DNS ACT1

DNS PRACTICE – DAW2

Environment we will simulate

The businessman Equipamientos Industriales Homero S.A. (EIHSA) has acquired a .com domain and has commissioned you to install and configure the primary and secondary servers of the domain authority.
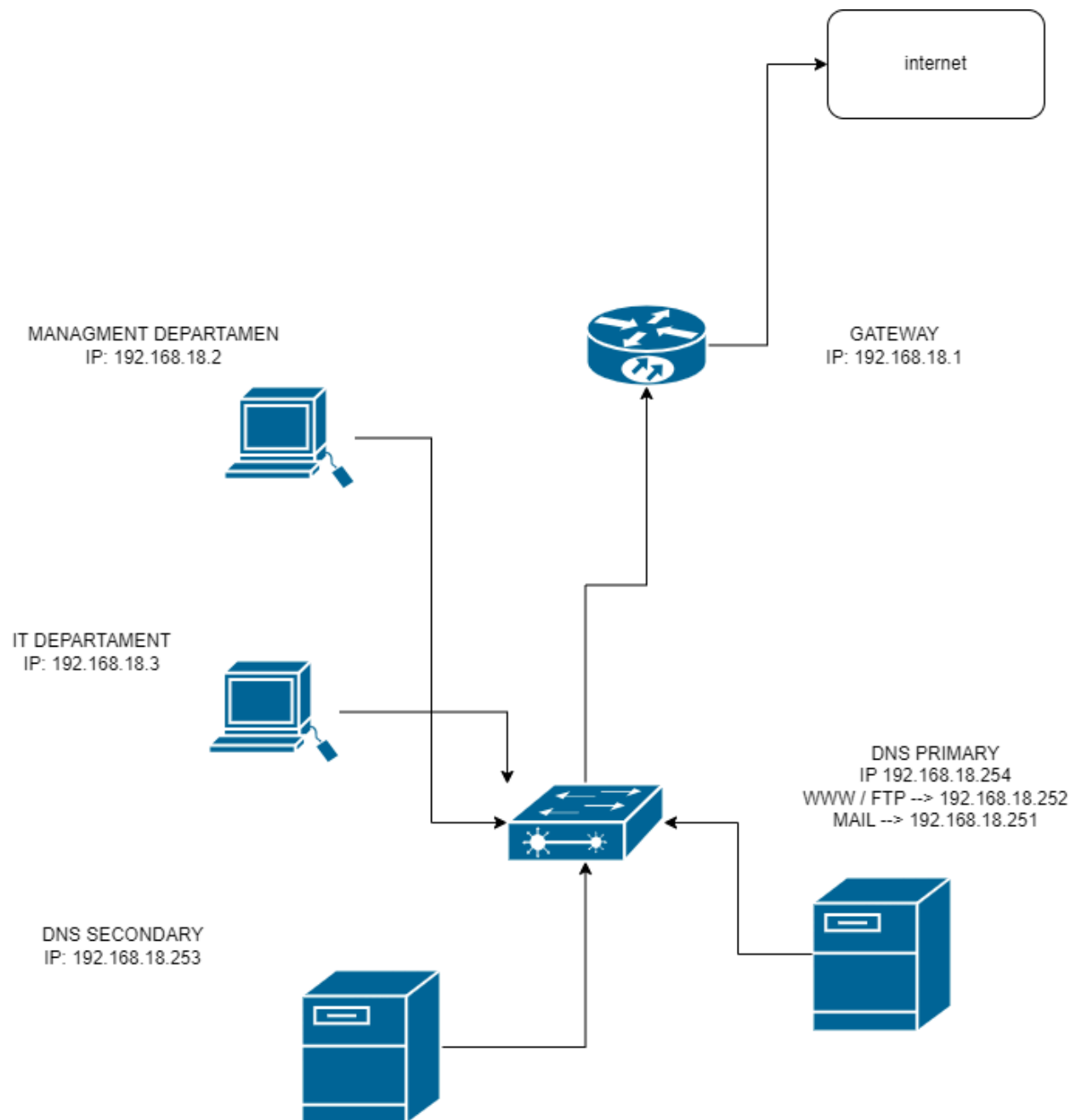
For the simulation, use the following relationship between machine names and IPs:

Name	IP	Description
router	192.168.x.1	Gateway
NS1	NS1 virtual Machine	Name Server 1 (Primary DNS Server)
NS2	NS2 virtual Machine	Name Server 2 (Secondary DNS Server)
www	192.168.x.252	Web server
FTP	192.168.x.252	FTP server (located on the same www machine)
mail	192.168.x.251	Mail Server
management	192.168.x.2	Management computer
Inf	192.168.x.3	Computer IT department

A. Installation planning

A.1. With the DÍA or similar software, you make a physical and logical diagram of the network where the different equipment and devices are shown, as well as their IPs and DNS names.

Insert physical/logical schematic of the network.

