

Report: DHCP, DHCP Relay, and DNS Configuration

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Objective:

To deploy and configure DHCP, DHCP Relay, and DNS servers, along with a web server, ensuring proper communication and resolution within the network environment.

Tasks Overview

- Install and configure a DHCP server.
- Deploy a DHCP relay agent to forward client requests.
- Set up a DNS server using BIND to manage forward and reverse lookups for the domain EIDIA.UEMF.
- Configure an Apache web server to host the domain.

```
a@ubuntu:~$ sudo apt install isc-dhcp-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
isc-dhcp-server is already the newest version (4.4.1-2.1ubuntu5.20.04.5).
0 upgraded, 0 newly installed, 0 to remove and 69 not upgraded.
a@ubuntu:~$ sudo nano /etc/default/isc-dhcp-server
```

3.1 DHCP Server Configuration

1. Install the DHCP server:

```
sudo apt update
sudo apt install isc-dhcp-server
```

2. Configure the listening interface in /etc/default/isc-dhcp-server: INTERFACESv4="ens33"

```
GNU nano 4.8 /etc/default/isc-dhcp-server Modified
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPDV4_CONF=/etc/dhcp/dhcpd.conf
#DHCPDV6_CONF=/etc/dhcp/dhcpd6.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPDV4_PID=/var/run/dhcpd.pid
#DHCPDV6_PID=/var/run/dhcpd6.pid

# Additional options to start dhcpd with.
# Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
# Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="ens33"
INTERFACESv6=""
```

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3. Define subnets and address ranges in `/etc/dhcp/dhcpd.conf`:

```
subnet 10.0.0.0 netmask 255.255.0.0
{
```

```
    range 10.0.1.2 10.0.2.253;
```

```
    option domain-name-servers
10.0.2.253;    option routers 10.
0.0.2.254;
}
```

4. Restart the service:

```
sudo systemctl restart isc-dhcp-server.service
```

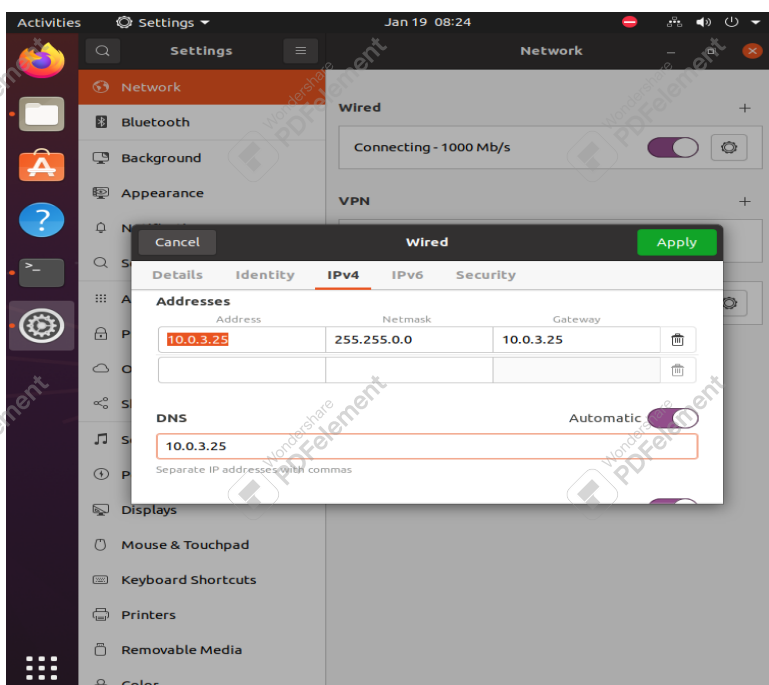
```
GNU nano 4.8 /etc/dhcp/dhcpd.conf Modified
# BOOTP or DHCP. Hosts for which no fixed address is specified can only
# be booted with DHCP, unless there is an address range on the subnet
# to which a BOOTP client is connected which has the dynamic bootp flag
# set.
#host fantasia {
#    hardware ethernet 08:00:07:26:c0:a5;
#    fixed-address fantasia.example.com;
#}

# You can declare a class of clients and then do address allocation
# based on that. The example below shows a case where all clients
# in a certain class get addresses on the 10.17.224/24 subnet, and all
# other clients get addresses on the 10.0.29/24 subnet.

#class "foo" {
#    match if substring (option vendor-class-identifier, 0, 4) = "SUNW";
#}

#shared-network 224-29 {
#    subnet 10.17.224.0 netmask 255.255.255.0 {
#        option routers rtr-224.example.org;
#    }
#    subnet 10.0.29.0 netmask 255.255.255.0 {
#        option routers rtr-29.example.org;
#    }
#    pool {
#        allow members of "foo";
#        range 10.17.224.10 10.17.224.250;
#    }
#    pool {
#        deny members of "foo";
#        range 10.0.29.10 10.0.29.230;
#    }
#}

subnet 10.0.0.0 netmask 255.255.0.0 {
    range                  10.0.1.2 10.0.2.253;
    option domain-name-servers 10.0.3.25;
    option routers          10.0.3.25;
}
```



```
b@ubuntu:~$ ping 10.0.3.25
PING 10.0.3.25 (10.0.3.25) 56(84) bytes of data:
64 bytes from 10.0.3.25: icmp_seq=1 ttl=64 time=1.03 ms
64 bytes from 10.0.3.25: icmp_seq=2 ttl=64 time=0.956 ms
64 bytes from 10.0.3.25: icmp_seq=3 ttl=64 time=0.564 ms
64 bytes from 10.0.3.25: icmp_seq=4 ttl=64 time=1.54 ms
64 bytes from 10.0.3.25: icmp_seq=5 ttl=64 time=0.694 ms
64 bytes from 10.0.3.25: icmp_seq=6 ttl=64 time=0.539 ms
64 bytes from 10.0.3.25: icmp_seq=7 ttl=64 time=0.715 ms
64 bytes from 10.0.3.25: icmp_seq=8 ttl=64 time=0.540 ms
64 bytes from 10.0.3.25: icmp_seq=9 ttl=64 time=0.716 ms
64 bytes from 10.0.3.25: icmp_seq=10 ttl=64 time=0.581 ms
^C
--- 10.0.3.25 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 911ms
rtt min/avg/max/mdev = 0.539/0.786/1.535/0.296 ms
```

