

Filière WM 2024
Module : Administration linux avancée

Installation et Configuration
d'un serveur DHCP

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Summary:

This report outlines the process of installing and configuring a DHCP (Dynamic Host Configuration Protocol) server on a Debian-based distribution. The DHCP server enables automatic management of IP addresses within a network, simplifying the administration of connected devices.

Keywords:

- **DHCP**
- **Installation**
- **Configuration**
- **Network**
- **Automation**

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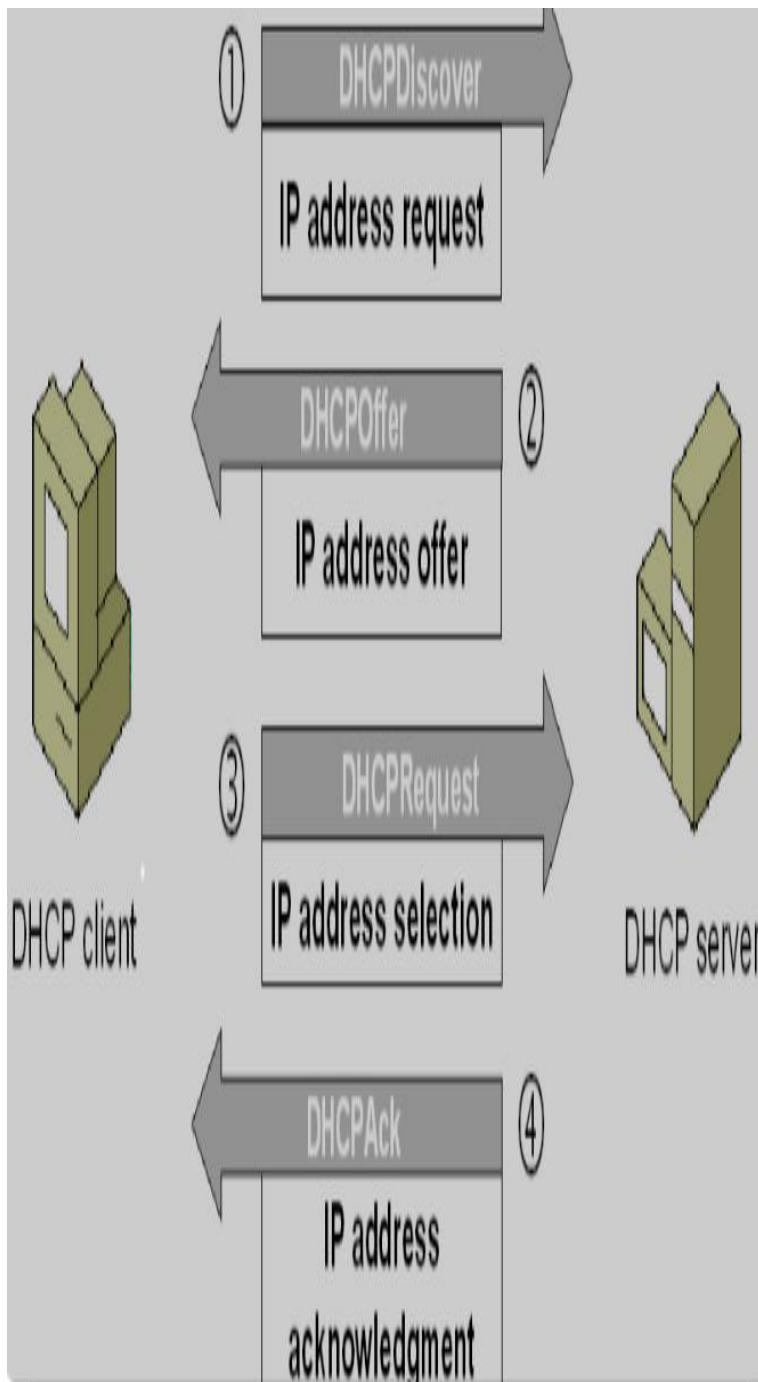
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Introduction :

