in-addr.arpa. 86400 IN  PTR    pc1.raularribas.org.  
  
;; Query time: 1 msec  
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)  
;; WHEN: Fri Nov 15 14:51:49 PST 2024  
;; MSG SIZE   rcvd: 117  
  
raul@raul-VirtualBox:~$
```

4.1 Comprobar el funcionamiento de los ALIAS (CNAME):



The screenshot shows a web browser window at the top and a terminal window titled "Ubuntu BBDD Raul Arribas Redondo [Corriendo] - Oracle VM VirtualBox" below it. The terminal window has a menu bar with "Archivo", "Máquina", "Ver", "Entrada", "Dispositivos", and "Ayuda". The terminal shows the command `dig @192.168.64.1 www.raularribas.org` and its output. The output includes DNS header information, a CNAME record pointing to `raul-VirtualBox.raularribas.org`, and an A record pointing to `192.168.64.1`. The terminal also shows the query time, server information, and the message size.

```
raul@raul-VirtualBox:~$ dig @192.168.64.1 www.raularribas.org

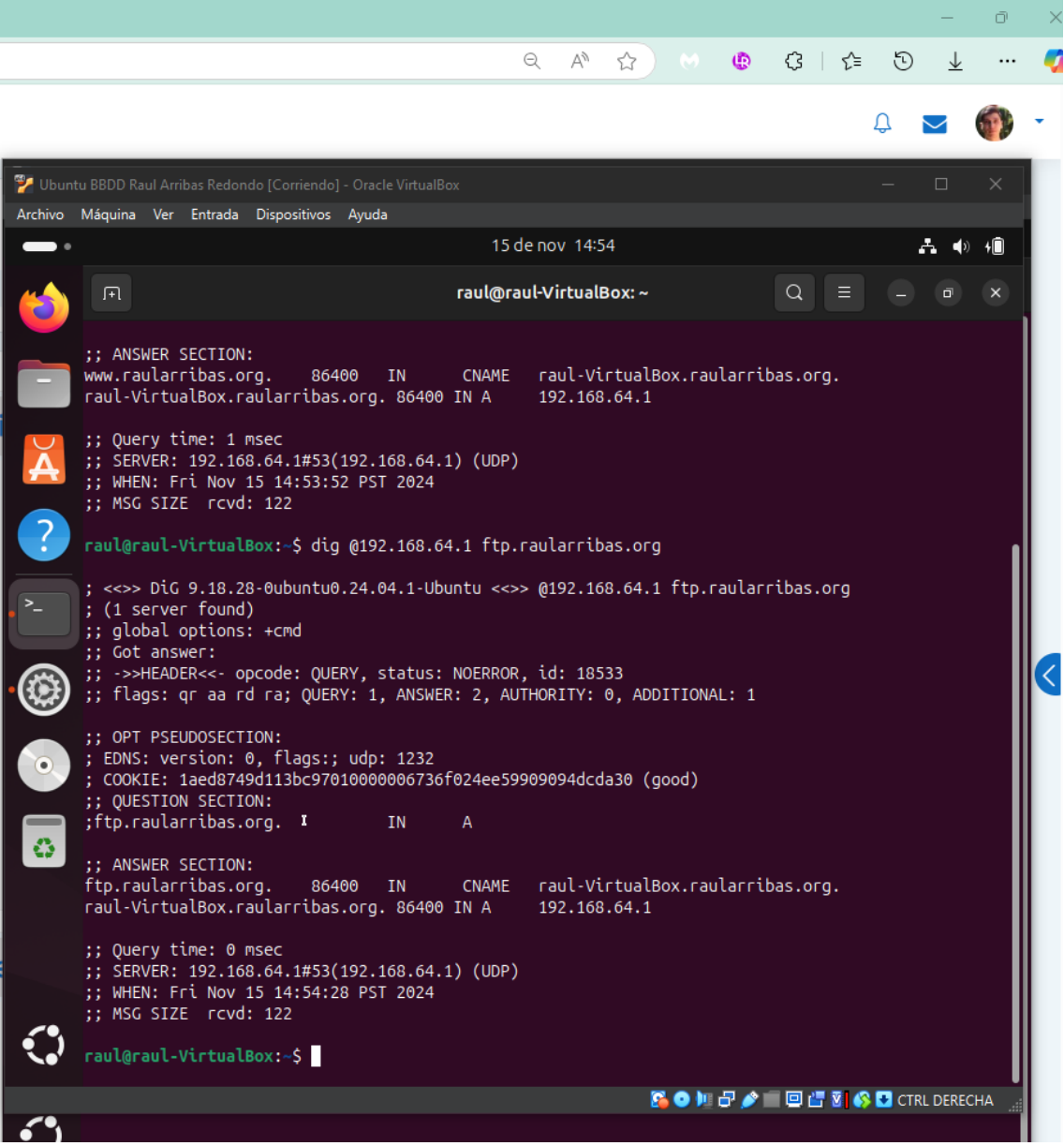
; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @192.168.64.1 www.raularribas.org
; (1 server found)
; global options: +cmd
; Got answer:
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 36213
; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: dd166d019b33ed2b010000006736f000824365c37ba53f48 (good)
;; QUESTION SECTION:
;www.raularribas.org.                IN      A