3.2 DHCP Relay Configuration

1. Install the DHCP relay:

```
sudo apt update
```

```
sudo apt install isc-dhcp-relay
```

2. Configure relay in `/etc/default/isc-dhcp-relay`:

```
SERVERS="10.0.2.253"
```

```
INTERFACES="eth0 eth1"
```

```
a@ubuntu:~$ sudo nano /etc/dhcp/dhcpd.conf
a@ubuntu:~$ sudo systemctl restart isc-dhcp-server.service
a@ubuntu:~$ sudo systemctl status isc-dhcp-server.service
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2025-01-19 08:27:01 PST; 2s ago
     Docs: man:dhcpd(8)
    Main PID: 3368 (dhcpd)
      Tasks: 4 (limit: 4540)
     Memory: 4.5M
    CGroup: /system.slice/isc-dhcp-server.service
            └─3368 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.conf ens33

Jan 19 08:27:01 ubuntu sh[3368]: PID file: /run/dhcp-server/dhcpd.pid
Jan 19 08:27:01 ubuntu dhcpd[3368]: Wrote 0 leases to leases file.
Jan 19 08:27:01 ubuntu sh[3368]: Wrote 0 leases to leases file.
Jan 19 08:27:01 ubuntu dhcpd[3368]: Listening on LPF/ens33/00:0c:29:6d:d5:36/10.0.0.0/16
Jan 19 08:27:01 ubuntu sh[3368]: Listening on LPF/ens33/00:0c:29:6d:d5:36/10.0.0.0/16
Jan 19 08:27:01 ubuntu dhcpd[3368]: Sending on LPF/ens33/00:0c:29:6d:d5:36/10.0.0.0/16
Jan 19 08:27:01 ubuntu sh[3368]: Sending on LPF/ens33/00:0c:29:6d:d5:36/10.0.0.0/16
Jan 19 08:27:01 ubuntu dhcpd[3368]: Sending on Socket/fallback/fallback-net
Jan 19 08:27:01 ubuntu sh[3368]: Sending on Socket/fallback/fallback-net
Jan 19 08:27:01 ubuntu dhcpd[3368]: Server starting service.
a@ubuntu:~$ sudo apt install isc-dhcp-relay
```

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3. Enable IP forwarding:

```
sudo nano /etc/sysctl.conf
```

```
net.ipv4.ip_forward=1
```

```
sudo sysctl -p
```