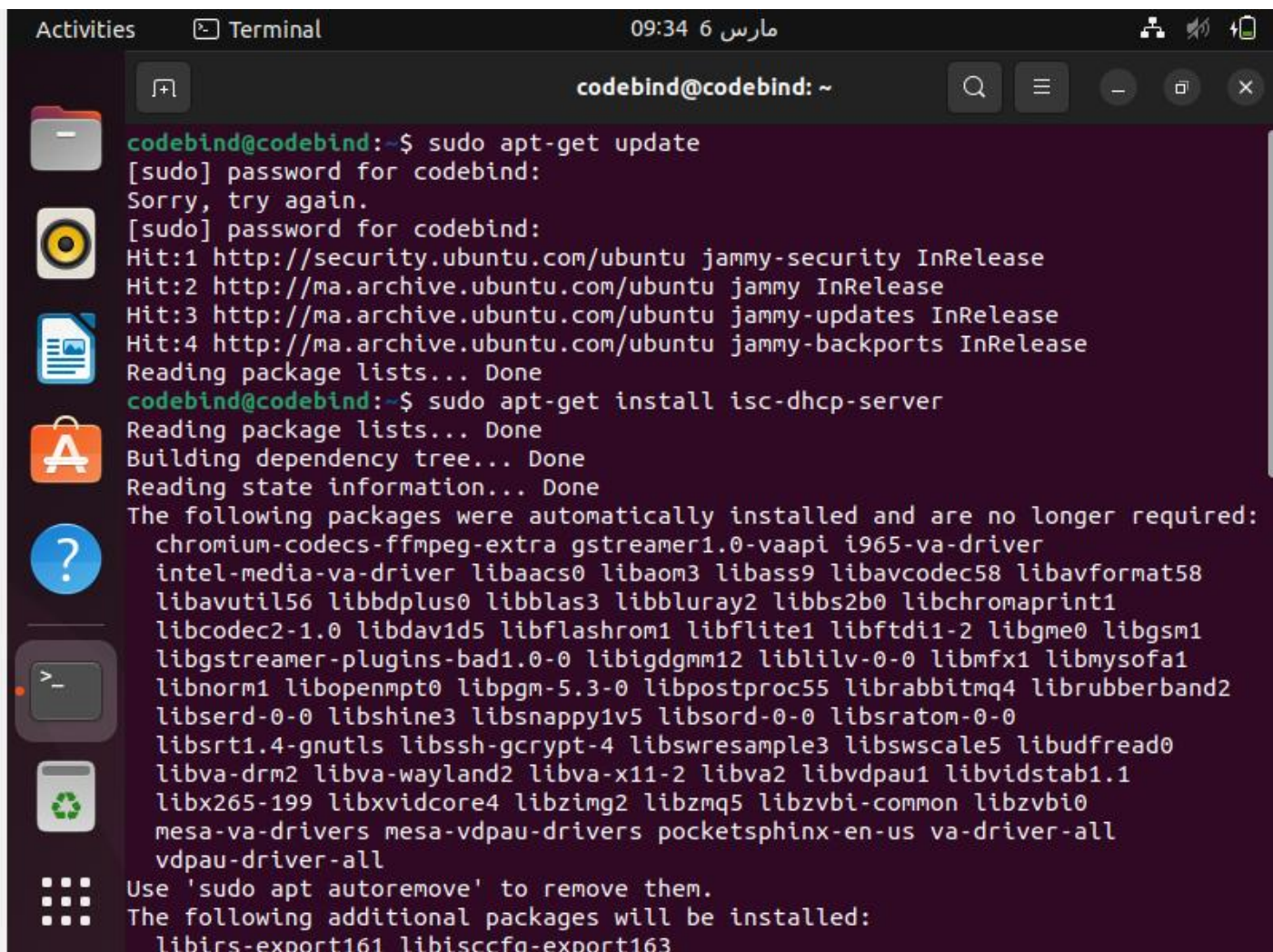


The DHCP Server's Role in Network Administration

The DHCP (Dynamic Host Configuration Protocol) server plays a vital role in the automatic management of IP addresses within a network. By dynamically allocating IP addresses and other network configuration parameters to connected devices, it streamlines the process of device administration, making it easier for network administrators to optimize and manage the network effectively.

With DHCP, the need for manual assignment of IP addresses to individual devices is eliminated, resulting in a more efficient and scalable network infrastructure. This automated approach not only saves time and effort but also reduces the likelihood of conflicts and errors that can arise from manual configuration.

