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Install and configure DNS server in Ubuntu 16.04 LTS

sk

12-15 minutes

This comprehensive tutorial describes how to install and configure DNS server in Ubuntu 16.04 LTS 64 bit server edition. As you may know already, **DNS** is the short form of **D**omain **n**ame **s**ystem, which is used to resolve hostnames into IP addresses and vice versa. For the purpose of this guide, I will be using three systems, one for Primary DNS server, other for secondary DNS, and the third one for DNS client. All systems are running with Ubuntu 16.04 operating systems. Here is the IP and host name of each system.

Primary DNS server:

- **Operating system** : Ubuntu 16.04 LTS 64 bit server
- **Hostname** : pri.ostechnix.lan
- **IP address** : 192.168.1.200/24

Secondary DNS server:

- **Operating system** : Ubuntu 16.04 LTS 64 bit server
- **Hostname** : sec.ostechnix.lan
- **IP address** : 192.168.1.201/24

DNS Client:

- **Operating system** : Ubuntu 16.04 LTS 64 bit server
- **Hostname** : client.ostechnix.lan
- **IP address** : 192.168.1.202/24

Let us get started.

Install and Configure DNS server in Ubuntu 16.04

I will split this guide as as three parts for the sake of simplicity and easy understanding.

1. Install and configure Caching-only name server,
2. Install and configure Primary DNS server or Master DNS server
3. Install and configure Secondary DNS server or Slave DNS server

Let us do it step by step.

Part 1 : Install and configure Caching-only name server,

Make sure your Ubuntu server is up-to-date.

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get dist-upgrade
```

Install BIND9

After updating the system, run the following command to install BIND9 packages which are used to setup DNS server.

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

Install BIND9

Configuring Caching name server

Caching name server saves the DNS query results locally for a particular period of time. It reduces the DNS server's traffic by saving the queries locally, therefore it improves the performance and efficiency of the DNS server.

To configure Caching name server, edit **/etc/bind /named.conf.options** file:

```
sudo nano /etc/bind/named.conf.options
```

Uncomment the following lines. And then, add your ISP or Google

public DNS server IP addresses.

```
forwarders {
 8.8.8.8;
 };
```

Save and close the file.

And then restart bind9 service to take effect the changes.

```
sudo systemctl restart bind9
```

We have successfully installed the caching name server.

Testing Caching name server

Now let us check if it is working or not using command:

```
dig -x 127.0.0.1
```

If you see something like below, congratulations! Caching name server is working!

```
; <<>> DiG 9.10.3-P4-Ubuntu <<>> -x 127.0.0.1
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR,
id: 22769
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1,
AUTHORITY: 1, ADDITIONAL: 3

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;1.0.0.127.in-addr.arpa. IN PTR

;; ANSWER SECTION:
1.0.0.127.in-addr.arpa. 604800 IN PTR localhost.

;; AUTHORITY SECTION:
127.in-addr.arpa. 604800 IN NS localhost.

;; ADDITIONAL SECTION:
localhost. 604800 IN A 127.0.0.1
localhost. 604800 IN AAAA ::1
```

```
;; Query time: 0 msec
;; SERVER: 192.168.1.200#53(192.168.1.200)
;; WHEN: Tue Aug 23 15:53:59 IST 2016
;; MSG SIZE rcvd: 132
```

Part 2 : Install and configure Primary DNS server

Make sure your Ubuntu server is up-to-date using the following commands:

```
sudo apt-get update
sudo apt-get upgrade
```

```
sudo apt-get dist-upgrade
```

Install BIND9

Run the following command to install BIND9 packages.

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

Configuring Primary DNS server

All configuration file be will be available under **/etc/bind/** directory.

Let us edit bind9 configuration file

Edit **'/etc/bind/named.conf'** using any editor of your choice:

```
sudo nano /etc/bind/named.conf
```

This file should have the following lines in it. If the lines are not there, just add them.

```
include "/etc/bind/named.conf.options";
include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";
```

Save the changes and exit the file.

We need to define the forward and reverse zone files.

To do so, edit **named.conf.local** file:

```
sudo nano /etc/bind/named.conf.local
```

Define the forward and reverse files as shown below.