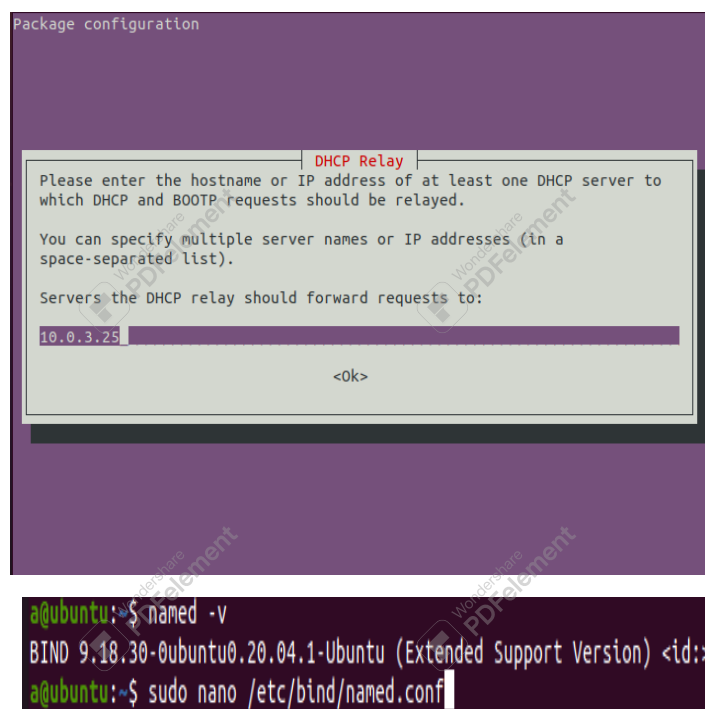
4. Restart the relay service:

```
sudo systemctl restart isc-dhcp-relay
```



```
c@ubuntu:~$ sudo systemctl restart isc-dhcp-relay
c@ubuntu:~$ sudo systemctl status isc-dhcp-relay
● isc-dhcp-relay.service - ISC DHCP IPv4 relay
   Loaded: loaded (/lib/systemd/system/isc-dhcp-relay.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2025-01-19 08:49:29 PST; 12s ago
     Docs: man:dhcrelay(8)
   Main PID: 3652 (dhcrelay)
    Tasks: 4 (limit: 4540)
   Memory: 1.5M
   CGroup: /system.slice/isc-dhcp-relay.service
           └─3652 /usr/sbin/dhcrelay -d -4 10.0.3.25

Jan 19 08:49:29 ubuntu sh[3652]: For info, please visit https://www.isc.org/software/dhcrelay/
Jan 19 08:49:29 ubuntu dhcrelay[3652]: Copyright 2004-2018 Internet Systems Consortium. All rights reserved.
Jan 19 08:49:29 ubuntu dhcrelay[3652]: For info, please visit https://www.isc.org/software/dhcrelay/
Jan 19 08:49:29 ubuntu dhcrelay[3652]: Listening on LPF/ens33/00:0c:29:da:4e:c2
Jan 19 08:49:29 ubuntu sh[3652]: Listening on LPF/ens33/00:0c:29:da:4e:c2
Jan 19 08:49:29 ubuntu sh[3652]: Sending on LPF/ens33/00:0c:29:da:4e:c2
Jan 19 08:49:29 ubuntu sh[3652]: Sending on Socket/fallback
Jan 19 08:49:29 ubuntu dhcrelay[3652]: Sending on LPF/ens33/00:0c:29:da:4e:c2
Jan 19 08:49:29 ubuntu dhcrelay[3652]: Sending on Socket/fallback
lines 1-20/20 (END)
```



3.3 DNS Server Configuration (BIND)

1. Install BIND DNS server:

```
sudo apt update
```

```
sudo apt install bind9 bind9utils bind9-doc dnstools
```

2. Configure zones in /etc/bind/named.conf.local:

```
zone "eidia.uemf" {
    type master;

    file "/etc/bind/db.eidia.uemf";
```

```
// 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";
// Définition de la zone principale (directe)
zone "eidia.uemf" {
    type master;
    file "/etc/bind/db.eidia.uemf";
};

// Définition de la zone inverse
zone "0.0.10.in-addr.arpa" {
    type master;
    file "/etc/bind/db.10";
};
```

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```
};
```

```
zone "0.168.192.in-addr.arpa" {
```

```
    type master;
```

```
    file "/etc/bind/db.192";
```

```
};
```

3. Create zone files and restart BIND:

```
sudo systemctl restart bind9
```

```
GNU nano 4.8 /etc/bind/named.conf.options Modified
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;
        8.8.4.4;
    };

    //=====
    // 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 { 10.0.3.25; };
};
```

3.4 Apache Web Server Configuration

1. Configure virtual host in /etc/apache2/sites-available/eidia.conf:

```
<VirtualHost *:80>
```

```
    ServerName www.eidia.uemf
```

```
    DocumentRoot /var/www/html
```

```
</VirtualHost>
```

2. Set permissions and reload Apache:

```
GNU nano 4.8 /etc/bind/db.10 Modified
$TTL      86400
@          IN      SOA      ns1.eidia.uemf. admin.eidia.uemf. (
                        2025011901 ; Serial
                        3600      ; Refresh
                        1800      ; Retry
                        1209600    ; Expire
                        86400     ) ; Minimum TTL

; Définition des serveurs de noms
@          IN      NS       ns1.eidia.uemf.
@          IN      NS       ns2.eidia.uemf.

; Enregistrements PTR (pour la résolution inverse)
25         IN      PTR      ns1.eidia.uemf.
26         IN      PTR      ns2.eidia.uemf.
10         IN      PTR      www.eidia.uemf.
20         IN      PTR      mail.eidia.uemf.
30         IN      PTR      ftp.eidia.uemf.
```

```
GNU nano 4.8 /etc/bind/db.eidia.uemf Modified
$TTL      86400
@          IN      SOA      ns1.eidia.uemf. admin.eidia.uemf. (
                        2025011901 ; Serial (année, mois, jour, numéro de révision)
                        3600      ; Refresh (1 heure)
                        1800      ; Retry (30 minutes)
                        1209600    ; Expire (2 semaines)
                        86400     ) ; Minimum TTL (1 jour)

; Définition des serveurs de noms
@          IN      NS       ns1.eidia.uemf.
@          IN      NS       ns2.eidia.uemf.

; Adresses des serveurs de noms
ns1        IN      A        10.0.3.25
ns2        IN      A        10.0.3.26

; Enregistrement des hôtes
www        IN      A        10.0.0.10
mail       IN      A        10.0.0.20
ftp        IN      A        10.0.0.30

