Ecole Supérieure Privée
d'Ingénierie et de Technologies

Ubuntu

configure DNS Service

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Networks and systems administration

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(BIND DNS)

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1. Introduction

The DNS service is a TCP/IP service that enables the matching between domain names and IP addresses.

Goals:

- Configure local resolver
- Configure an IPV4 DNS server.
- Integration part between DNS and WEB server.

Before we begin installation of the necessary packages, we run the updated Ubuntu server:

```
sudo -s
# apt update -y
```

We can also use:

```
sudo apt update –fix-missing && apt upgrade -y

// upgrade runs if update is successful
```

2. Service installation

Download the necessary packages from Ubuntu base:

Next, we're going to install three packages on our DNS server:

- **bind9** - The BIND 9 DNS server software.
- **bind9utils** - Utilities that make working with BIND 9 easier.
- **bind9-doc** - A documentation package for BIND 9.

```
#apt install -y bind9 bind9utils bind9-doc dnsutils
```

After installation, the BIND 9 service should be running. We check the status with this command:

```
systemctl status bind9
```

3. Configure the Bind DNS Server

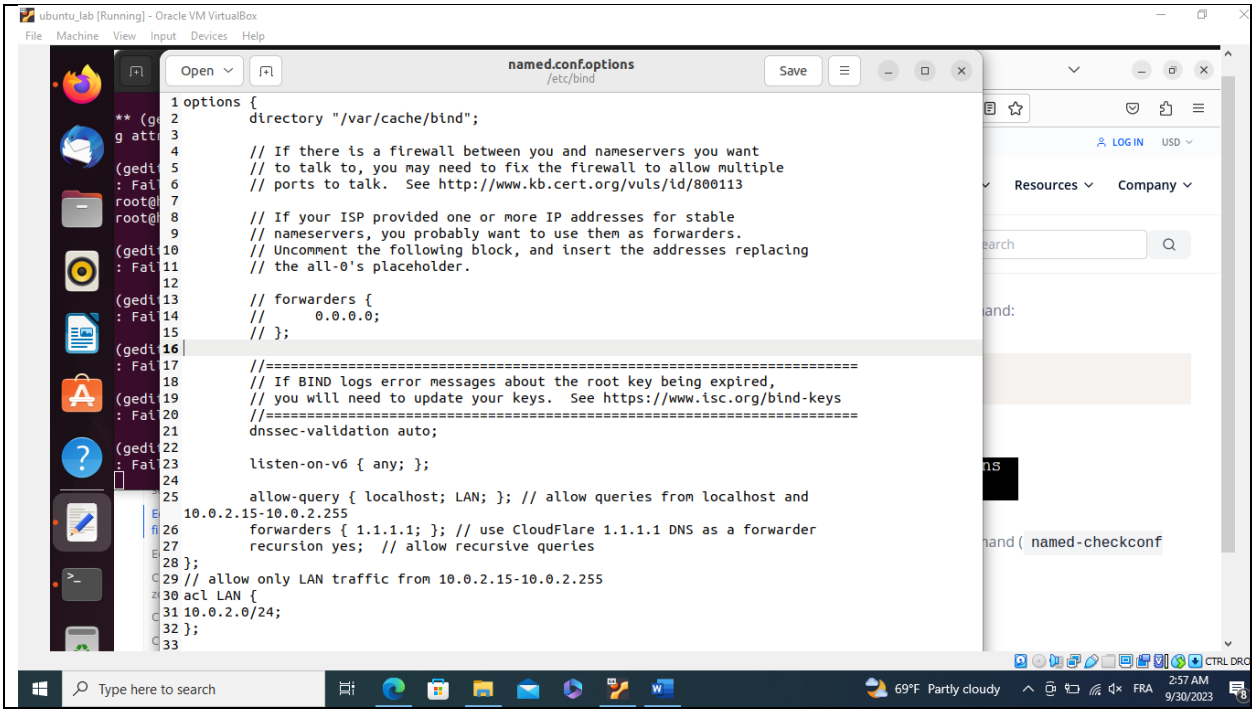
The named.conf file is BIND 9's main configuration file. That main file includes a reference to /etc/bind/named.conf.options where we can specify options we need for our configuration. We'll make four modifications to the /etc/bind/named.conf.options file:

