

DNS

PRACTICAL WORK 3

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I. Requirements – Network configuration on VBox

1. Proxmox DNS configuration

The screenshot shows the Proxmox Virtual Environment 7.0-11 interface. On the left, the 'Server View' sidebar shows a tree structure with 'Datacenter' expanded, containing 'proxrt' and several VMs. The 'Container 2046 (debian-46) on node 'proxrt'' is selected. The main panel shows the 'DNS' configuration for this container. The 'DNS server' is set to '10.22.141.16'. Other fields include 'Hostname' (debian-46) and 'DNS domain' (grp46.mrt).

2. Host only network configuration

The screenshot shows the 'Host Network Manager' window. It displays a list of network adapters. The 'VirtualBox Host-Only Ethernet Adapter #3' is selected, showing its IPv4 address (10.22.141.14) and mask (255.255.252.0). The 'DHCP Server' tab is active, showing options to configure the adapter manually. The 'Configure Adapter Manually' option is selected, and the 'IPv4 Address' is set to 10.22.141.14, 'IPv4 Network Mask' is 255.255.252.0, 'IPv6 Address' is fe80::6caa:e88b:5608:67f6, and 'IPv6 Prefix Length' is 64.

3. Debian network configuration

```
# This file describes the network interfaces
# and how to activate them. For more
source /etc/network/interfaces.d/*

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
allow-hotplug enp0s3
iface enp0s3 inet dhcp

auto lo
allow-hotplug enp0s8
iface enp0s8 inet static
    address 10.22.141.16/22
    gateway 10.22.143.254
```

```

GNU nano 5.4
# This file describes the network inter
# and how to activate them. For more in

source /etc/network/interfaces.d/*

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
allow-hotplug enp0s3
iface enp0s3 inet dhcp

auto lo
allow-hotplug enp0s8
iface enp0s8 inet static
    address 10.22.141.16/22
    gateway 10.22.143.254

```

4. [Alpine network configuration](#)

```

auto lo
iface lo inet loopback

auto eth0
iface eth0 inet dhcp
    hostname alpine

auto eth1
iface eth1 inet static
    address 10.22.141.15/22
    gateway 10.22.143.254

```

```

auto lo
iface lo inet loopback

auto eth0
iface eth0 inet dhcp
    hostname alpine

auto eth1
iface eth1 inet static
    address 10.22.141.15/22
    gateway 10.22.143.254

```

5. [Ubuntu network configuration](#)

```

# This is the network config written to
network:
  ethernets:
    enp0s3:
      dhcp4: true
    enp0s8:
      addresses: [10.22.141.17/22]_
      version: 2

```

```

0
link/ether 08:00:27:c7:69:20 brd ff:ff:ff:ff:ff:ff
inet 10.22.141.17/22 brd 10.22.143.255 scope global enp0s8
    valid_lft forever preferred_lft forever
inet6 fe80::a00:27ff:fec7:6920/64 scope link
    valid_lft forever preferred_lft forever
tub@ubuntu:~$

```

1. Installation dig command on Debian

- ➔ `sudo apt-get install dnsutils`
- ➔ `dig -v`

2. Installation bind9 on Debian

- ➔ `sudo apt-get install bind9`

II. DNS Master + cache Configuration

6. DNS Master configuration on Debian

Debian Master DNS

- Save the config file `/etc/bind/named.conf.options`

Zones configuration

- Save the config file `/etc/bind/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 "grp46.mrt" {
    type master;
    file "/etc/bind/db.grp46.mrt";
};

zone "141.22.10.in-addr.arpa" {
    type master;
    file "/etc/bind/db.141.22.10";
};

```

Forward resolution configuration

- Copy the `/etc/bind/db.local` file to the `/etc/bind/db.grp46.mrt` file

```

; BIND data file for grp46.mrt zone
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                        3      ; Serial
                        604800 ; Refresh
                        86400  ; Retry
                        2419200 ; Expire
                        604800 ) ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
ip2       IN      A         10.22.141.16
ip1       IN      A         10.22.141.15
ip3       IN      A         10.22.141.17
alpine    IN      CNAME    ip1
debian    IN      CNAME    ip2
ubuntu    IN      CNAME    ip3

```

Check the Forward resolution configuration

```
tdeb@debian-46:/etc/bind$ sudo named-checkzone grp46.mrt db.grp46.mrt
zone grp46.mrt/IN: loaded serial 3
OK
```

Reverse resolution configuration

- Copy the /etc/bind/db.127 file to the /etc/bind/db.141.22.10 file

```

; BIND reverse data file for grp46.mrt zone
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                        2      ; Serial
                        604800 ; Refresh
                        86400  ; Retry
                        2419200 ; Expire
                        604800 ) ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
16        IN      PTR      ip2.grp46.mrt.

