

Lab experiment 2: Install and configure DNS

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AIM:

To create and configure DNS Server

DESCRIPTION:

DNS Server

A DNS server is a computer server that contains a database of public IP addresses and their associated hostnames, and in most cases, serves to resolve, or translate, those common names to IP addresses as requested.

Port No: 53

Package name: bind9

Configuration file: /etc/bind/named.conf. (Primary configuration file),/etc/bind/db.root
(root nameservers)

PROCEDURE:

CASHING NAMESERVER

When configured as a caching nameserver BIND9 will find the answer to name queries and

remember the answer when the domain is queried again.

1. Install bind9 by typing

```
$sudo apt install bind9
```

```
$sudo apt install dnsutils
```

2.The default configuration is set up to act as a caching server. All that is required is simply

adding the IP Addresses of your ISP's DNS servers. Simply uncomment and edit the following in `/etc/bind/named.conf.options`:

3.Restart it by typing

```
$sudo systemctl restart bind9.service
```

PRIMARY MASTER

As a primary master server BIND9 reads the data for a zone from a file on it's host and is authoritative for that zone.

Forward zone file

To add a DNS zone to BIND9, turning BIND9 into a Primary Master server, the first step is to edit `/etc/bind/named.conf.local`:

```
$sudo cp /etc/bind/db.local /etc/bind/db.example.com
```

```
$sudo systemctl restart bind9.service
```

Reverse Zone File

Now that the zone is set up and resolving names to IP Addresses, a *Reverse zone* needs to be added to allows DNS to resolve an address to a name.

1. Edit `/etc/bind/named.conf.local`

2. Now create the `/etc/bind/db.192` file:

```
$sudo cp /etc/bind/db.127 /etc/bind/db.192
```

3. edit `/etc/bind/db.192` changing the basically the same options as `/etc/bind/db.example.com`:

4.After creating the reverse zone file restart BIND9:

```
$sudo systemctl restart bind9.service
```

5.Check the status

```
$Sudo service bind9 status
```

6.Check if nslookup can resolve

```
$nslookup ftp.example.com
```

```
$nslookup ubuntu.example.com
```

7.Gather information about your DNS server

```
$dig ubuntu.example.com
```

```
$dig ftp.example.com
```

The screenshot shows a terminal window with the following content:

```
root@UBUNTU: /home/ubuntu22

libreoffice-ogltrans libwpe-1.0-1 libwpebackend-fdo-1.0-1 linux-image-6.2.0-26-generic linux-modules-6.2.0-26-generic
linux-modules-extra-6.2.0-26-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bind9-dnswtills bind9-host bind9-libs bind9-utils
Suggested packages:
  bind-doc resolvconf
The following packages will be upgraded:
  bind9 bind9-dnswtills bind9-host bind9-libs bind9-utils
5 upgraded, 0 newly installed, 0 to remove and 214 not upgraded.
Need to get 1,878 kB of archives.
After this operation, 6,144 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Ign:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9 amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Ign:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-utils amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Err:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9 amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Err:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-utils amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Ign:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-host amd64 1:9.18.24-0ubuntu0.22.04.1
Err:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-host amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Ign:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-dnswtills amd64 1:9.18.24-0ubuntu0.22.04.1
Ign:5 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-libs amd64 1:9.18.24-0ubuntu0.22.04.1
Err:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-dnswtills amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
Err:5 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-libs amd64 1:9.18.24-0ubuntu0.22.04.1
403 Forbidden [IP: 192.168.0.1 8090]
root@UBUNTU: /home/ubuntu22#
```

The terminal output indicates that the installation of bind9 and its dependencies failed due to a 403 Forbidden error. The error messages are repeated for each package that failed to update. The terminal also shows the disk space requirements and the list of packages to be installed.

Activities Terminal Jun 13 15:02

root@UBUNTU: /home/ubuntu22

```
Unpacking bind9-utils (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-host_1:9.18.24-0ubuntu0.22.04.1 amd64.deb ...
Unpacking bind9-host (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-dnsscripts_1:9.18.24-0ubuntu0.22.04.1 amd64.deb ...
Unpacking bind9-dnsscripts (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-libs_1:9.18.24-0ubuntu0.22.04.1 amd64.deb ...
Unpacking bind9-libs:amd64 (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Setting up bind9-libs:amd64 (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up bind9-utils (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up bind9 (1:9.18.24-0ubuntu0.22.04.1) ...
named-resolvconf.service is a disabled or a static unit not running, not starting it.
Setting up bind9-host (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up bind9-dnsscripts (1:9.18.24-0ubuntu0.22.04.1) ...
Processing triggers for ufw (0.36-1-4ubuntu0.1) ...
Rules updated for profile 'Samba'

Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.4) ...
root@ubuntu22:~# sudo apt install dnsmasq
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libbrooffice-ogltrans libwp6-1.0-1 libwpbackend-fdo-1.0-1 linux-image-6.2.0-26-generic linux-modules-6.2.0-26-generic
linux-modules-extra-6.2.0-26-generic
Use 'sudo apt autoremove' to remove them.
The following packages will be upgraded:
  dnsmasq
1 upgraded, 0 newly installed, 0 to remove and 213 not upgraded.
Need to get 3,916 B of archives.
After this operation, 1,024 B of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 dnsmasq all 1:9.18.24-0ubuntu0.22.04.1 [3,916 B]
Fetched 3,916 B in 1s (7,263 B/s)
(Reading database ... 241469 files and directories currently installed.)
Preparing to unpack .../dnsmasq_1:9.18.24-0ubuntu0.22.04.1_all.deb ...
Unpacking dnsmasq (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Setting up dnsmasq (1:9.18.24-0ubuntu0.22.04.1) ...
root@ubuntu22:~#
```