I. Installation of DHCP Server :



```
codebind@codebind: ~  
codebind@codebind:~$ sudo apt-get update  
[sudo] password for codebind:  
Sorry, try again.  
[sudo] password for codebind:  
Hit:1 http://security.ubuntu.com/ubuntu jammy-security InRelease  
Hit:2 http://ma.archive.ubuntu.com/ubuntu jammy InRelease  
Hit:3 http://ma.archive.ubuntu.com/ubuntu jammy-updates InRelease  
Hit:4 http://ma.archive.ubuntu.com/ubuntu jammy-backports InRelease  
Reading package lists... Done  
codebind@codebind:~$ sudo apt-get install isc-dhcp-server  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver  
intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58  
libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1  
libcodec2-1.0 libdav1d5 libflashrom1 libflite1 libftdi1-2 libgme0 libgsm1  
libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libmfx1 libmysofa1  
libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4 librubberband2  
libserd-0-0 libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0  
libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0  
libva-drm2 libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1  
libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common libzvbi0  
mesa-va-drivers mesa-vdpau-drivers pocketsphinx-en-us va-driver-all  
vdpau-driver-all  
Use 'sudo apt autoremove' to remove them.  
The following additional packages will be installed:  
libirs-export161 libisccfg-export163
```

Update available packages:

```
codebind@codebind:~$ sudo apt-get update  
[sudo] password for codebind:
```

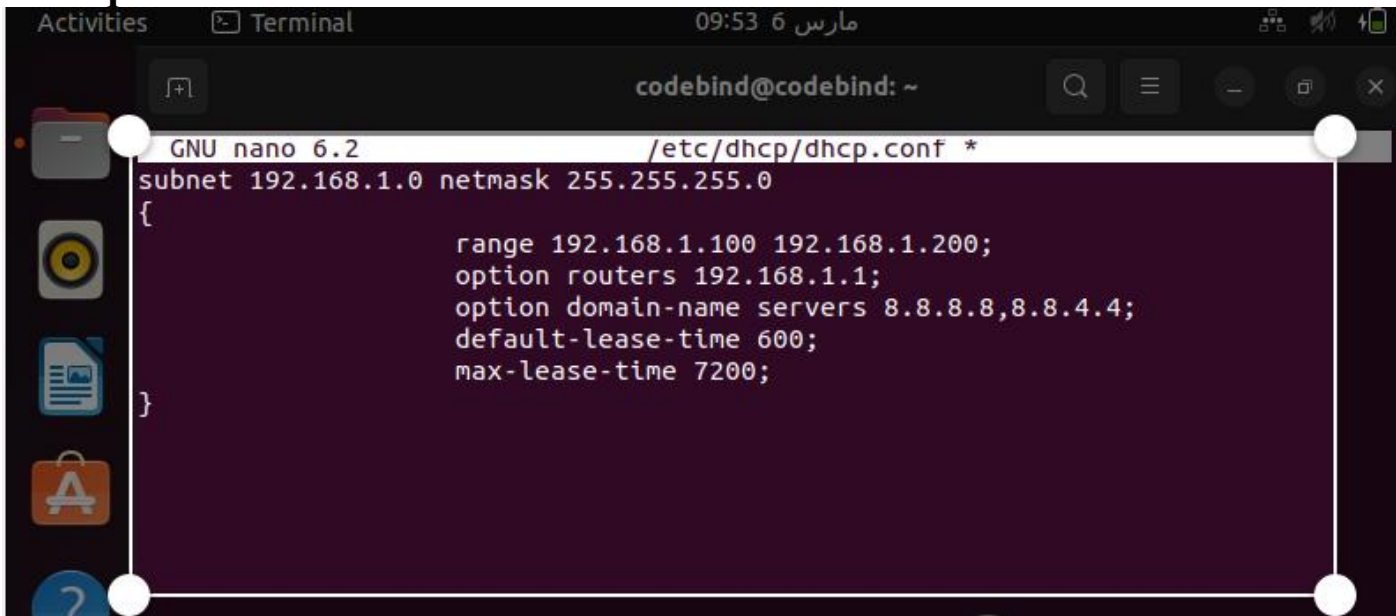
- This command updates the list of available packages to ensure the system has the latest information about software packages.

```
codebind@codebind:~$ sudo apt-get install isc-dhcp-server  
Reading package lists... Done
```

- This command installs the ISC DHCP server package which provides the necessary software to run a DHCP server on the system.