15        IN      PTR      ip1.grp46.mrt.
17        IN      PTR      ip3.grp46.mrt.

```

Check the Reverse resolution configuration

```
tdeb@debian-46:/etc/bind$ sudo named-checkzone 141.22.10.in-addr.arpa db.141.22.10
zone 141.22.10.in-addr.arpa/IN: loaded serial 2
OK
```

7. [DNS Cache configuration on Debian](#)

- Forward
- /etc/bind/named.conf.options

```

forwarders {
    8.8.8.8;
};

//=====
// If BIND logs error mes
// you will need to updat
//=====
dnssec-validation auto;

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

```

8. [DNS Dynamic](#)

- /etc/resolv.conf

```
nameserver 10.22.141.16
```

- ➔ sudo systemctl restart bind9
- ➔ sudo systemctl restart networking

III. DNS & web server

9. [Web server on Debian](#)

- ➔ sudo apt-get -y install apache2

→ Edit the /var/www/html/index.html file

```
<meta http-equiv="Content-Type" content="text/html; charset=utf-8">
<title>Apache2 Debian Default Page: It works</title>
<style type="text/css" media="screen">
```

10. [Web server on Alpine](#)

- sudo apk add apache2
- sudo service apache2 start
- Edit the /var/www/localhost/htdocs/index.html file

```
<html><body><h1>ALPINE !!!! It works!</h1></body></html>
```

11. [Web server on Ubuntu](#)

- Sudo apt-get install -y apache2
- Edit the /var/www/html/index.html file

```
<meta http-equiv="Content-Type" content="text/html; charset=utf-8">
<title>Apache2 Ubuntu Default Page: It works</title>
<style type="text/css" media="screen">
```

12. [Configuring resolv files on Alpine](#)

- Edit the /etc/resolv.conf file

```
nameserver 10.22.141.16
nameserver 192.168.1.254
```

- sudo apk add curl
- curl ubuntu.grp46.mrt | grep "Apache2 Ubuntu Default Page"

13. [Configuring resolv file on Ubuntu](#)

- Edit the /etc/resolv.conf file

```
#nameserver 127.0.0.53
#options edns0 trust-ad
nameserver 10.22.141.16
```

- curl alpine.grp46.mrt

```
ub@ubuntu:~$ curl alpine.grp46.mrt
<html><body><h1>ALPINE !!!! It works!</h1></body></html>
```

IV. DNS slave on Ubuntu

14. [DNS master configuration](#)

- Edit /etc/bind/named.conf.local file

```

zone "grp46.mrt" {
    type master;
    file "/etc/bind/db.grp46.mrt";
    notify yes;
    allow-transfer { 10.22.141.17; };
    also-notify { 10.22.141.17; };
};

zone "141.22.10.in-addr.arpa" {
    type master;
    file "/etc/bind/db.141.22.10";
    notify yes;
    allow-transfer {10.22.141.17; }; // Ameliorer la convergence en notifiant l'esclave lors de la modif de la zone
    also-notify { 10.22.141.17; }; // Autoriser les serveurs esclaves pour le transfert de la zone
};
~

```

- Edit the /etc/bind/db.grp46.mrt and /etc/bind/db.141.22.10 files

```

;
; BIND data file for grp46.mrt zone
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                                3           ; Serial
                                604800      ; Refresh
                                86400       ; Retry
                                2419200     ; Expire
                                604800 )    ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
@         IN      NS       ip3.grp46.mrt. ←
ip1       IN      A        10.22.141.15
ip2       IN      A        10.22.141.16
ip3       IN      A        10.22.141.17

alpine    IN      CNAME    ip1
debian    IN      CNAME    ip2
ubuntu    IN      CNAME    ip3
~

```

```

;
; BIND reverse data file for grp46.mrt zone
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                                2           ; Serial
                                604800      ; Refresh
                                86400       ; Retry
                                2419200     ; Expire
                                604800 )    ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
@         IN      NS       ip3.grp46.mrt. ←
15        IN      PTR      ip1.grp46.mrt.
16        IN      PTR      ip2.grp46.mrt.
17        IN      PTR      ip3.grp46.mrt.
~

```

➔ sudo systemctl restart bind9

15. DNS slave configuration

- sudo apt-get -y install bind9
- sudo cp /etc/bind/named.conf.options /etc/bind/named.conf.options.bak
- Edit the /etc/bind/named.conf.options