A.2. Indicate which registers will be required to configure the direct resolution zone and the values of the configuration parameters for each register.

Indicate the required registers and the value of the different configuration parameters

```
@       IN      NS      ns1.eihsa.
@       IN      NS      ns2.eihsa.
ns1     IN      A       192.168.18.254
ns2     IN      A       192.168.18.253
www     IN      A       192.168.18.252
```

```
ftp          IN     A        192.168.18.252
mail         IN     MX       192.168.18.251
management   IN  A           192.168.18.2
inf          IN     A        192.168.18.3
```

A.3. Indicate which registers will be required to configure the reverse resolution zone and the values of the configuration parameters for each register.

Indicate the required registers and the value of the different configuration parameters

```
@        IN      NS      ns1.eihsa.
@        IN      NS      ns2.eihsa.
254      IN      PTR     ns1.eihsa.
253      IN      PTR     ns2.eihsa.
252      IN      PTR     www.eihsa.
252      IN      PTR     ftp.eihsa.
251      IN      PTR     mail.eihsa.
2        IN      PTR     management.eihsa.
3        IN      PTR     inf.eihsa.
```

B. DNS Server Installation and Forwarder Operation

From this section, the virtual machine network must be configured as a bridge adapter.

B.1. Assign a static network configuration to the NS1 server according to the IP that corresponds to your virtual machine

Insert screenshot

```
  GNU nano 6.2                                    00-installer-config.yaml *
# This is the network config written by 'subiquity'
network:
  ethernets:
    enp0s3:
      dhcp4: true
    enp0s8:
      addresses: [192.168.18.254/24]
      gateway4: 192.168.18.1
      nameservers:
        search: [eihsa]
        addresses: [192.168.18.254]
  version: 2
```

B.2. . Install the bind9 DNS server software.

Insert screenshot and answer, if applicable, the question

```
root@server:/etc/netplan# dpkg -l | grep bind9
ii  bind9                          1:9.18.28-0ubuntu0.22.04.1          amd64        Internet Domain Name Ser
ii  bind9-dnsutils                 1:9.18.28-0ubuntu0.22.04.1          amd64        Clients provided with B
ii  bind9-doc                      1:9.18.28-0ubuntu0.22.04.1          all          Documentation for BIND
ii  bind9-host                     1:9.18.28-0ubuntu0.22.04.1          amd64        DNS Lookup Utility
ii  bind9-libs:amd64               1:9.18.28-0ubuntu0.22.04.1          amd64        Shared Libraries used b
ii  bind9-utils                    1:9.18.28-0ubuntu0.22.04.1          amd64        Utilities for BIND 9
ii  dnsutils                       1:9.18.28-0ubuntu0.22.04.1          all          Transitional package fo
nsutils
root@server:/etc/netplan# systemctl status bind9.service
● named.service - BIND Domain Name Server
     Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
     Active: active (running) since Mon 2024-09-23 13:51:36 UTC; 42min ago
       Docs: man:named(8)
   Main PID: 1745 (named)
      Tasks: 5 (limit: 2204)
     Memory: 5.6M
        CPU: 163ms
     CGroup: /system.slice/named.service
             └─1745 /usr/sbin/named -u bind

Sep 23 13:51:36 server named[1745]: FORMERR resolving './NS/IN': 202.12.27.33#53
Sep 23 13:51:36 server named[1745]: resolver priming query complete: failure
Sep 23 14:28:23 server named[1745]: no longer listening on 10.0.2.15#53
Sep 23 14:28:23 server named[1745]: no longer listening on 192.168.18.254#53
Sep 23 14:28:23 server named[1745]: listening on IPv4 interface enp0s3, 10.0.2.15#53
Sep 23 14:28:23 server named[1745]: listening on IPv4 interface enp0s8, 192.168.18.254#53
Sep 23 14:28:23 server named[1745]: no longer listening on 192.168.18.254#53
Sep 23 14:28:23 server named[1745]: no longer listening on 10.0.2.15#53
Sep 23 14:28:23 server named[1745]: listening on IPv4 interface enp0s8, 192.168.18.254#53
Sep 23 14:28:23 server named[1745]: listening on IPv4 interface enp0s3, 10.0.2.15#53
root@server:/etc/netplan# _
```

B.3.You show the contents of the configuration file /etc/bind/named.conf. What is the use of the include directive? What files are included?

Insert screenshot and answer the questions

- the directive "Include" means that when the "named.conf" file is executed, it will sequentially execute the files that have been specified.

```
  GNU nano 6.2                                              named.conf
// This is the primary configuration file for the BIND DNS server named.
//
// Please read /usr/share/doc/bind9/README.Debian.gz for information on the
// structure of BIND configuration files in Debian, *BEFORE* you customize
// this configuration file.
//
// If you are just adding zones, please do that in /etc/bind/named.conf.local

include "/etc/bind/named.conf.options";
include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";
```

B.4. You look for which file, within the configuration directory /etc/bind/ you find the IP addresses of the root servers and show their content.