- An acl directive that defines our local area network (LAN).
- An allow-query directive that defines what IP addresses can send DNS queries to the server.
- A forwarders directive that defines what DNS servers this server will forward recursive queries to.
- A recursion directive that allows recursive DNS queries to the server

To make those changes, open **/etc/bind/named.conf.options** in a text editor

Edit the **named.conf.options** file

```
#gedit  /etc/bind/named.conf.options
```



After you make the changes, check the syntax of the file with the named-checkconf command:

```
#named-checkconf /etc/bind/named.conf.options
```

Note: If the syntax is correct, the command should not return any output.

Now update named service

```
#named -V
# ss -lnptu | grep named

#ufw allow in from 10.0.2.0/24 to any port 53

#ufw allow in from 192.168.121.0/24 to any port 53


#systemctl restart named
#systemctl enable named
```

The DNS main configuration directory is /etc/bind.

It contains the zone-lookup files

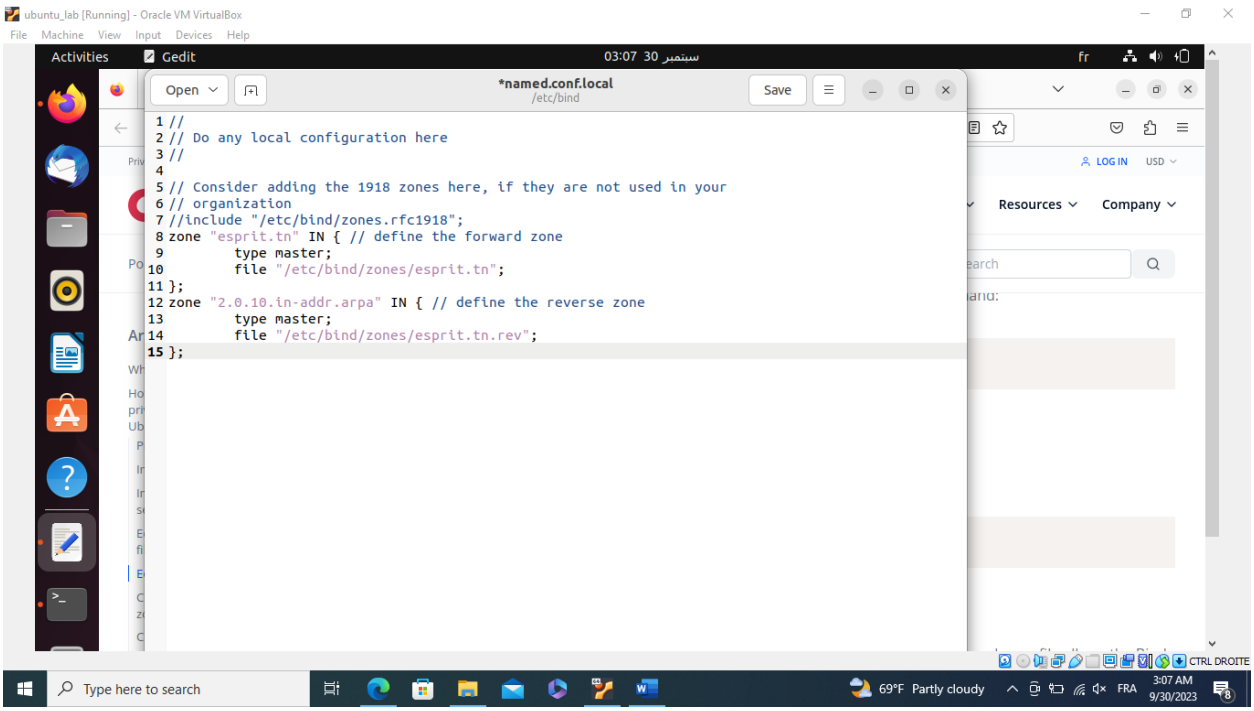
The global DNS configuration file is located at /etc/bind/named.conf

For local configuration, we use the next file instead: /etc/bind/named.conf.local.

