

## 2.DNS

**Experiment: 4**

**Date:** 13-06-2024

**Aim:** To create and configure DNS Server

**Description:**

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 allow 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](http://ftp.example.com)

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

7. Gather information about your DNS server

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

```
$dig www.example.com
```

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

**Result:**

```
Activities Terminal Jul 17 14:48 root@UBUNTU: /etc/bind

inet6 fe80::babf:b255:e5ba:c37c prefixlen 64 scopeid 0x20<link>
ether 08:00:27:0e:3c:4f txqueuelen 1000 (Ethernet)
RX packets 23463 bytes 34643510 (34.6 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 4712 bytes 404938 (404.9 KB)
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 15661 bytes 1151235 (1.1 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 15661 bytes 1151235 (1.1 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@UBUNTU:/etc/bind# nano /etc/resolv.conf
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: 45893
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags: udp: 1232
;; COOKIE: 6a63d9b3170087bd010000066978ba3c9151af5a2daebfe (good)
;; QUESTION SECTION:
;test.example.com. IN A
;; ANSWER SECTION:
test.example.com. 604800 IN A 192.168.56.20

;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Wed Jul 17 14:45:15 IST 2024
;; MSG SIZE rcvd: 89

root@UBUNTU:/etc/bind#
```

```
root@UBUNTU: /etc/bind

GNU nano 6.2 db.20.16.192

; BIND reverse data file for local loopback interface
$TTL 604800
@ IN SOA example.com. root.example.com. (
; Serial
604800 ; Refresh
86400 ; Retry
2419200 ; Expire
604800 ) ; Negative Cache TTL
;
@ IN NS example.com.
1.0.0 IN PTR localhost.
5 IN PTR sreealakshmikm.example.com

[ Read 14 lines ]
^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
```

```
root@UBUNTU: /etc/bind
;; AUTHORITY SECTION:
. 10800 IN SOA a.root-servers.net. nstld.verisign-grs.com. 2024071700 1800 900 604800 86400
;; Query time: 143 msec
;; SERVER: 172.16.30.119#53(172.16.30.119) (UDP)
;; WHEN: Wed Jul 17 16:39:40 IST 2024
;; MSG SIZE rcvd: 144

root@UBUNTU:/etc/bind# nslookup 192.16.20.15
15.20.16.192.in-addr.arpa      name = ftp.example.com.20.16.192.in-addr.arpa.

root@UBUNTU:/etc/bind# nano db.20.16.192
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# nslookup 192.16.20.6
6.20.16.192.in-addr.arpa      name = sreelakshmikm.example.com.20.16.192.in-addr.arpa.

root@UBUNTU:/etc/bind# nano db.20.16.192
root@UBUNTU:/etc/bind# nslookup 192.16.20.6
6.20.16.192.in-addr.arpa      name = sreelakshmikm.example.com.20.16.192.in-addr.arpa.

root@UBUNTU:/etc/bind#
```

```
root@UBUNTU: /etc/bind
;; SERVER: 172.16.30.119#53(172.16.30.119) (UDP)
;; WHEN: Wed Jul 17 16:27:53 IST 2024
;; MSG SIZE rcvd: 138

root@UBUNTU:/etc/bind# nano db.local
root@UBUNTU:/etc/bind# cp db.127 db.20.16.192
root@UBUNTU:/etc/bind# nano db.20.16.192
root@UBUNTU:/etc/bind# nano name.conf.local
root@UBUNTU:/etc/bind# nano named.conf.local
root@UBUNTU:/etc/bind# nano db.local
root@UBUNTU:/etc/bind# nano db.127
root@UBUNTU:/etc/bind# nano db.20.16.192
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# dig 192.16.20.15

;<<>> DiG 9.18.24-0ubuntu0.22.04.1-Ubuntu <<>> 192.16.20.15
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NXDOMAIN, id: 17343
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1232
;; COOKIE: a0e92b521e6b422d010000006697a6741e622cf9d1cf83d7 (good)
```