Insert screenshot

- In the file... all the information about the root IP's is indicated.

```
  GNU nano 6.2                                     named.conf.default-zones
// prime the server with knowledge of the root servers
zone "." {
        type hint;
        file "/usr/share/dns/root.hints";
};

// be authoritative for the localhost forward and reverse zones, and for
// broadcast zones as per RFC 1912

zone "localhost" {
        type master;
        file "/etc/bind/db.local";
};

zone "127.in-addr.arpa" {
        type master;
        file "/etc/bind/db.127";
};

zone "0.in-addr.arpa" {
        type master;
        file "/etc/bind/db.0";
};

zone "255.in-addr.arpa" {
        type master;
        file "/etc/bind/db.255";
};
```
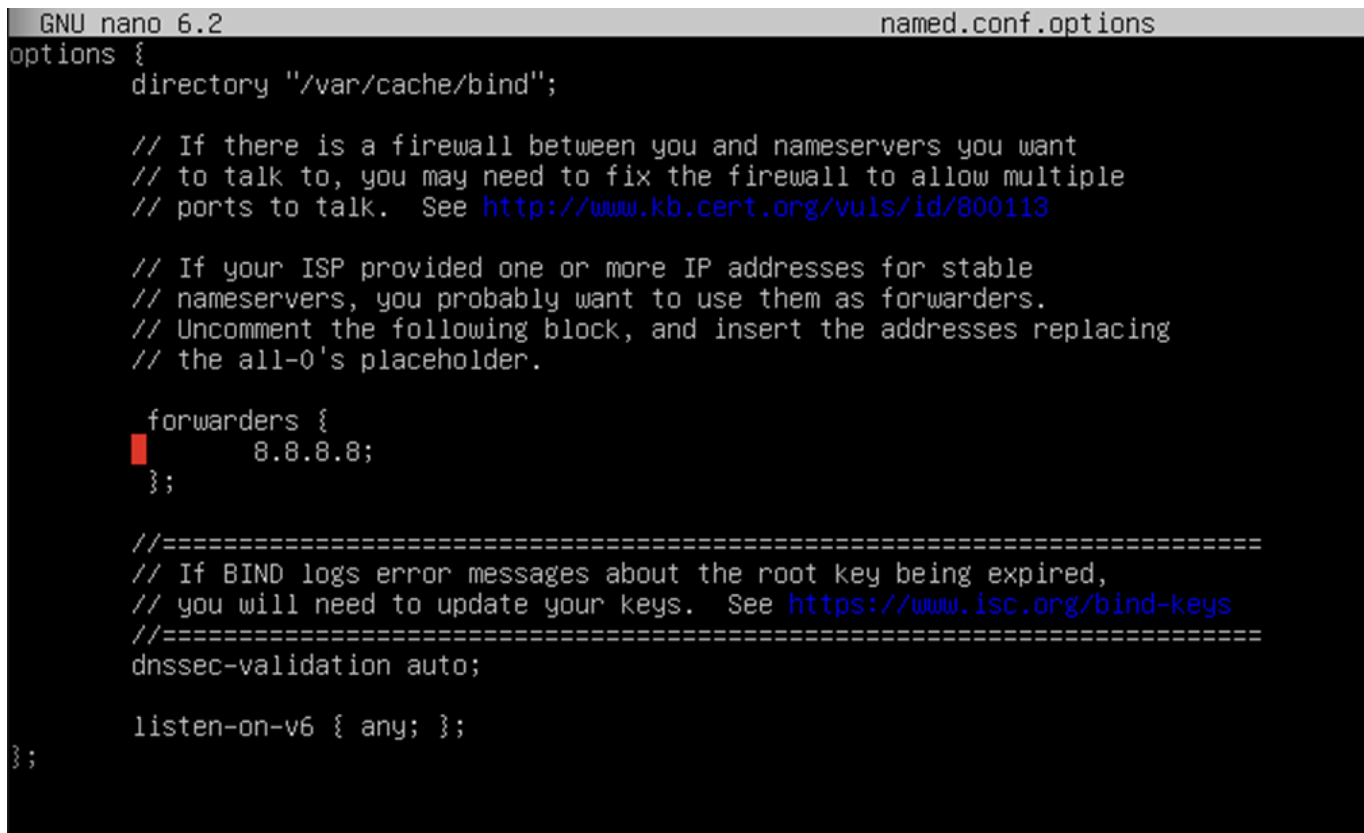
B.5. You configure forwarders to the named.conf.options file.