;; ANSWER SECTION:
www.raularribas.org.      86400   IN      CNAME   raul-VirtualBox.raularribas.org.
raul-VirtualBox.raularribas.org. 86400   IN      A       192.168.64.1

;; Query time: 1 msec
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)
;; WHEN: Fri Nov 15 14:53:52 PST 2024
;; MSG SIZE rcvd: 122

raul@raul-VirtualBox:~$
```



The screenshot shows a terminal window titled "Ubuntu BDD Raul Arribas Redondo [Corriendo] - Oracle VirtualBox". The terminal output displays the results of a DNS lookup for `raul-VirtualBox.raularribas.org` and `ftp.raularribas.org`. The first lookup for `raul-VirtualBox.raularribas.org` shows a CNAME record pointing to `raul-VirtualBox.raularribas.org` and an A record pointing to `192.168.64.1`. The second lookup for `ftp.raularribas.org` shows a CNAME record pointing to `raul-VirtualBox.raularribas.org` and an A record pointing to `192.168.64.1`. The terminal also shows the query time, server address, and message size for both lookups.

```
;; ANSWER SECTION:
www.raularribas.org. 86400 IN CNAME raul-VirtualBox.raularribas.org.
raul-VirtualBox.raularribas.org. 86400 IN A 192.168.64.1

;; Query time: 1 msec
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)
;; WHEN: Fri Nov 15 14:53:52 PST 2024
;; MSG SIZE rcvd: 122

raul@raul-VirtualBox:~$ dig @192.168.64.1 ftp.raularribas.org

<<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @192.168.64.1 ftp.raularribas.org
(1 server found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 18533
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