Forward

```
Activities Terminal Jun 13 14:08 root@UBUNTU: ~
Unpacking bind9-host (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-dnswtills_1%3a9.18.24-0ubuntu0.22.04.1_amd64.deb ...
Unpacking bind9-dnswtills (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.18-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-libs_1%3a9.18.24-0ubuntu0.22.04.1_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-utills (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-dnswtills (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 (2.35-0ubuntu3.8) ...
root@UBUNTU:~# sudo apt install dnswtills
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  dnswtills
0 upgraded, 1 newly installed, 0 to remove and 123 not upgraded.
Need to get 3,916 B of archives.
After this operation, 60.4 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 dnswtills all 1:9.18.24-0ubuntu0.22.04.1 [3,916 B]
Fetched 3,916 B in 1s (7,148 B/s)
Selecting previously unselected package dnswtills.
(Reading database ... 231075 files and directories currently installed.)
Preparing to unpack .../dnswtills_1%3a9.18.24-0ubuntu0.22.04.1_all.deb ...
Unpacking dnswtills (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up dnswtills (1:9.18.24-0ubuntu0.22.04.1) ...
root@UBUNTU:~#
```

```
Activities Terminal Jun 13 14:29 root@UBUNTU: /etc/bind
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; };
};
```

Help Exit Write Out Read File Where Is Replace Cut Paste Execute Justify Location Go To Line Undo Redo Set Mark Copy

```
Activities Terminal Jun 13 14:39 root@UBUNTU: /etc/bind

Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  dnstools
0 upgraded, 1 newly installed, 0 to remove and 123 not upgraded.
Need to get 3,916 B of archives.
After this operation, 60.4 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 dnstools all 1:9.18.24-0ubuntu0.22.04.1 [3,916 B]
Fetched 3,916 B in 1s (7,148 B/s)
Selecting previously unselected package dnstools.
(Reading database ... 231075 files and directories currently installed.)
Preparing to unpack .../dnstools_1%3a9.18.24-0ubuntu0.22.04.1_all.deb ...
Unpacking dnstools (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up dnstools (1:9.18.24-0ubuntu0.22.04.1) ...
root@UBUNTU:~# cd /etc/bind
root@UBUNTU:/etc/bind# ls
bind.keys  db.127  db.empty  named.conf  named.conf.local  rndc.key
db.0      db.255  db.local  named.conf.default-zones  named.conf.options  zones.rfc1918
root@UBUNTU:/etc/bind# nano named.conf.options
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::babf:b255:e5ba:c37c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:0e:3c:4f txqueuelen 1000 (Ethernet)
    RX packets 23635 bytes 34959586 (34.9 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3906 bytes 331393 (331.3 KB)
    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 333 bytes 37325 (37.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 333 bytes 37325 (37.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
Activities Terminal Jun 13 14:53 root@UBUNTU: /etc/bind

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; };

    forwarders {
        192.168.56.101;
    };
};

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location  ^U Undo     ^M Set Mark
^X Exit      ^R Read File ^A Replace   ^U Paste     ^D Justify  ^/_ Go To Line ^E Redo     ^G Copy
```

```
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com db.example.com
example.com/IN: loaded serial 2
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" IN{
    type master;
    file "/etc/bind/db.example.com";
};

^G Help      ^O Write Out  ^W Where Is   ^X Cut        ^T Exec      ^L Location   ^U Undo       ^M Set Mark   ^I To Bracket
^X Exit      ^R Read File  ^_ Replace    ^U Paste      ^J Just      ^_ Go To Line ^E Redo       ^C Copy       ^Q Where Was
```

```
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.
est IN      A      192.168.56.101
IN      A      127.0.0.1
IN      AAAA     ::1