Insert screenshot

```
  GNU nano 6.2                                     named.conf.options
options {
        directory "/var/cache/bind";

        // If there is a firewall between you and nameservers you want
        // to talk to, you may need to fix the firewall to allow multiple
        // ports to talk.  See http://www.kb.cert.org/vuls/id/800113

        // If your ISP provided one or more IP addresses for stable
        // nameservers, you probably want to use them as forwarders.
        // Uncomment the following block, and insert the addresses replacing
        // the all-0's placeholder.

        forwarders {
                8.8.8.8;
        };

        //========================================================================
        // If BIND logs error messages about the root key being expired,
        // you will need to update your keys.  See https://www.isc.org/bind-keys
        //========================================================================
        dnssec-validation auto;

        listen-on-v6 { any; };
};
```

B.6. You configure your server and a client so that they have the DNS server you are configuring. You check the result of the *resolve status* command to check the configuration of the Name Resolution System (DNS).

```
root@server:/etc/netplan# resolvectl status
Global
        Protocols: -LLMNR -mDNS -DNSOverTLS DNSSEC=no/unsupported
resolv.conf mode: stub

Link 2 (enp0s3)
    Current Scopes: DNS
         Protocols: ████████████████████████████████████████
Current DNS Server: ████████
        DNS Servers: █████████
        DNS Domain: ████████████t

Link 3 (enp0s8)
    Current Scopes: DNS
         Protocols: +DefaultRoute +LLMNR -mDNS -DNSOverTLS DNSSEC=no/unsupported
Current DNS Server: 192.168.18.254
        DNS Servers: 192.168.18.254
        DNS Domain: eihsa
```

B.7. Install the dnsutils package and check that your server performs the catching correctly by testing dig, nslookup and host requests

```
root@server:/etc# dig eihsa

; <<>> DiG 9.18.28-0ubuntu0.22.04.1-Ubuntu <<>> eihsa
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 63038
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;eihsa.                         IN      A

;; ANSWER SECTION:
eihsa.                 0        IN      A       192.168.18.254

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Wed Sep 25 15:26:08 UTC 2024
;; MSG SIZE  rcvd: 50

root@server:/etc# nslookup eihsa
Server:         127.0.0.53
Address:        127.0.0.53#53

Name:    eihsa
Address: 192.168.18.254

root@server:/etc# host eihsa
eihsa has address 192.168.18.254
Host eihsa not found: 3(NXDOMAIN)
root@server:/etc# _
```

C. Direct Zone Configuration

C.1. Create a new direct zone for the domain eimsa.com to the /etc/bind/named.conf.local file. The file where the database of the zone will be saved will be the /etc/bind/db.eihsa.com

```
;
; BIND data file for broadcast zone
;
$TTL    604800
@       IN      SOA     eihsa. root.eihsa. (
                               2          ; Serial
                            604800        ; Refresh
                             86400        ; Retry
                           2419200        ; Expire
                            604800 )      ; Negative Cache TTL
;
@       IN      NS      ns1.eihsa.
@       IN      NS      ns2.eihsa.
ns1     IN      A       192.168.18.254
ns2     IN      A       192.168.18.253
www     IN      A       192.168.18.252
ftp     IN      A       192.168.18.252
mail    IN      MX      10      mail.eihsa.com
mail.eihsa.com  IN      A       192.168.18.251
management      IN      A       192.168.18.2
inf     IN      A       192.168.18.3
```

C.2. Create a new file called /etc/bind/db.eihsa.com and configure it taking into account the requirements of the statement for the direct zone.

```
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";

zone "eihsa.com" {
        type master;
        file "/etc/bind/db.eihsa.com";
        allow-query{ any; };
        allow-transfer { none; };
};
```

C.3. Restart the service with the sudo systemctl restart bind9.service command for the changes to take effect

```
root@server:/home/user# systemctl restart bind9
root@server:/home/user# systemctl status bind9
• named.service - BIND Domain Name Server
     Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
     Active: active (running) since Thu 2024-10-03 20:07:14 UTC; 42s ago
       Docs: man:named(8)
    Process: 1001 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 1002 (named)
      Tasks: 14 (limit: 5963)
     Memory: 6.8M
        CPU: 72ms
     CGroup: /system.slice/named.service
             └─1002 /usr/sbin/named -u bind

Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2801:1b8:10::b#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:7fd::1#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:2f::f#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:503:ba3e::2:30#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:12::d0d#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:2d::d#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:9f::42#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:1::53#53
Oct 03 20:07:24 server named[1002]: resolver priming query complete: timed out
Oct 03 20:07:24 server named[1002]: managed-keys-zone: Unable to fetch DNSKEY set '.': timed out
root@server:/home/user# _
```

C.4. Check, using the named-checkzone command, that the syntax of the /etc/bind/db.eihsa.com file is correct. You can use the man named-checkzone command to check how the order works. If you have any syntax errors, correct them until the zone is correctly configured. Don't forget to restart the service and update the serial of the SOA record. Insert screenshot

Insert screenshot

```
root@server:/etc/bind# named-checkzone eihsa.com /etc/bind/db.eihsa.com
zone eihsa.com/IN: loaded serial 2
OK
root@server:/etc/bind# _
```

C.5. Using the nslookup, dig and host commands, verify that your DNS server has the direct zone correctly configured.