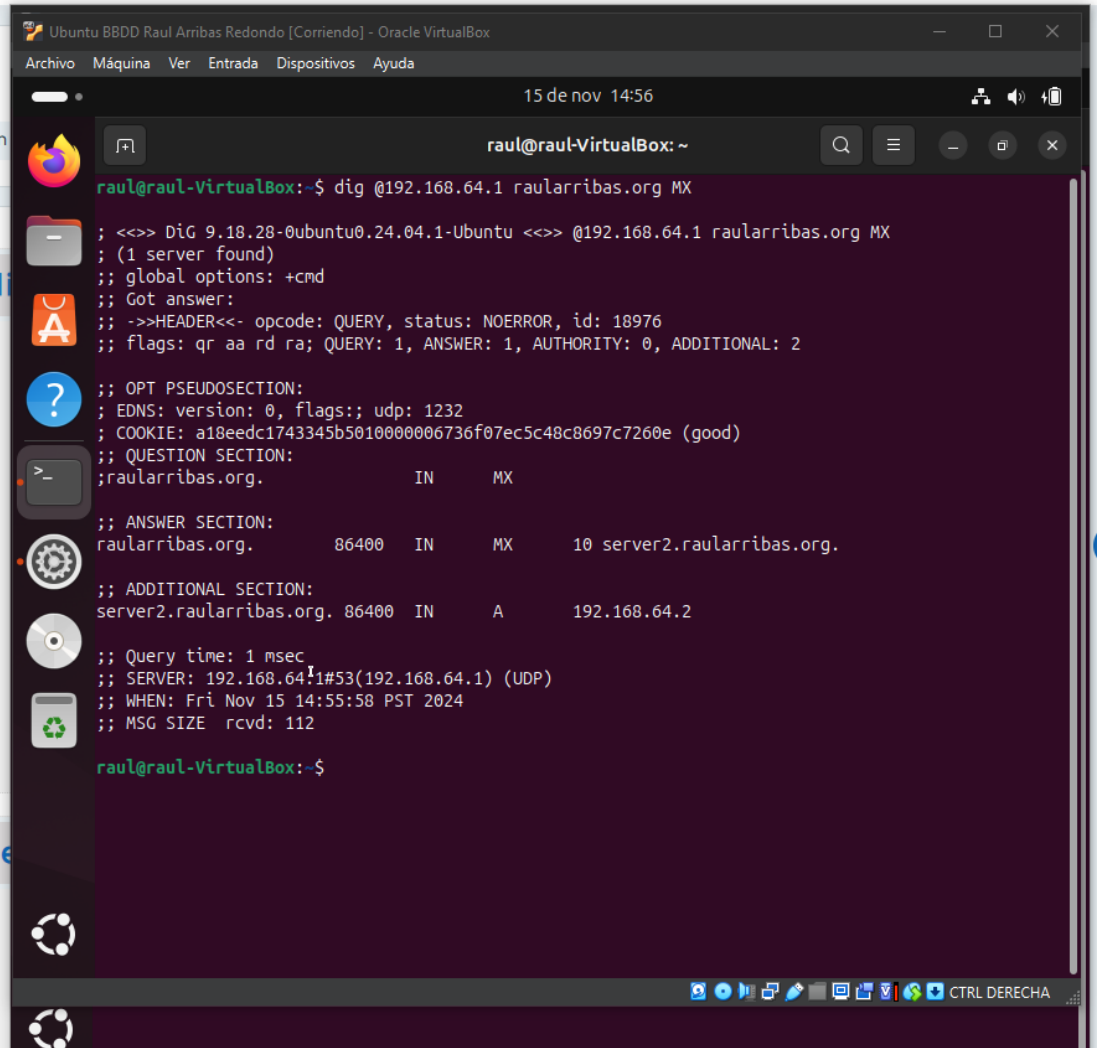
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 1aed8749d113bc97010000006736f024ee59909094dcda30 (good)
;; QUESTION SECTION:
;ftp.raularribas.org. IN A

;; ANSWER SECTION:
ftp.raularribas.org. 86400 IN CNAME raul-VirtualBox.raularribas.org.
raul-VirtualBox.raularribas.org. 86400 IN A 192.168.64.1

;; Query time: 0 msec
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)
;; WHEN: Fri Nov 15 14:54:28 PST 2024
;; MSG SIZE rcvd: 122

raul@raul-VirtualBox:~$
```

4.2 Verificar la resolución del correo



The screenshot shows a terminal window titled "Ubuntu BDD Raul Arribas Redondo [Corriendo] - Oracle VirtualBox". The terminal is running a command to check the MX record for raularribas.org using the dig command. The output shows the query details, the MX record pointing to server2.raularribas.org, and the IP address 192.168.64.2.

```
raul@raul-VirtualBox:~$ dig @192.168.64.1 raularribas.org MX

; <<>> DiG 9.18.28-0ubuntu0.24.04.1-Ubuntu <<>> @192.168.64.1 raularribas.org MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 18976
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: a18eedc1743345b5010000006736f07ec5c48c8697c7260e (good)
;; QUESTION SECTION:
;raularribas.org.                IN      MX