Activities Terminal Jun 13 14:11 root@UBUNTU: /home/ubuntu22

nano 6.2 /etc/bind/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 {
  //     0.0.0.0;
  // };

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

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

Read 24 lines

^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo M-A Set Mark M-] To Bracket
^X Read File ^R Replace ^U Paste ^J Justify ^_ Go To Line M-E Redo M-C Copy M-^ Where Was

Activities Terminal Jun 13 14:53

root@UBUNTU: /home/ubuntu22

```
GNU nano 6.2 /etc/bind/named.conf.options
// Uncomment the following block, and insert the addresses replacing
// the all-0's placeholder.

// forwarders {
//      192.168.56.101;
// };

//=====
// 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; };
forwarders {
    192.168.56.101;
};

};
```

^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line

Activities Terminal Jun 13 15:05

root@UBUNTU: /etc/bind

```
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 "example.com"
```

^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line


```
Activities Terminal Jun 13 14:54
root@UBUNTU: /home/ubuntu22

inet 192.168.56.101 netmask 255.255.255.0 broadcast 192.168.56.255
inet6 fe80::babf:b255:e5ba:c37c prefixlen 64 scopeid 0x20<link>
ether 08:00:27:0e:3c:4f txqueuelen 1000 (Ethernet)
RX packets 154003 bytes 51253498 (51.2 MB)
RX errors 0 dropped 2072 overruns 0 frame 0
TX packets 10625 bytes 1142219 (1.1 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
inet6 ::1 prefixlen 128 scopeid 0x10<host>
loop txqueuelen 1000 (Local Loopback)
RX packets 1712 bytes 193578 (193.5 KB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 1712 bytes 193578 (193.5 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@UBUNTU: /home/ubuntu22# ^C
root@UBUNTU: /home/ubuntu22# nano /etc/bind/named.conf.options
root@UBUNTU: /home/ubuntu22# sudo systemctl restart bind9.service
root@UBUNTU: /home/ubuntu22# nano /etc/bind/named.conf.options
root@UBUNTU: /home/ubuntu22# nano /etc/bind/named.conf.options
root@UBUNTU: /home/ubuntu22# sudo systemctl restart bind9.service
root@UBUNTU: /home/ubuntu22#
```

```
Activities Terminal Jun 13 15:31
root@UBUNTU: /etc/bind

root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
Job for named.service failed because the control process exited with error code.
See "systemctl status named.service" and "journalctl -xeu named.service" for details.
root@UBUNTU:/etc/bind# nano named.conf.local
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# nano /etc/bind/named.conf.options
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com
^Z
[1]+  Stopped                  named-checkzone example.com
root@UBUNTU:/etc/bind# nano dblocker
root@UBUNTU:/etc/bind# nano dblocal
root@UBUNTU:/etc/bind# nano db.local
root@UBUNTU:/etc/bind# nano db.local
root@UBUNTU:/etc/bind# cp db.local db.example.com
root@UBUNTU:/etc/bind# ls
bind.keys  db.empty      named.conf.default-zones  zones.rfc1918
db.0       db.example.com named.conf.local
db.127     db.local      named.conf.options
db.255     named.conf    rndc.key
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind#
```

```
Activities Terminal Jun 13 15:32