The named.conf.local is typically used to define local DNS zones for a private domain. We will update this file to include our forward and reverse DNS zones.

Create forward and reverse zones in the file:

- **esprit.tn** is the zone name.
- **esprit.tn.rev** is the name of the forward lookup zone.



4. Configure Bind DNS zone lookup files

Next, we'll create a directory to store the zone files we specified in the previous step.

```
Mkdir/etc/bind/zones
```

- **Create the forward zone lookup file**

Now, we'll create a corresponding zone file /etc/bind/zones/esprit.tn. The forward zone file allows the Bind DNS server to resolve names (like bindserver. esprit.tn) to IP addresses (like 10.0.2.15).

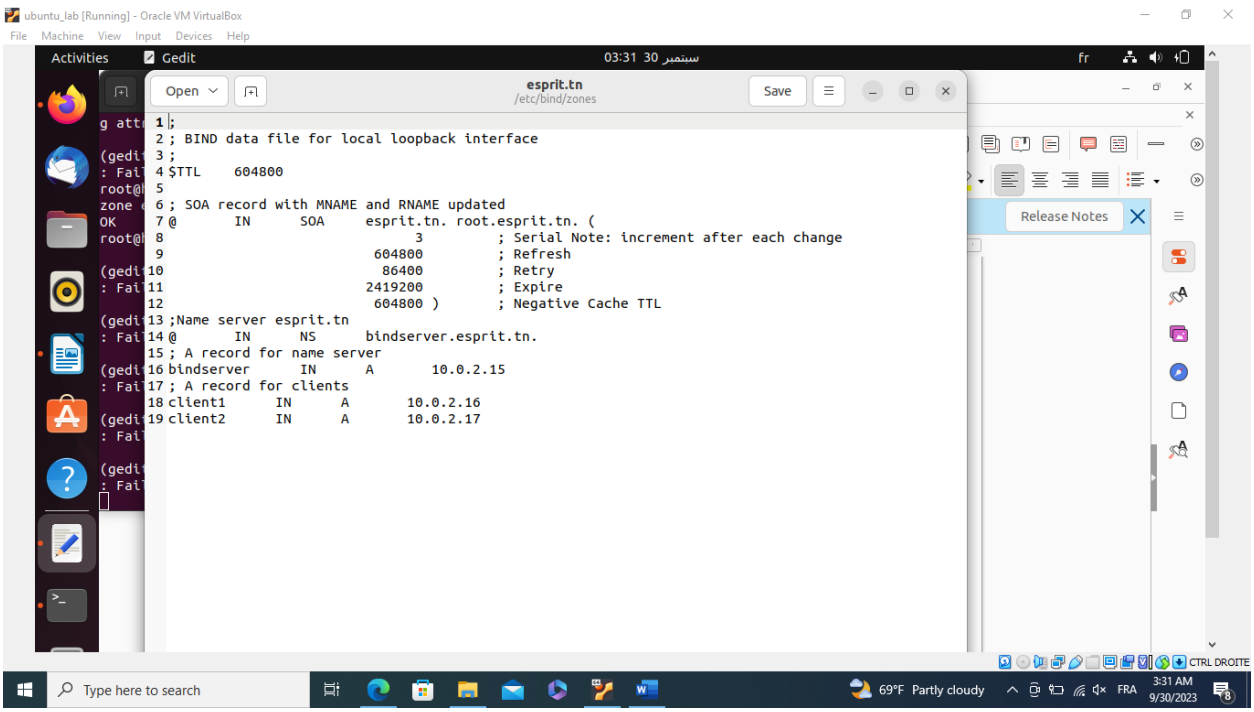
First, copy the default db.local zone file to /etc/bind/zones/ esprit.tn:

```
#cp /etc/bind/db.local /etc/bind/zones/esprit.tn
#gedit /etc/bind/zones/esprit.tn
```

Note: the zone file syntax, domain names should end with a dot (.)