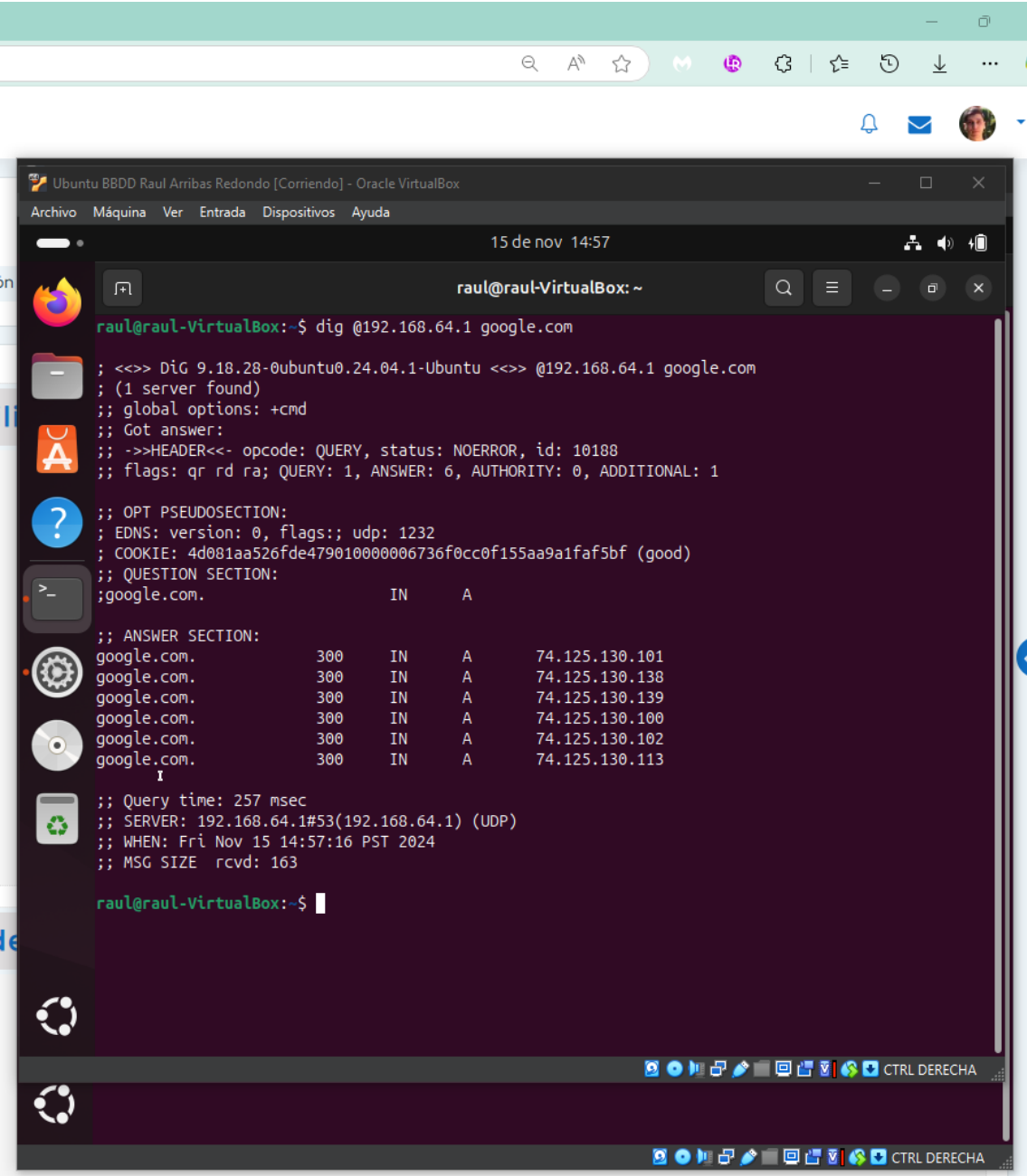
;; ANSWER SECTION:
raularribas.org.                86400   IN      MX      10 server2.raularribas.org.

;; ADDITIONAL SECTION:
server2.raularribas.org. 86400   IN      A       192.168.64.2