Insert screenshot

```
root@server:/etc/bind# nslookup eihsa
Server:         127.0.0.53
Address:        127.0.0.53#53

Name:   eihsa
Address: 192.168.18.254

root@server:/etc/bind# dig eihsa

; <<>> DiG 9.18.28-0ubuntu0.22.04.1-Ubuntu <<>> eihsa
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 50258
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;eihsa.                         IN      A

;; ANSWER SECTION:
eihsa.                  0       IN      A       192.168.18.254

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Wed Sep 25 17:01:00 UTC 2024
;; MSG SIZE  rcvd: 50

root@server:/etc/bind# host eihsa
eihsa has address 192.168.18.254
Host eihsa not found: 3(NXDOMAIN)
root@server:/etc/bind#
```
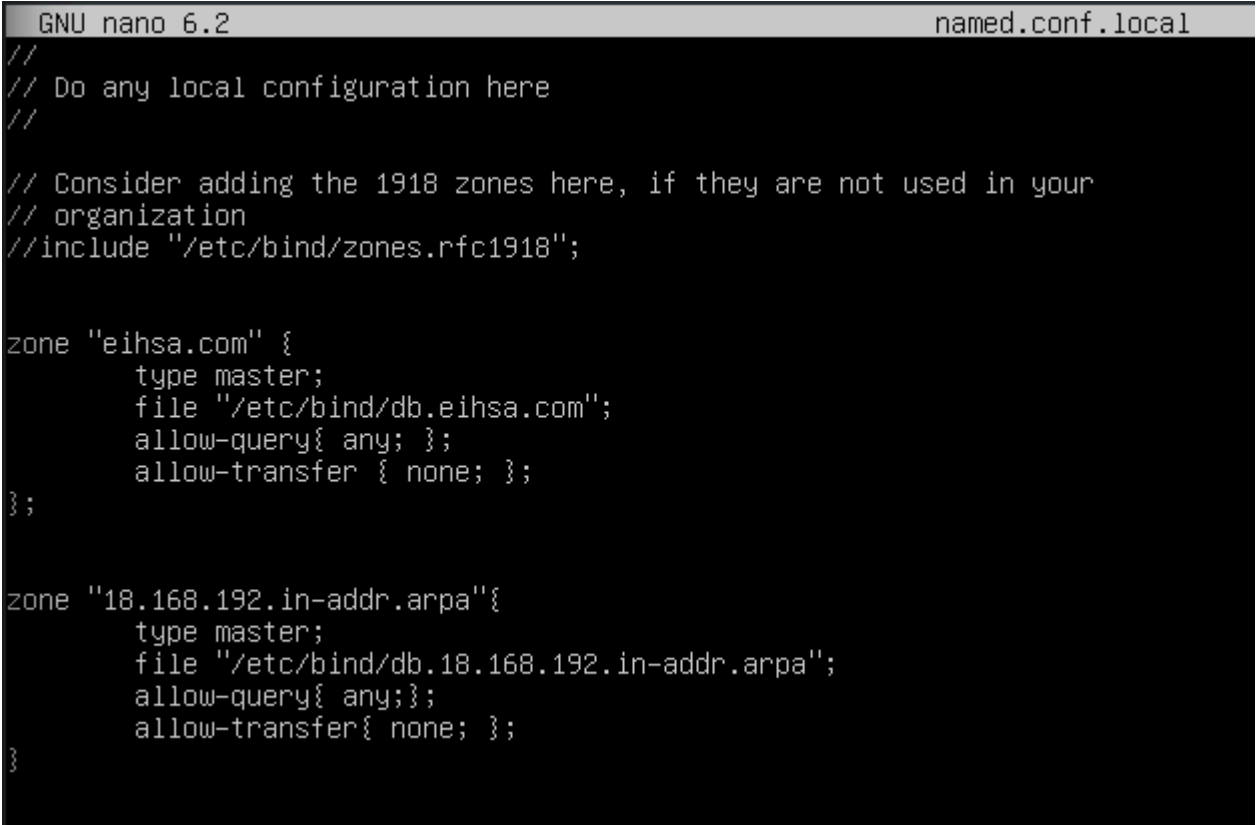
D. Reverse Zone Configuration

D.1. Create a new reverse zone for the domain eihsa.com to the /etc/bind/named.conf.local file. The file where the database of the zone will be saved will be the /etc/bind/db.x.168.192.in-addr.arpa.

Insert screenshot

```
  GNU nano 6.2                                              named.conf.local
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";


zone "eihsa.com" {
        type master;
        file "/etc/bind/db.eihsa.com";
        allow-query{ any; };
        allow-transfer { none; };
};


zone "18.168.192.in-addr.arpa"{
        type master;
        file "/etc/bind/db.18.168.192.in-addr.arpa";
        allow-query{ any;};
        allow-transfer{ none; };
}
```

D.2. Create a new file called /etc/bind/db.x.168.192.in-addr.arpa. Set it up with the requirements of the statement for the inverse zone in mind.

