

## 2.DNS

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**Experiment:** 4

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**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](http://www.example.com)  
\$dig ftp.example.com

## Result:

```
Activities Terminal Jun 13 13:57 root@UBUNTU: ~
ubuntu22@UBUNTU:~$ su -
Password:
root@UBUNTU:~# sudo apt install bind9
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bind9-dnssutils bind9-host bind9-libs bind9-utils
Suggested packages:
  bind-doc resolvconf
The following NEW packages will be installed:
  bind9 bind9-utils
The following packages will be upgraded:
  bind9-dnssutils bind9-host bind9-libs
3 upgraded, 2 newly installed, 0 to remove and 318 not upgraded.
Need to get 1,878 kB of archives.
After this operation, 3,549 kB disk space will be freed.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-host amd64 1:9.18.24-0ubuntu0.22.04.1 [52.5 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-dnssutils amd64 1:9.18.24-0ubuntu0.22.04.1 [157 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-libs amd64 1:9.18.24-0ubuntu0.22.04.1 [1,247 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9-utils amd64 1:9.18.24-0ubuntu0.22.04.1 [161 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 bind9 amd64 1:9.18.24-0ubuntu0.22.04.1 [260 kB]
Fetched 1,878 kB in 3s (603 kB/s)
(Reading database ... 163534 files and directories currently installed.)
Preparing to unpack .../bind9-host_1%3a9.18.24-0ubuntu0.22.04.1_amd64.deb ...
Unpacking bind9-host (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.12-0ubuntu0.22.04.2) ...
Preparing to unpack .../bind9-dnssutils_1%3a9.18.24-0ubuntu0.22.04.1_amd64.deb ...
Unpacking bind9-dnssutils (1:9.18.24-0ubuntu0.22.04.1) over (1:9.18.12-0ubuntu0.22.04.2) ...
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 (1:9.18.12-0ubuntu0.22.04.2) ...
Selecting previously unselected package bind9-utils.
Preparing to unpack .../bind9-utils_1%3a9.18.24-0ubuntu0.22.04.1_amd64.deb ...
Unpacking bind9-utils (1:9.18.24-0ubuntu0.22.04.1) ...
Selecting previously unselected package bind9.
Preparing to unpack .../bind9_1%3a9.18.24-0ubuntu0.22.04.1_amd64.deb ...
```

```
Activities Terminal Jun 13 15:37 root@UBUNTU: /etc/bind
Adding group 'bind' (GID 139) ...
Done.
Adding system user 'bind' (UID 130) ...
Adding new user 'bind' (UID 130) with group 'bind' ...
Not creating home directory '/var/cache/bind'.
wrote key file "/etc/bind/rndc.key"
named-resolvconf.service is a disabled or a static unit, not starting it.
Created symlink /etc/systemd/system/bind9.service → /lib/systemd/system/named.service.
Created symlink /etc/systemd/system/multi-user.target.wants/named.service → /lib/systemd/system/named.service.
Setting up bind9-host (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up bind9-dnssutils (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 (2.35-0ubuntu3.1) ...
root@UBUNTU:~# sudo apt install dnssutils
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  dnssutils
0 upgraded, 1 newly installed, 0 to remove and 318 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 dnssutils all 1:9.18.24-0ubuntu0.22.04.1 [3,916 B]
Fetched 3,916 B in 1s (4,476 B/s)
Selecting previously unselected package dnssutils.
(Reading database ... 163622 files and directories currently installed.)
Preparing to unpack .../dnssutils_1%3a9.18.24-0ubuntu0.22.04.1_all.deb ...
Unpacking dnssutils (1:9.18.24-0ubuntu0.22.04.1) ...
Setting up dnssutils (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
```

Activities Terminal Jun 13 14:52 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;
    };
};
```

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 15:11 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";

//forward zone
zone "example.com" IN {
    type master;
    file "/etc/bind/db.example.com";
};
```

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 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. (
    2      ; Serial
    604800 ; Refresh
    86400  ; Retry
    2419200 ; Expire
    604800 ) ; Negative Cache TTL
;
@ IN NS example.com.
test IN A 192.168.10.20
@ IN A 127.0.0.1
@ IN AAAA ::1

Wrote 15 lines
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo M-A Set Mark
^X Exit ^R Read File ^_ Replace ^U Paste ^J Justify ^/_ Go To Line M-E Redo M-6 Copy
```

```
Activities Terminal Jun 13 15:35 root@UBUNTU: /etc/bind
root@UBUNTU:/etc/bind# ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    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 487027 bytes 633290220 (633.2 MB)
    RX errors 0 dropped 1281 overruns 0 frame 0
    TX packets 30646 bytes 2201911 (2.2 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 452 bytes 50298 (50.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 452 bytes 50298 (50.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@UBUNTU:/etc/bind# nano named.conf.options
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
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.local
root@UBUNTU:/etc/bind# sudo systemctl restart bind9.service
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 db.local
root@UBUNTU:/etc/bind# cp db.local db.example.com
root@UBUNTU:/etc/bind# ls
bind.keys db.127 db.empty db.local named.conf.default-zones named.conf.options zones.rfc1918
db.0 db.255 db.example.com named.conf named.conf.local rndc.key
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
^C
root@UBUNTU:/etc/bind# nslookup test.example.com
```



```
Activities Terminal Jun 13 15:36 root@UBUNTU: /etc/bind
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 db.local
root@UBUNTU:/etc/bind# cp db.local db.example.com
root@UBUNTU:/etc/bind# ls
bind.keys db.127 db.empty db.local named.conf.default-zones named.conf.local rndc.key
db.0 db.255 db.example.com named.conf named.conf.local zones.rfc1918
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
^C
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: 20286
;; 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 15:33:36 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
zone example.com/IN: loaded serial 2
OK
root@UBUNTU:/etc/bind#
```

```
Activities Terminal Jun 13 15:46 root@UBUNTU: /etc
GNU nano 6.2 resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resolved(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /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 .
Wrote 23 lines
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^G Location ^M-U Undo ^M-A Set Mark
^Y Exit ^P Read File ^V Replace ^N Paste ^J Justify ^G Go To Line ^M-E Redo ^M-C Copy
```

```
Activities Terminal Jun 13 15:57 root@UBUNTU: /etc
;test.example.com. IN A
;; ANSWER SECTION:
test.example.com. 604800 IN A 192.168.10.20
;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:51:38 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# cd /bind/
-bash: cd: /bind/: No such file or directory
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: 62289
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 80f15fc8595d3d4b01000000666ac95dfb89a55da6a93165 (good)
;; QUESTION SECTION:
;test.example.com. IN A

;; ANSWER SECTION:
test.example.com. 604800 IN A 192.168.10.20

;; Query time: 0 msec
;; SERVER: 192.168.56.101#53(192.168.56.101) (UDP)
;; WHEN: Thu Jun 13 15:56:37 IST 2024
;; MSG SIZE rcvd: 89

root@UBUNTU:/etc#
```

Conclusion: The DNS has installed and configured successfully.