The acronyms on the file have the following description:

- **SOA** – Start of Authority
- **NS** – Name Server
- **A** – A record
- **MX** – Mail for Exchange
- **CN** – Canonical Name



- **<u>Create the reverse zone lookup file</u>**

Now, we'll create a corresponding reverse zone file /etc/bind/zones/ esprit.tn.rev. The reverse zone file allows the Bind DNS server to resolve IP addresses (like 10.0.2.15) to names (like bindserver.esprit.tn). First, copy the default db.local zone file to /etc/bind/zones/ esprit.tn.rev

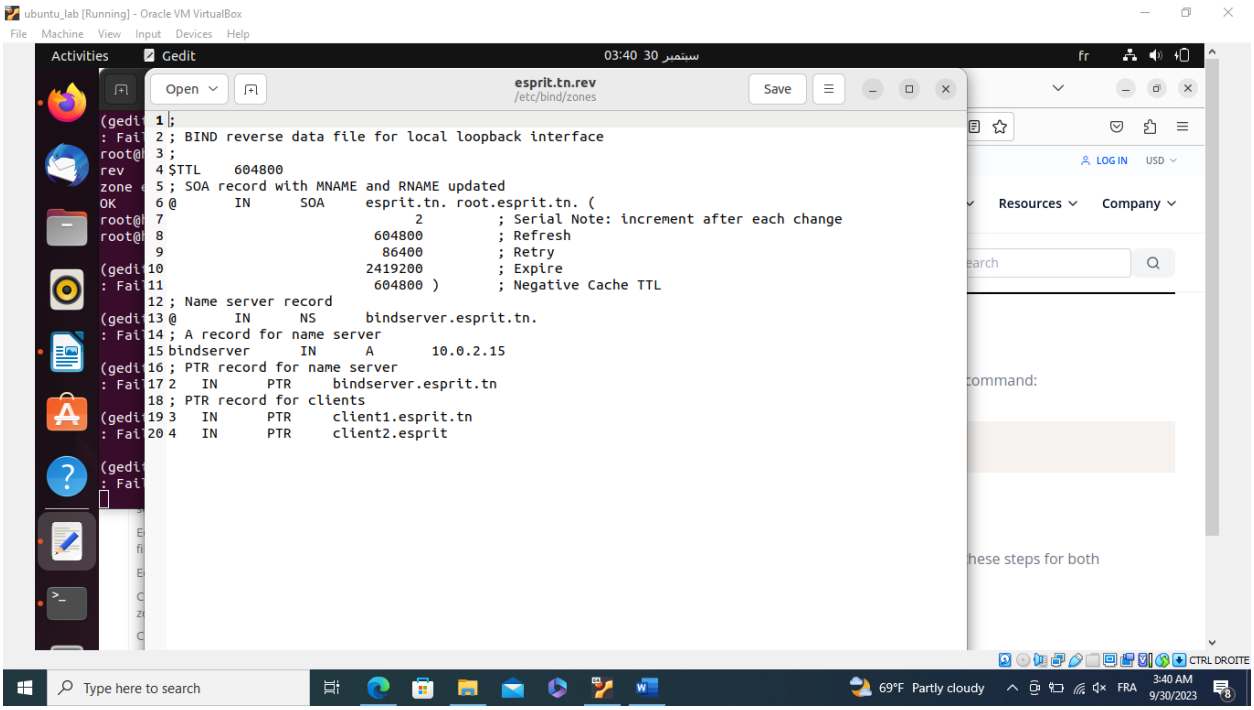
```
#cp /etc/bind/db.127 /etc/bind/zones/esprit.tn.rev
```

Open /etc/bind/zones/esprit.tn.rev in a text editor and make the changes indicated in the figure below:

```
#gedit /etc/bind/zones/esprit.tn.rev
```