Insert screenshot

```
 GNU nano 6.2                                        db.18.168.192.in-addr.arpa
;
; BIND reverse data file for broadcast zone
;
$TTL    604800
@       IN      SOA     eihsa. root.eihsa. (
                              1         ; Serial
                         604800         ; Refresh
                          86400         ; Retry
                        2419200         ; Expire
                         604800 )       ; Negative Cache TTL
;
@       IN      NS      ns1.eihsa.
@       IN      NS      ns2.eihsa.
254     IN      PTR     ns1.eihsa.
253     IN      PTR     ns2.eihsa.
252     IN      PTR     www.eihsa
252     IN      PTR     ftp.eihsa
251     IN      PTR     mail.eihsa.
2       IN      PTR     managment.eihsa.
3       IN      PTR     inf.eihsa.
```

D.3. Restart the service with the sudo systemctl restart bind9 command for the changes to take effect.

Insert screenshot

```
root@server:/home/user# systemctl restart bind9
root@server:/home/user# systemctl status bind9
● named.service - BIND Domain Name Server
     Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
     Active: active (running) since Thu 2024-10-03 20:07:14 UTC; 42s ago
       Docs: man:named(8)
    Process: 1001 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
   Main PID: 1002 (named)
      Tasks: 14 (limit: 5963)
     Memory: 6.8M
        CPU: 72ms
     CGroup: /system.slice/named.service
             └─1002 /usr/sbin/named -u bind

Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2801:1b8:10::b#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:7fd::1#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:2f::f#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:503:ba3e::2:30#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:12::d0d#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:2d::d#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:9f::42#53
Oct 03 20:07:15 server named[1002]: network unreachable resolving 'ns2.eihsa/A/IN': 2001:500:1::53#53
Oct 03 20:07:24 server named[1002]: resolver priming query complete: timed out
Oct 03 20:07:24 server named[1002]: managed-keys-zone: Unable to fetch DNSKEY set '.': timed out
root@server:/home/user# _
```

D.4. Check, using the named-checkzone command, that the syntax of the /etc/bind/db.x.168.192.in-addr.arpa file is correct. You can use the man named-checkzone command to check how the order works. If you have any syntax errors, correct them until the zone is correctly configured. Don't forget to restart the service and update the serial of the SOA record.

Insert screenshot

```
root@server:/etc/bind# named-checkzone 192.168.18.254 db.18.168.192.in-addr.arpa
zone 192.168.18.254/IN: loaded serial 1
OK
root@server:/etc/bind# _
```

D.5. Verifying Reverse Zone Configuration

Insert screenshot

```
root@server:/etc/bind# nslookup 192.168.18.254
254.18.168.192.in-addr.arpa      name = eihsa.

root@server:/etc/bind# dig -x 192.168.18.254

; <<>> DiG 9.18.28-0ubuntu0.22.04.1-Ubuntu <<>> -x 192.168.18.254
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 56952
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

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

;; ANSWER SECTION:
254.18.168.192.in-addr.arpa. 0  IN      PTR     eihsa.

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Mon Sep 30 14:22:34 UTC 2024
;; MSG SIZE  rcvd: 75

root@server:/etc/bind# host 192.168.18.254
254.18.168.192.in-addr.arpa domain name pointer eihsa.
root@server:/etc/bind#
```
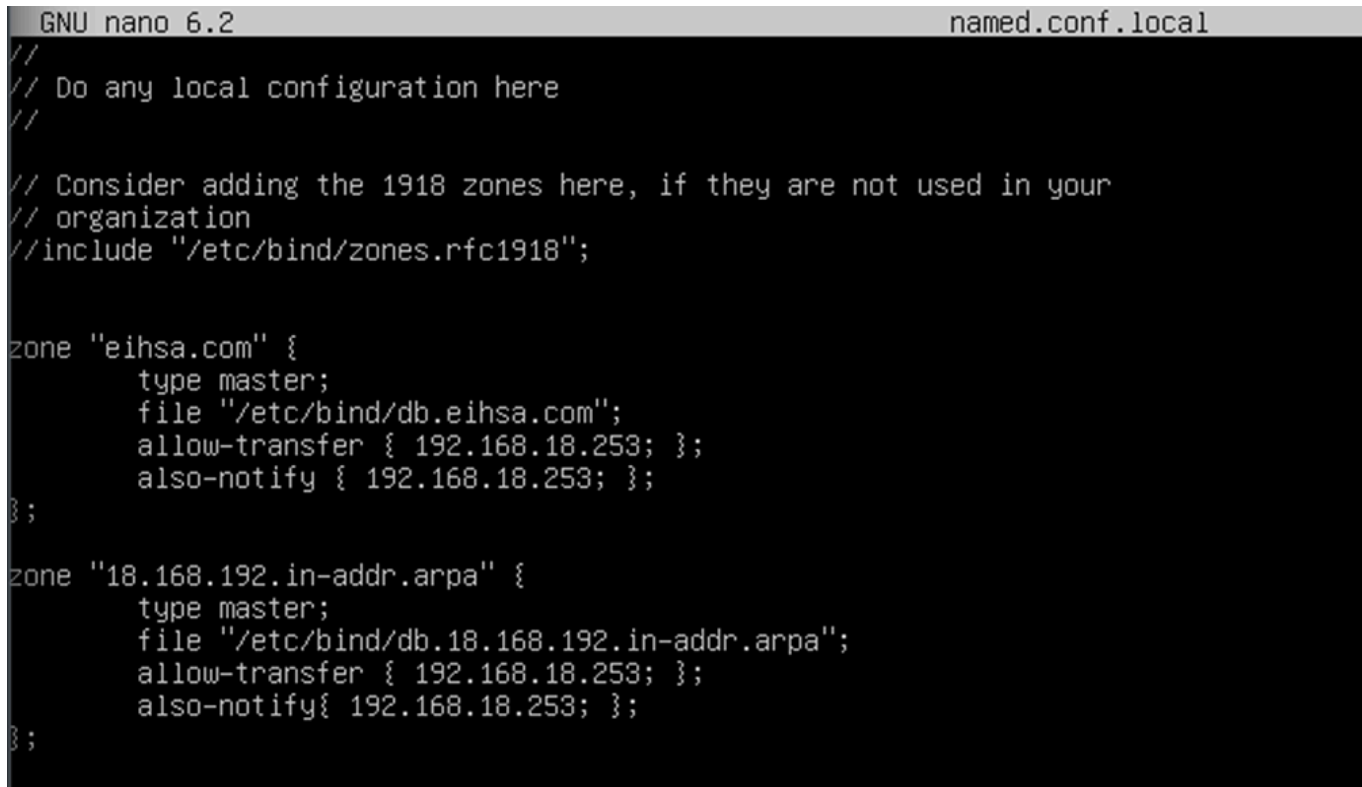
E. Secondary Server Configuration