```

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; };
listen-on port 53 { 127.0.0.1; 10.22.141.16; };
allow-query { 127.0.0.1; 10.22.141.16; };

```

- `sudo cp /etc/bind/named.conf.local /etc/bind/named.conf.local`
- Edit the `/etc/bind/named.conf.local` file

```

//
// 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 "grp46.mrt" {
    type slave;
    file "/var/cache/bind/db.grp46.mrt";
    masters { 10.22.141.16; };
    allow-transfer { 10.22.141.16; };
};

zone "141.22.10.in-addr.arpa" {
    type slave;
    file "/var/cache/bind/db.141.grp46.mrt";
    masters { 10.22.141.16; };
    allow-transfer { 10.22.141.16; };
};
~

```

- `sudo cp /etc/bind/db.local /var/cache/bind/db.grp46.mrt`
- Edit the `/var/cache/bind/db.grp46.mrt` file

```

;
; BIND data file for grp46.mrt
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                                3           ; Serial
                                604800      ; Refresh
                                86400       ; Retry
                                2419200    ; Expire
                                604800 )   ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
@         IN      NS       ip3.grp46.mrt.
ip1       IN      A        10.22.141.15
ip2       IN      A        10.22.141.16
ip3       IN      A        10.22.141.17

alpine    IN      CNAME    ip1
debian    IN      CNAME    ip2
ubuntu    IN      CNAME    ip3

```

- `sudo cp /etc/bind/db.127 /var/cache/bind/db.141.22.10`
- Edit the `/var/cache/bind/db.141.22.10` file

```

;
; BIND reverse data file for grp46.mrt zone
;
$TTL      604800
@         IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. (
                        2      ; Serial
                        604800 ; Refresh
                        86400  ; Retry
                        2419200 ; Expire
                        604800 ) ; Negative Cache TTL
;
@         IN      NS       ip2.grp46.mrt.
@         IN      NS       ip3.grp46.mrt.

15        IN      PTR      ip1.grp46.mrt.
16        IN      PTR      ip2.grp46.mrt.
17        IN      PTR      ip3.grp46.mrt.

```

- Edit owner

```

tub@ubuntu:/etc/bind$ sudo chown bind:bind /var/cache/bind/db.grp46.mrt
tub@ubuntu:/etc/bind$ sudo chown bind:bind /var/cache/bind/db.141.22.10

```

- sudo systemctl restart bind9

16. Check DNS slave configuration

- Zone transfer axfr

```

tub@ubuntu:/etc/bind$ dig axfr @10.22.141.16 grp46.mrt
;
<>> DiG 9.16.1-Ubuntu <>> axfr @10.22.141.16 grp46.mrt
; (1 server found)
; global options: +cmd
grp46.mrt.      604800 IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. 3 604800 86400 2419200 604800
grp46.mrt.      604800 IN      NS       ip2.grp46.mrt.
ip1.grp46.mrt.  604800 IN      CNAME     ip1.grp46.mrt.
ip2.grp46.mrt.  604800 IN      CNAME     ip2.grp46.mrt.
ip3.grp46.mrt.  604800 IN      A         10.22.141.15
ip4.grp46.mrt.  604800 IN      A         10.22.141.16
ip5.grp46.mrt.  604800 IN      A         10.22.141.17
ip6.grp46.mrt.  604800 IN      CNAME     ip3.grp46.mrt.
ip7.grp46.mrt.  604800 IN      SOA      ip2.grp46.mrt. admin.grp46.mrt. 3 604800 86400 2419200 604800
; Query time: 3 msec
; SERVER: 10.22.141.16#53(10.22.141.16)
; WHEN: Mon Dec 20 15:56:16 UTC 2021
; XFR size: 9 records (messages 1, bytes 281)

```

V. DNS configuration

17. DNS master

- Check Master configuration

```

tdeb@debian:~$ dig NS +short @10.22.141.16 grp46.mrt
ip3.grp46.mrt.
ip2.grp46.mrt.

```

- Check forwarding

```

tdeb@debian:~$ dig A +short @10.22.141.16 www.univ-reims.fr
194.57.105.223

```

- Check local DNS

```

tdeb@debian:~$ dig A +short @10.22.141.16 ip2.grp46.mrt
10.22.141.16

```

18. Cache Master

```
tdeb@debian:~$ dig A @10.22.141.16 www.juventus.com | grep time  
;; Query time: 288 msec  
tdeb@debian:~$ dig A @10.22.141.16 www.juventus.com | grep time  
;; Query time: 0 msec
```

19. Slave DNS server