Note: The acronyms in the revese zone file are:

- **PTR** – Pointer
- **SOA** – Start of Authority



5. Check BIND DNS syntax

The named-checkconf command is used to check if the syntax is okay or if there is any error. The command should return to shell if there is no error

```
sudo named-checkconf
```

The named-checkzone command is used to check the syntax of the forward and reverse zone files:

```
#forward zone file

sudo named-checkzone esprit.tn  /etc/bind/zones/esprit.tn

#reverse zone file
```

```
sudo named-checkzone  esprit.tn.rev /etc/bind/zones/esprit.tn.rev
```

The output should be:

```
root@hajjoura-VirtualBox:~# sudo named-checkzone esprit.tn /etc/bind/zones/esprit.tn
zone esprit.tn/IN: loaded serial 3
OK
```

```
root@hajjoura-VirtualBox:~# sudo named-checkzone esprit.tn.rev /etc/bind/zones/esprit.tn.rev
zone esprit.tn.rev/IN: loaded serial 2
OK
```

Finally restart BIND service:

6. Updating Bind DNS Records

A DNS record should be updated in both the /etc/bind/zones files.

```
#systemctl restart named
#systemctl enable named
#systemctl restart bind9
#systemctl status bind9
```

7. Testing the DNS Server

Let's test our DNS resolution using the dig command. The dig command is used to get the information about a domain name, this includes things like the DNS server, the IP of the domain, the MX records, etc.

```
Sudo dig -a www.esprit.tn @10.0.2.15
```

```
root@hajjoura-VirtualBox:~# dig a www.esprit.tn @10.0.2.15

; <<>> DiG 9.18.12-0ubuntu0.22.04.3-Ubuntu <<>> a www.esprit.tn @10.0.2.15
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 5431
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: bff0cabe8e3979ac010000006517d2fadca77eafd6f250b2 (good)
;; QUESTION SECTION:
;www.esprit.tn.                 IN      A

;; AUTHORITY SECTION:
esprit.tn.              604800  IN      SOA     esprit.tn. root.esprit.tn. 3 604800 86400 2419200 604800

;; Query time: 44 msec
;; SERVER: 10.0.2.15#53(10.0.2.15) (UDP)
;; WHEN: Sat Sep 30 08:49:14 CET 2023
;; MSG SIZE  rcvd: 111
```

To check the reverse DNS: use dig -x your_ip_address

#dig -x 10.0.2.15

```
root@hajjoura-VirtualBox:~# dig -x 10.0.2.15

; <<>> DiG 9.18.12-0ubuntu0.22.04.3-Ubuntu <<>> -x 10.0.2.15
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 31902
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;15.2.0.10.in-addr.arpa.                IN      PTR

;; ANSWER SECTION:
15.2.0.10.in-addr.arpa. 0       IN      PTR     hajjoura-VirtualBox.
15.2.0.10.in-addr.arpa. 0       IN      PTR     hajjoura-VirtualBox.local.

;; Query time: 80 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Sat Sep 30 09:55:47 CET 2023
;; MSG SIZE  rcvd: 123
```

This is a working proof that both the forward and reverse zone lookups are working fine.

8. Integration Part

After testing the DNS server using **DIG** command now try to test the function of the four sites created in TP1(web server) add the modification needed and check it using the browser.

On any client machine, change its DNS server to our newly deployed server. In our case, it is 10.0.2.15

9. Conclusion

We have successfully deployed a local DNS server on Ubuntu 22.04. So as an administrator in your local network, you can now manage your systems and applications. You could have your applications communicating via the domain names. When IPs changes, you have to re-configure your applications.

10. References

[1] web_link1: https://www.cherryservers.com/blog/how-to-install-and-configure-a-private-bind-dns-server-on-ubuntu-22-04

[2] web_link2: https://askubuntu.com/questions/1297425/server-cant-find-servfail-bind9-dns-server-setup

[3] web_link3 : https://www.linuxbabe.com/ubuntu/set-up-local-dns-resolver-ubuntu-20-04-bind9