E.1. Allow the primary server to transfer the zone to the secondary server. Add the corresponding configuration options to the /etc/bind/named.conf.local file on the primary server. Don't forget to restart the service for the changes to take effect.

Insert screenshot

```
  GNU nano 6.2                                          named.conf.local
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";


zone "eihsa.com" {
        type master;
        file "/etc/bind/db.eihsa.com";
        allow-transfer { 192.168.18.253; };
        also-notify { 192.168.18.253; };
};

zone "18.168.192.in-addr.arpa" {
        type master;
        file "/etc/bind/db.18.168.192.in-addr.arpa";
        allow-transfer { 192.168.18.253; };
        also-notify{ 192.168.18.253; };
};
```

E.2. Configure the /etc/bind/named.conf.local file of the secondary server to connect to the primary server and perform the corresponding zone transfer. You need to edit the /etc/bind/named.conf.local file. Don't forget to restart the service for the changes to take effect.

```
  GNU nano 6.2                          named.conf.local
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";

zone "eihsa.com" {
        type slave;
        file "/var/cache/bind/db.eihsa.com";
        masters { 192.168.18.254; };
};

zone "18.168.192.in-addr.arpa"{
        type slave;
        file "/var/cache/bind/db.18.168.192.in-addr.arpa";
        masters { 192.168.18.254; };
};
```

E.3. Check the /var/log/syslog file, both on the primary and secondary servers, that the transfer has been carried out correctly.

Insert screenshots

- Previously, the transfer service for data connection activities in Bind, the route was located in /var/log/syslog, but currently this changed as it was adapted to another type of package called journel. This is located in /var/log/journel/
- primary

```
root@server:/var/log/journal# ls
4d4f462bfe4048c5abfb3747f0445687
root@server:/var/log/journal# cd 4d4f462bfe4048c5abfb3747f0445687/
root@server:/var/log/journal/4d4f462bfe4048c5abfb3747f0445687# ls
system.journal                                    system@0006236a92438626-cddce6e1d67c5e93.journal~
system@000622f2d6500680-487c1f322d6f6d55.journal~  system@0006237022f1bfca-e09d1b44b50ca2d2.journal~
system@000622f2db8005f9-26d57cedbf3613bc.journal~  system@000623813db8d1d0-a2cae7e617c953ba.journal~
system@000623569c085ae2-e52a6fcf08bbd4f9.journal~  user-1000.journal
system@00062356a89e3249-ff6f79c401b31dd5.journal~  user-1000@000622f2ddd09708-ea543751e63960ea.journal~
system@00062356e47cd1fd-f77877508d2bd740.journal~  user-1000@00062356aa857ea9-986f159bf5236b1f.journal~
system@00062357ad0b2939-9df0b19a33ce0129.journal~  user-1000@00062356e6b5eb63-25c40b2dcc43f040.journal~
system@000623679d5348b2-8c946bc2a979a543.journal~  user-1000@0006236a94a98300-dd71beb0fc3d87cc.journal~
system@00062367d7cfefc5-28ab8bf7c300574e.journal~  user-1000@0006238140ddad77-5c54adcde80e42d1.journal~
root@server:/var/log/journal/4d4f462bfe4048c5abfb3747f0445687# _
```