```
zone "ostechnix.lan" {
        type master;
        file "/etc/bind/for.ostechnix.lan";
        allow-transfer { 192.168.1.201; };
        also-notify { 192.168.1.201; };
 };
zone "1.168.192.in-addr.arpa" {
        type master;
        file "/etc/bind/rev.ostechnix.lan";
        allow-transfer { 192.168.1.201; };
        also-notify { 192.168.1.201; };
 };
```

Here, **for.ostechnix.lan** is the forward zone file. **rev.ostechnix.lan** is the reverse zone files. And **192.168.1.202** is the IP address of secondary DNS server. We do this because, the secondary DNS will start to fetch the queries if primary server is down.

Save and close the file.

Let us now create the zone files which we defined in the previous step.

First let us create forward zone file as shown below.

```
sudo nano /etc/bind/for.ostechnix.lan
```

Add the following lines:

```
$TTL 86400
```

```
@   IN  SOA     pri.ostechnix.lan.
root.ostechnix.lan. (
        2011071001  ;Serial
        3600        ;Refresh
        1800        ;Retry
        604800      ;Expire
        86400       ;Minimum TTL
)
@       IN  NS          pri.ostechnix.lan.
@       IN  NS          sec.ostechnix.lan.
@       IN  A           192.168.1.200
@       IN  A           192.168.1.201
@       IN  A           192.168.1.202
pri     IN  A           192.168.1.200
sec     IN  A           192.168.1.201
client  IN  A           192.168.1.202
```

Similarly, you can add the other client records as defined in the above file.

Save and close the file. Next create reverse zone.

```
sudo nano /etc/bind/rev.ostechnix.lan
```

Add the following lines:

```
$TTL 86400
@   IN  SOA     pri.ostechnix.lan.
root.ostechnix.lan. (
        2011071002  ;Serial
        3600        ;Refresh
        1800        ;Retry
        604800      ;Expire
        86400       ;Minimum TTL
)
@       IN  NS          pri.ostechnix.lan.
@       IN  NS          sec.ostechnix.lan.
@       IN  PTR         ostechnix.lan.
pri     IN  A           192.168.1.200
sec     IN  A           192.168.1.201
client  IN  A           192.168.1.202
200     IN  PTR         pri.ostechnix.lan.
201     IN  PTR         sec.ostechnix.lan.
202     IN  PTR         client.ostechnix.lan.
```

Save and close the file.

Set the proper permissions and ownership to the bind9 directory.

```
sudo chmod -R 755 /etc/bind
```

```
sudo chown -R bind:bind /etc/bind
```

Next, we need to verify the DNS configuration files and zone files.

Check the DNS configuration files with commands:

```
sudo named-checkconf /etc/bind/named.conf
```

```
sudo named-checkconf /etc/bind/named.conf.local
```

If the above commands returns nothing, it means DNS configuration is valid.

Next, check the zone files using commands:

```
sudo named-checkzone ostechnix.lan /etc/bind
/for.ostechnix.lan
```

Sample output:

```
zone ostechnix.lan/IN: loaded serial 2011071001
OK
```

Check the reverse zone file:

```
sudo named-checkzone ostechnix.lan /etc/bind
/rev.ostechnix.lan
```

Sample output:

```
 zone ostechnix.lan/IN: loaded serial 2011071002
OK
```

If you got the results as shown above, then everything is good.

Now, it is time to check whether the primary DNS server is working or not.

Edit **/etc/network/interfaces** file:

```
sudo vi /etc/network/interfaces
```

Add the DNS server IP address. In our case, the DNS server IP is the same IP address of this machine itself.

```
dns-nameservers 192.168.1.200
```

Save and close the file.

Finally, restart Bind9 service.

```
sudo systemctl restart bind9
```

Testing primary DNS server

Verify DNS server using dig or nslookup commands.

```
dig pri.ostechnix.lan
```

Sample output:

```
; <<>> DiG 9.10.3-P4-Ubuntu <<>> pri.ostechnix.lan
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR,
id: 51989
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1,
AUTHORITY: 2, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;pri.ostechnix.lan. IN A

;; ANSWER SECTION:
```

```
pri.ostechnix.lan. 86400 IN A 192.168.1.200

;; AUTHORITY SECTION:
ostechnix.lan. 86400 IN NS sec.ostechnix.lan.
ostechnix.lan. 86400 IN NS pri.ostechnix.lan.