root@UBUNTU: /etc/bind
GNU nano 6.2 db.example.com
; BIND data file for local loopback interface
;
$TTL 604800
@ IN SOA example.com. root.example.com (
    2      ; Serial
    604800 ; Refresh
    86400  ; Retry
    2419200 ; Expire
    604800 ) ; Negative Cache TTL
;
@ IN NS example.com
test IN A 192.168.56.101
@ IN A 127.0.0.1
@ IN AAAA ::1

^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^A Replace ^U Paste ^J Justify ^_ Go To Line
Read 15 lines
```

```
Activities Terminal Jun 13 15:36
root@UBUNTU: /etc/bind
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# nslookup test.example.com
Server: 127.0.0.53
Address: 127.0.0.53#53

** server can't find test.example.com: SERVFAIL

root@UBUNTU:/etc/bind# dig test.example.com

;; <<>> DiG 9.18.24-0ubuntu0.22.04.1-Ubuntu <<>> test.example.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: SERVFAIL, id: 62813
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

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

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Thu Jun 13 15:36:11 IST 2024
```

```
Activities Terminal Jun 13 15:55
root@UBUNTU: /etc

root@UBUNTU:/etc# nano resolv.conf
root@UBUNTU:/etc# dig test.example.com

; <<>> DiG 9.18.24-0ubuntu0.22.04.1-Ubuntu <<>> test.example.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 44742
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:: udp: 1232
;; COOKIE: 2bba6127b011dad301000000666ac90f2bfabf53e83711e2 (good)
;; QUESTION SECTION:
;test.example.com.                IN      A

;; ANSWER SECTION:
test.example.com.                604800  IN      A      192.168.56.101

;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:55:19 IST 2024
;; MSG SIZE rcvd: 89

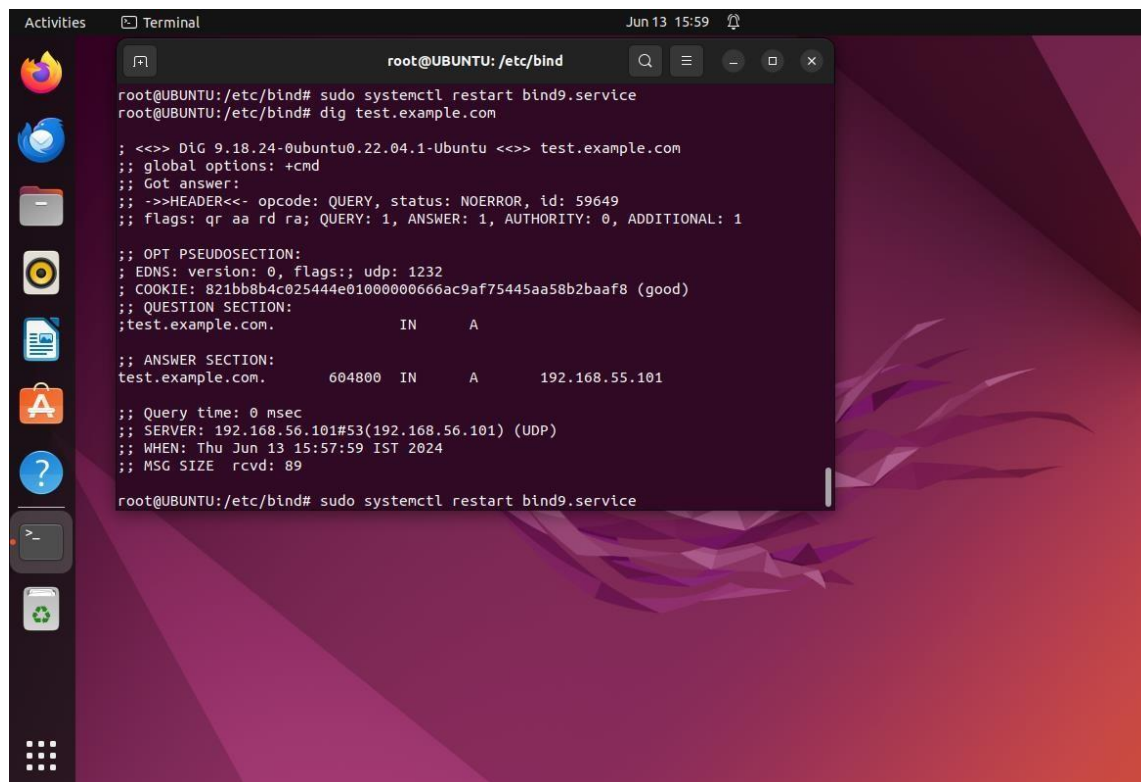
root@UBUNTU:/etc#
```

```
Activities Terminal Jun 13 15:56
root@UBUNTU: /etc

GNU nano 6.2 resolv.conf
# /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 192.168.56.101
options edns0 trust-ad
search .

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste    ^J Justify  ^_ Go To Line
```


A terminal window titled 'root@UBUNTU: /etc/bind' is open on an Ubuntu desktop. The terminal shows the execution of 'sudo systemctl restart bind9.service' and 'dig test.example.com'. The output of the dig command is displayed, showing query details and the resulting DNS record for test.example.com. The desktop background is a purple and red geometric pattern, and the left sidebar shows various application icons.

```
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# dig test.example.com

; <<>> DiG 9.18.24-0ubuntu0.22.04.1-Ubuntu <<>> test.example.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 59649
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1232
;; COOKIE: 821bb8b4c025444e01000000666ac9af75445aa58b2baaf8 (good)
;; QUESTION SECTION:
;test.example.com.                IN      A

;; ANSWER SECTION:
test.example.com.                604800  IN      A      192.168.55.101

;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:57:59 IST 2024
;; MSG SIZE rcvd: 89

root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
```

All the commands have been executed and the output has been obtained successfully.