- secondary

```
root@user2:/home/user2# cd /var/log/journal/
root@user2:/var/log/journal# ls
fc01dc0397fd4e079e2ee52319d9d866
root@user2:/var/log/journal# cd fc01dc0397fd4e079e2ee52319d9d866/
root@user2:/var/log/journal/fc01dc0397fd4e079e2ee52319d9d866# ls
system.journal
system@00062367a9053e35-bc621afb6e8d1a3e.journal~
system@00062367d1009067-93f2474be5632f49.journal~
system@0006236a92ab989d-fb5b9479e91036ce.journal~
system@00062370282f4924-e78ad8eea2802293.journal~
system@000623813db91e49-19283382643d843c.journal~
user-1000.journal
user-1000@0006236a973eae3e-5a7d271d65a6447f.journal~
user-1000@00062381553cdb6c-779d2bfaaf65405d.journal~
root@user2:/var/log/journal/fc01dc0397fd4e079e2ee52319d9d866# _
```

E.4. A zone transfer is performed only if the serial number of the primary server is larger than the serial number of the secondary server. Add the also-notify directive to the /etc/bind/named.conf.local configuration file on the primary server to notify the secondary server of the changes made.

Insert screenshot

```
  GNU nano 6.2                                        named.conf.local
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";


zone "eihsa.com" {
        type master;
        file "/etc/bind/db.eihsa.com";
        allow-transfer { 192.168.18.253; };
        also-notify { 192.168.18.253; };
};

zone "18.168.192.in-addr.arpa" {
        type master;
        file "/etc/bind/db.18.168.192.in-addr.arpa";
        allow-transfer { 192.168.18.253; };
        also-notify{ 192.168.18.253; };
};
```

E.5. Checking /var/cache/bind on Secondary Server

Insert screenshot

```
root@user2:/home/user2# cd /var/cache/bind/
root@user2:/var/cache/bind# ls
db.18.168.192.in-addr.arpa  db.eihsa.com  managed-keys.bind  managed-keys.bind.jnl
root@user2:/var/cache/bind#
```

E.6. Configuring DNS Client for Secondary Server

- Are the responses authoritative or non-authoritative? **Insert screenshot**

```
root@user-virtualbox:/etc/netplan# nslookup www.eihsa.com 192.168.18.254
Server:         192.168.18.254
Address:        192.168.18.254#53

Name:    www.eihsa.com
Address: 192.168.18.252

root@user-virtualbox:/etc/netplan# nslookup www.eihsa.com 192.168.18.253
Server:         192.168.18.253
Address:        192.168.18.253#53

Name:    www.eihsa.com
Address: 192.168.18.252

root@user-virtualbox:/etc/netplan# host www.eihsa.com 192.168.18.253
Using domain server:
Name: 192.168.18.253
Address: 192.168.18.253#53
Aliases:

www.eihsa.com has address 192.168.18.252
root@user-virtualbox:/etc/netplan# host www.eihsa.com 192.168.18.254
Using domain server:
Name: 192.168.18.254
Address: 192.168.18.254#53
Aliases:

www.eihsa.com has address 192.168.18.252
root@user-virtualbox:/etc/netplan# 
```

```
root@user-virtualbox:/etc/netplan# dig @192.168.18.254 www.eihsa.com

; <<>> DiG 9.18.28-0ubuntu0.22.04.1-Ubuntu <<>> @192.168.18.254 www.eihsa.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 35147
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: af531704967f55dd0100000066fdb41ab0ebb3b67cbf87d8 (good)
;; QUESTION SECTION:
;www.eihsa.com.                  IN      A

;; ANSWER SECTION:
www.eihsa.com.          604800  IN      A       192.168.18.252

;; Query time: 3 msec
;; SERVER: 192.168.18.254#53(192.168.18.254) (UDP)
;; WHEN: Wed Oct 02 22:59:21 CEST 2024
;; MSG SIZE  rcvd: 86

root@user-virtualbox:/etc/netplan# dig @192.168.18.253 www.eihsa.com

; <<>> DiG 9.18.28-0ubuntu0.22.04.1-Ubuntu <<>> @192.168.18.253 www.eihsa.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 27103
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: d456f445134666e50100000066fdb41d64c964ec641aede7 (good)
;; QUESTION SECTION:
;www.eihsa.com.                  IN      A

;; ANSWER SECTION:
www.eihsa.com.          604800  IN      A       192.168.18.252

;; Query time: 4 msec
;; SERVER: 192.168.18.253#53(192.168.18.253) (UDP)
;; WHEN: Wed Oct 02 22:59:24 CEST 2024
;; MSG SIZE  rcvd: 86

root@user-virtualbox:/etc/netplan#
```