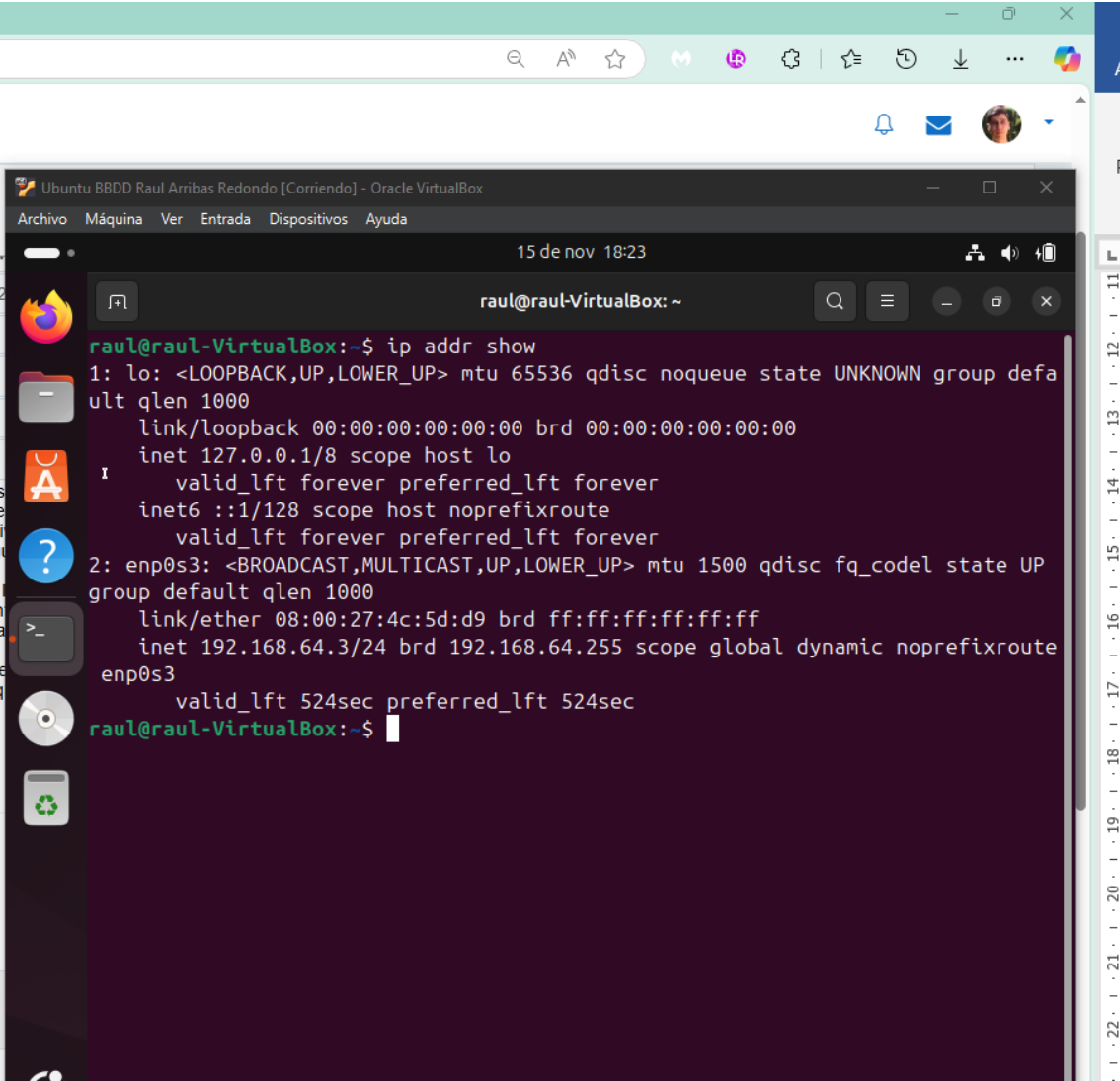
;; Query time: 1 msec
;; SERVER: 192.168.64.1#53(192.168.64.1) (UDP)
;; WHEN: Fri Nov 15 14:55:58 PST 2024
;; MSG SIZE rcvd: 112