; Enregistrements MX pour le mail
@          IN      MX       10 mail.eidia.uemf.
```


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```
a@ubuntu:~$ named -v
BIND 9.18.30-0ubuntu0.20.04.1-Ubuntu (Extended Support Version) <id>
a@ubuntu:~$ sudo nano /etc/bind/named.conf
a@ubuntu:~$ sudo nano /etc/bind/named.conf.options
a@ubuntu:~$ sudo nano /etc/bind/db.eidia.uemf
a@ubuntu:~$ sudo nano /etc/bind/db.10
a@ubuntu:~$ sudo named-checkconf
a@ubuntu:~$ sudo named-checkzone eidia.uemf /etc/bind/db.eidia.uemf
dns_rdata fromtext: /etc/bind/db.eidia.uemf:2: near '20250101901': out of range
zone eidia.uemf/IN: loading from master file /etc/bind/db.eidia.uemf failed: out of range
zone eidia.uemf/IN: not loaded due to errors.
a@ubuntu:~$ sudo nano /etc/bind/db.eidia.uemf
a@ubuntu:~$ sudo named-checkzone eidia.uemf /etc/bind/db.eidia.uemf
zone eidia.uemf/IN: loaded serial 2025011901
OK
a@ubuntu:~$ sudo named-checkzone eidia.uemf /etc/bind/db.eidia.uemf
zone eidia.uemf/IN: loaded serial 2025011901
OK
a@ubuntu:~$ sudo named-checkzone 0.168.192.in-addr.arpa /etc/bind/db.192
zone 0.168.192.in-addr.arpa/IN: loading from master file /etc/bind/db.192 failed: file not found
zone 0.168.192.in-addr.arpa/IN: not loaded due to errors.
a@ubuntu:~$ sudo named-checkzone 0.168.192.in-addr.arpa /etc/bind/db.10
zone 0.168.192.in-addr.arpa/IN: loaded serial 2025011901
OK
```

```
a@ubuntu:~$ sudo nano /etc/bind/db.eidia.uemf
a@ubuntu:~$ sudo named-checkzone eidia.uemf /etc/bind/db.eidia.uemf
zone eidia.uemf/IN: loaded serial 2025011901
OK
a@ubuntu:~$ sudo named-checkzone 0.168.192.in-addr.arpa /etc/bind/db.192
zone 0.168.192.in-addr.arpa/IN: loading from master file /etc/bind/db.192 failed: file not found
zone 0.168.192.in-addr.arpa/IN: not loaded due to errors.
a@ubuntu:~$ sudo named-checkzone 0.168.192.in-addr.arpa /etc/bind/db.10
zone 0.168.192.in-addr.arpa/IN: loaded serial 2025011901
OK
a@ubuntu:~$ sudo systemctl restart bind9
a@ubuntu:~$ sudo systemctl enable bind9
Failed to enable unit: Refusing to operate on alias name or linked unit file: bind9.service
a@ubuntu:~$ sudo systemctl enable named
Synchronizing state of named.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable named
a@ubuntu:~$ sudo systemctl status named
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2025-01-19 09:20:09 PST; 43s ago
     Docs: man:named(8)
    Main PID: 29797 (named)
      Tasks: 8 (limit: 4540)
     Memory: 5.1M
    CGroup: /system.slice/named.service
            └─29797 /usr/sbin/named -f -u bind
```

```
a@ubuntu:~$ dig @10.0.3.25 www.eidia.uemf
; <<>> DiG 9.18.30-0ubuntu0.20.04.1-Ubuntu <<>> @10.0.3.25 www.eidia.uemf
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24092
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: e28ec43ee065200401000000678d3524992fdac65191cfdd (good)
;; QUESTION SECTION:
;www.eidia.uemf.                IN      A

;; ANSWER SECTION:
www.eidia.uemf.                86400   IN      A      10.0.0.10

;; Query time: 0 msec
;; SERVER: 10.0.3.25#53(10.0.3.25) (UDP)
;; WHEN: Sun Jan 19 09:23:48 PST 2025
;; MSG SIZE rcvd: 87
```

```
a@ubuntu:~$ dig @10.0.3.25 mail.eidia.uemf
; <<>> DiG 9.18.30-0ubuntu0.20.04.1-Ubuntu <<>> @10.0.3.25 mail.eidia.uemf
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 2332
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: de57ffd0f9dd59b401000000678d3556277a0b3debc09cfd (good)
;; QUESTION SECTION:
;mail.eidia.uemf.              IN      A

;; ANSWER SECTION:
mail.eidia.uemf.              86400   IN      A      10.0.0.20

;; Query time: 0 msec
;; SERVER: 10.0.3.25#53(10.0.3.25) (UDP)
;; WHEN: Sun Jan 19 09:24:38 PST 2025
;; MSG SIZE rcvd: 88
```

```
a@ubuntu:~$ dig @10.0.3.25 -x 10.0.0.10
; <<>> DiG 9.18.30-0ubuntu0.20.04.1-Ubuntu <<>> @10.0.3.25 -x 10.0.0.10
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 36646
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: c13d7162324ae7f001000000678d35a1223221ca8a1c0d63 (good)
;; QUESTION SECTION:
;10.0.0.10.in-addr.arpa.       IN      PTR

;; ANSWER SECTION:
10.0.0.10.in-addr.arpa. 86400   IN      PTR    www.eidia.uemf.

;; Query time: 0 msec
;; SERVER: 10.0.3.25#53(10.0.3.25) (UDP)
;; WHEN: Sun Jan 19 09:25:53 PST 2025
;; MSG SIZE rcvd: 107
```

```
a@ubuntu:~$ dig @10.0.3.25 -x 10.0.0.20
; <<>> DiG 9.18.30-0ubuntu0.20.04.1-Ubuntu <<>> @10.0.3.25 -x 10.0.0.20
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10436
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 170784ea9f33cea001000000678d35e98b09b4193a0a1d04 (good)
;; QUESTION SECTION:
;20.0.0.10.in-addr.arpa.       IN      PTR

;; ANSWER SECTION:
20.0.0.10.in-addr.arpa. 86400   IN      PTR    mail.eidia.uemf.

;; Query time: 0 msec
;; SERVER: 10.0.3.25#53(10.0.3.25) (UDP)
;; WHEN: Sun Jan 19 09:27:05 PST 2025
;; MSG SIZE rcvd: 108
```

```
GNU nano 4.8 /etc/resolv.conf Modified
# This file is managed by man:systemd-resolved(8). Do not edit.
#
# 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 must not access this file directly, but only through
# 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
# operation for /etc/resolv.conf.

nameserver 10.0.3.25
options edns0 trust-ad
```

```
b@ubuntu:~$ sudo nano /etc/resolv.conf
[sudo] password for b:
b@ubuntu:~$ nslookup www.eidia.uemf
Server:      10.0.3.25
Address:     10.0.3.25#53

Name:   www.eidia.uemf
Address: 10.0.0.10

b@ubuntu:~$ nslookup mail.eidia.uemf
Server:      10.0.3.25
Address:     10.0.3.25#53

Name:   mail.eidia.uemf
Address: 10.0.0.20
```