;; ADDITIONAL SECTION:
sec.ostechnix.lan. 86400 IN A 192.168.1.201

;; Query time: 0 msec
;; SERVER: 192.168.1.200#53(192.168.1.200)
;; WHEN: Tue Aug 23 16:56:13 IST 2016
;; MSG SIZE rcvd: 110
```

Or, use nslookup command as shown below:

```
nslookup ostechnix.lan
```

Sample output:

```
Server: 192.168.1.200
Address: 192.168.1.200#53

Name: ostechnix.lan
Address: 192.168.1.200
Name: ostechnix.lan
Address: 192.168.1.201
Name: ostechnix.lan
Address: 192.168.1.202
```

If you got results something like above, then primary DNS server is up and is working perfectly!

Part 2: Install and configure Secondary DNS server

You need a separate system to setup this server. We need secondary DNS server, because in case of any problem with Primary DNS, then secondary dns server will still resolve quries.

First, Update server using commands:

```
sudo apt-get update

sudo apt-get upgrade

sudo apt-get dist-upgrade
```

Install BIND9

Install required bind9 packages:

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

Configure secondary DNS server

Edit bind9 configuration file:

```
sudo nano /etc/bind/named.conf
```

Add the following lines if they are not there.

```
include "/etc/bind/named.conf.options";
```

```
include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";
```

Save and close the file.

Next, we need to define zone files.

To do so, edit **named.conf.local** file:

```
sudo nano /etc/bind/named.conf.local
```

Add or modify the following lines. Replace IP address and zone files with your own values.

```
zone "ostechnix.lan" {
        type slave;
        file "/var/cache/bind/for.ostechnix.lan";
        masters { 192.168.5.200; };
 };
zone "1.168.192.in-addr.arpa" {
        type slave;
        file "/var/cache/bind/rev.ostechnix.lan";
        masters { 192.168.5.200; };
 };
```

Here, **192.168.1.200** is the IP address of the primary DNS server.

Please note that the path of zone files must be **/var/cache /bind/** directory. It is because AppArmor only allow write access inside it by default.

Next set the proper permission and ownership to the bind directory.

```
sudo chmod -R 755 /etc/bind
```

```
sudo chown -R bind:bind /etc/bind
```

Then, edit network configuration file and add the primary and secondary DNS server's IP address.

```
sudo nano /etc/network/interfaces
```

```
[...]
dns-nameservers 192.168.1.200
dns-nameservers 192.168.1.201
```

Save and close the file.

Finally, reboot your system to take effect the all changes.

Testing Secondary DNS server

As I mentioned already, we use “dig” or “nslookup” commands to test DNS server.

Let us verify the secondary DNS server with command:

```
dig sec.ostechnix.lan
```

Sample Output:

```
; <<>> DiG 9.10.3-P4-Ubuntu <<>> sec.ostechnix.lan
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR,
```

```
id: 49308
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1,
AUTHORITY: 2, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;sec.ostechnix.lan. IN A

;; ANSWER SECTION:
sec.ostechnix.lan. 86400 IN A 192.168.1.201

;; AUTHORITY SECTION:
ostechnix.lan. 86400 IN NS sec.ostechnix.lan.
ostechnix.lan. 86400 IN NS pri.ostechnix.lan.

;; ADDITIONAL SECTION:
pri.ostechnix.lan. 86400 IN A 192.168.1.200

;; Query time: 2 msec
;; SERVER: 192.168.1.200#53(192.168.1.200)
;; WHEN: Tue Aug 23 18:19:47 IST 2016
;; MSG SIZE rcvd: 110
```

Similarly, you can verify primary DNS server with command:

```
dig pri.ostechnix.lan
```

Or, just use nslookup command as shown below.

```
nslookup ostechnix.lan
```

Note: Please note that the zone files will be transferred only when the **Serial Number** on the Primary DNS server is higher than the Secondary DNS server's serial number.

Configuring DNS client

Edit network configuration file in the client system:

```
sudo nano /etc/network/interfaces
```

Add the nameserver IP addresses.

```
[...]
nameserver 192.168.1.200
nameserver 192.168.1.201
```

Save and close the file. Then, reboot your system to take effect the changes.

Test the DNS servers using any one of the following commands:

```
dig pri.ostechnix.lan

dig sec.ostechnix.lan

dig client.ostechnix.lan

nslookup ostechnix.local
```

At this stage, you will have working primary and secondary DNS servers.

Don't forget to download the following free EBOOK that explains how to install and configure various server applications on your Ubuntu system.

That's all for now. If you find this guide useful, please share it on your social networks and support OSTechNix.

Cheers!

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