^G Help      ^O Write Out  ^W Where Is   ^X Cut        ^T Exec      ^L Location   ^U Undo       ^M Set Mark   ^I To Bracket
^X Exit      ^R Read File  ^_ Replace    ^U Paste      ^J Just      ^_ Go To Line ^E Redo       ^C Copy       ^Q Where Was
```



```
Activities Terminal Jun 13 15:35 root@UBUNTU: /etc/bind
root@UBUNTU:/etc/bind# cp db.local db.example.com
root@UBUNTU:/etc/bind# ls
keys db.127 db.empty db.local named.conf.default-zones named.conf.options zones.rfc1918
db.255 db.example.com named.conf named.conf.local rndc.key
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# named-checkzone example.com
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com
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
;
; answer:
; HEADER<<- opcode: QUERY, status: SERVFAIL, id: 34235
; Flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1
;
; PSEUDOSECTION:
; 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 15:33:44 IST 2024
; MSG SIZE rcvd: 45
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com db.example.com
;; example.com/IN: loaded serial 2
OK
root@UBUNTU:/etc/bind#

Activities Terminal Jun 13 15:36 root@UBUNTU: /etc/bind
root@UBUNTU:/etc/bind# cp db.local db.example.com
root@UBUNTU:/etc/bind# ls
keys db.127 db.empty db.local named.conf.default-zones named.conf.options zones.rfc1918
db.255 db.example.com named.conf named.conf.local rndc.key
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# named-checkzone example.com
root@UBUNTU:/etc/bind# nano db.example.com
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com
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
;
; answer:
; HEADER<<- opcode: QUERY, status: SERVFAIL, id: 34235
; Flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1
;
; PSEUDOSECTION:
; 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 15:33:44 IST 2024
; MSG SIZE rcvd: 45
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
root@UBUNTU:/etc/bind# named-checkzone example.com db.example.com
;; example.com/IN: loaded serial 2
OK
root@UBUNTU:/etc/bind#
```



```
Activities Terminal Jun 13 15:56 root@UBUNTU: /etc
; COOKIE: 04ce5501c12a305501000000666ac85c69d159f2abf782cf (good)
;; QUESTION SECTION:
;test.example.com.                IN      A
;; ANSWER SECTION:
test.example.com.                604800 IN      A      192.168.56.20
;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:52:20 IST 2024
;; MSG SIZE rcvd: 89

root@UBUNTU:/etc# named-checkzone example.com db.example.com
zone example.com/IN: loading from master file db.example.com failed: file not found
zone example.com/IN: not loaded due to errors.
root@UBUNTU:/etc# nano resolv.conf
root@UBUNTU:/etc# sudo systemctl restart bind9.service
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: 29360
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: udp: 1232
; COOKIE: 9ea42daec9b86cba01000000666ac94c655d4df8ab776eb0 (good)
;; QUESTION SECTION:
;test.example.com.                IN      A
;; ANSWER SECTION:
test.example.com.                604800 IN      A      192.168.56.20
;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:56:20 IST 2024
;; MSG SIZE rcvd: 89

root@UBUNTU:/etc#
```

```
Activities Terminal Jun 13 15:50 root@UBUNTU: /etc
GNU nano 6.2 /etc/bind/db.example.com
; BIND data file for local loopback interface
;
$TTL 604800
@      IN      SOA      example.com. root.example.com. (
; Serial
        604800      ; Refresh
        86400       ; Retry
        2419200     ; Expire
        604800 )    ; Negative Cache TTL
;
@      IN      NS       example.com.
test   IN      A        192.168.56.20
@      IN      A        127.0.0.1
@      IN      AAAA     ::1

Read 15 lines
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^J Execute  ^C Location ^U Undo      ^M-A Set Mark
^X Exit      ^R Read File ^A Replace   ^U Paste     ^D Justify  ^_ Go To Line ^I-E Redo    ^I-G Copy
```

Conclusion: The DNS has installed and configured successfully.