raul@raul-VirtualBox:~$
```

4.3 Comprobaciones de los reenviadores



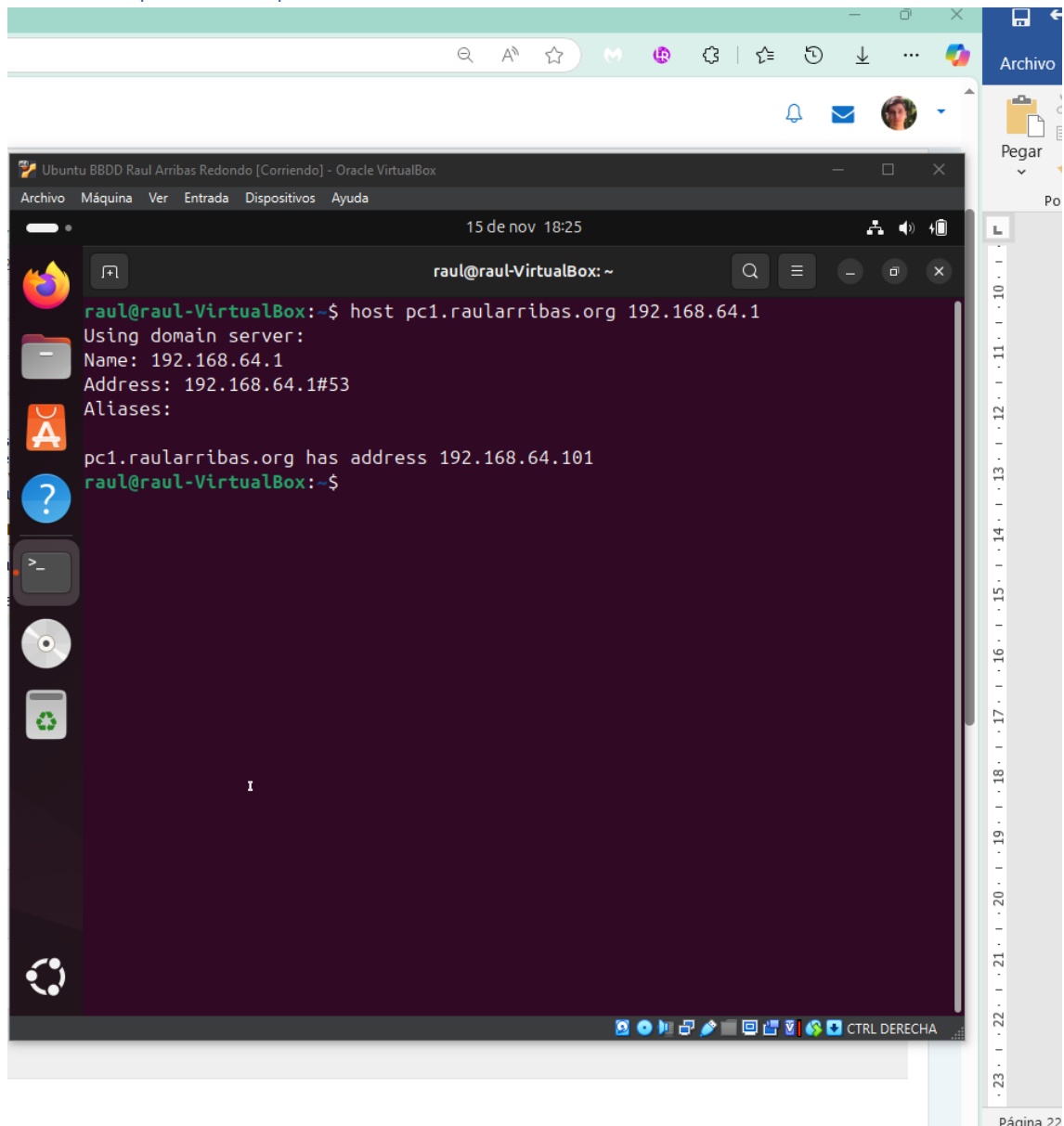
4.4 Comprobación por IP



The screenshot shows a terminal window titled "Ubuntu BBDD Raul Arribas Redondo [Corriendo] - Oracle VirtualBox". The terminal displays the output of the command `ip addr show`. The output shows two network interfaces: `lo` (loopback) and `enp0s3` (ethernet). The `lo` interface has an IP address of `127.0.0.1` and a scope of `host`. The `enp0s3` interface has an IP address of `192.168.64.3` and a scope of `global`. The terminal window is running on a host named `raul@raul-VirtualBox`.

```
raul@raul-VirtualBox:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defa
    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 08:00:27:4c:5d:d9 brd ff:ff:ff:ff:ff:ff
    inet 192.168.64.3/24 brd 192.168.64.255 scope global dynamic noprefixroute
        enp0s3
        valid_lft 524sec preferred_lft 524sec
raul@raul-VirtualBox:~$
```

4.5 Comprobación por Host



5 CONCLUSIÓN

En esta práctica configuré un servidor DNS primario y uno secundario usando BIND para manejar la resolución de nombres en mi dominio. Creé zonas de resolución directa e inversa con registros como A, CNAME y MX para convertir nombres en direcciones IP y al revés. Aprendí a hacer que estos servidores se comuniquen para compartir información.

Probé que todo funcionara bien usando comandos como dig y nslookup para ver cómo se resolvían los nombres. Tuve que asegurarme de que el sistema usara mi servidor DNS configurado, lo que me ayudó a entender mejor cómo se manejan estas consultas.