sudo chown -R www-data:www-data /var/www/

html sudo chmod -R 755 /var/www/html

sudo systemctl reload apache2

```
GNU nano 4.8 /etc/apache2/sites-available/eidia.conf Modified
<VirtualHost *:80>
    ServerName www.eidia.uemf
    DocumentRoot /var/www/html
    <Directory /var/www/html>
        AllowOverride All
        Require all granted
    </Directory>
    ErrorLog ${APACHE_LOG_DIR}/eidia_error.log
    CustomLog ${APACHE_LOG_DIR}/eidia_access.log combined
</VirtualHost>
```

```
nd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service
→ /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36-6ubuntu1.1) ...
Processing triggers for systemd (245.4-4ubuntu3.24) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.16) ...
a@ubuntu:~$ sudo nano /etc/apache2/sites-available/eidia.conf
a@ubuntu:~$ sudo a2ensite eidia.conf
Enabling site eidia.
To activate the new configuration, you need to run:
  systemctl reload apache2
a@ubuntu:~$ systemctl reload apache2
Failed to reload apache2.service: Connection timed out
See system logs and 'systemctl status apache2.service' for details.
a@ubuntu:~$ systemctl reload apache2
a@ubuntu:~$ sudo chown -R www-data:www-data /var/www/html
a@ubuntu:~$ sudo chmod -R 755 /var/www/html
a@ubuntu:~$ sudo ufw allow 80
Rules updated
Rules updated (v6)
a@ubuntu:~$ sudo ufw allow 443
Rules updated
Rules updated (v6)
a@ubuntu:~$ sudo ufw reload
Firewall not enabled (skipping reload)
a@ubuntu:~$ sudo ufw enable
Firewall is active and enabled on system startup
a@ubuntu:~$ sudo ufw reload
Firewall reloaded
a@ubuntu:~$ sudo ufw status
Status: active

To Action From
--
80 ALLOW Anywhere
443 ALLOW Anywhere
80 (v6) ALLOW Anywhere (v6)
443 (v6) ALLOW Anywhere (v6)

a@ubuntu:~$ sudo ufw allow 'Apache'
Rule added
Rule added (v6)
a@ubuntu:~$ sudo nano /etc/bind/db.eidia.uemf
a@ubuntu:~$ sudo nano /etc/bind/db.10
a@ubuntu:~$ sudo tail -f /var/log/apache2/access.log
^C
a@ubuntu:~$ sudo tail -f /var/log/apache2/error.log
[Sun Jan 19 09:32:11.456579 2025] [mpm_event:notice] [pid 30419:tid 140308104727616] AH0
0489: Apache/2.4.41 (Ubuntu) configured -- resuming normal operations
[Sun Jan 19 09:32:11.456688 2025] [core:notice] [pid 30419:tid 140308104727616] AH00094:
Command line: '/usr/sbin/apache2'
[Sun Jan 19 09:35:33.459672 2025] [mpm_event:notice] [pid 30419:tid 140308104727616] AH0
0493: SIGUSR1 received. Doing graceful restart
AH00558: apache2: Could not reliably determine the server's fully qualified domain name,
using 127.0.1.1. Set the 'ServerName' directive globally to suppress this message
[Sun Jan 19 09:35:33.463933 2025] [mpm_event:notice] [pid 30419:tid 140308104727616] AH0
0489: Apache/2.4.41 (Ubuntu) configured -- resuming normal operations
[Sun Jan 19 09:35:33.463937 2025] [core:notice] [pid 30419:tid 140308104727616] AH00094:
Command line: '/usr/sbin/apache2'
^C
a@ubuntu:~$ sudo nano /etc/apache2/apache2.conf
a@ubuntu:~$ sudo apachectl configtest
Syntax OK
a@ubuntu:~$ sudo systemctl restart apache2
a@ubuntu:~$
```

Conclusion

The DHCP server, relay agent, and DNS server were successfully configured and tested. All systems are functional, and the domain www.eidia. uemf resolves correctly.