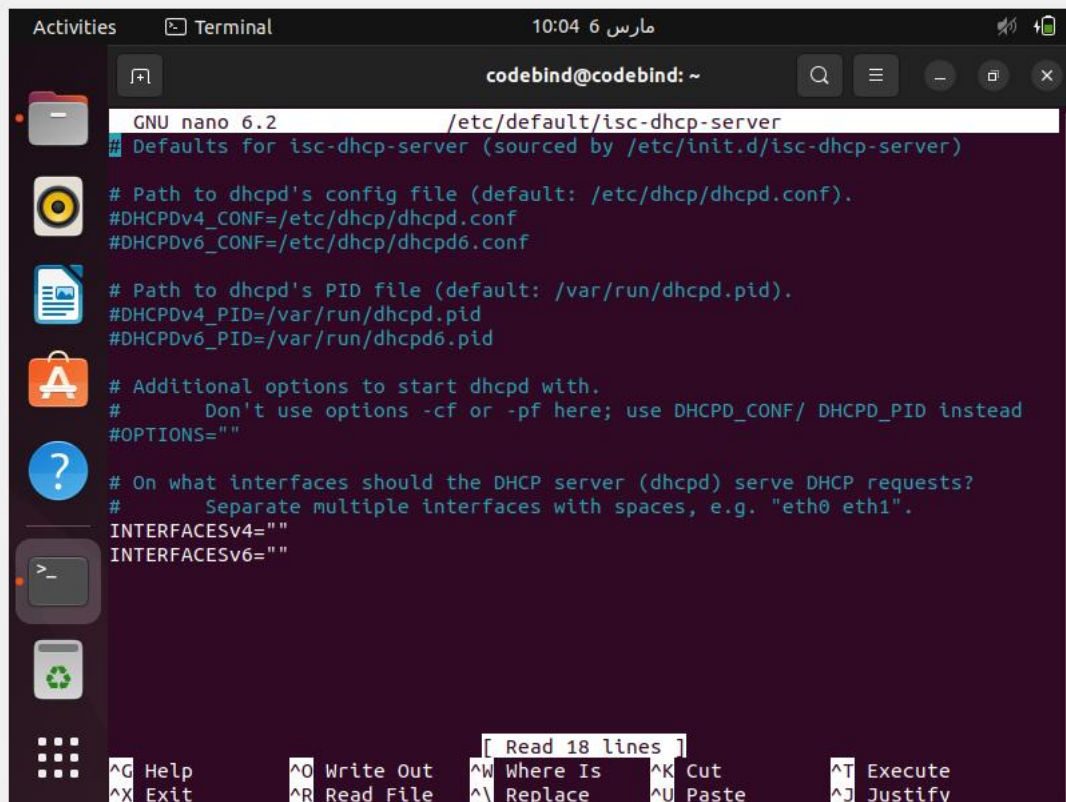
II. Configuration of DHCP Server:

- Modify the configuration file according to the network requirements.



A terminal window titled 'codebind@codebind: ~' showing the configuration of the DHCP server using the nano editor. The file being edited is `/etc/dhcp/dhcp.conf`. The configuration is as follows:

```
GNU nano 6.2 /etc/dhcp/dhcp.conf *
subnet 192.168.1.0 netmask 255.255.255.0
{
    range 192.168.1.100 192.168.1.200;
    option routers 192.168.1.1;
    option domain-name servers 8.8.8.8,8.8.4.4;
    default-lease-time 600;
    max-lease-time 7200;
}
```



A terminal window titled 'codebind@codebind: ~' showing the configuration of the DHCP server using the nano editor. The file being edited is `/etc/default/isc-dhcp-server`. The configuration is as follows:

```
GNU nano 6.2 /etc/default/isc-dhcp-server
## 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=""
INTERFACESv6=""
```

At the bottom of the terminal window, there is a status bar showing the following information:

```
[ Read 18 lines ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify
```

```
Try: sudo apt install <deb name>
codebind@codebind:~$ sudo nano /etc/default/isc-dhcp-server
[sudo] password for codebind:
codebind@codebind:~$ sudo nano /etc/default/isc-dhcp-server
```

This example configuration defines a **subnet, IP address range, default gateway, subnet mask, domain name, and DNS servers for DHCP clients.**

III. Starting and Managing DHCP Service

- Start the DHCP service:

```
codebind@codebind:~$ systemctl restart isc-dhcp-server
codebind@codebind:~$ systemctl status isc-dhcp-server
* isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; ven
   Active: failed (Result: exit-code) since Wed 2024-03-06 11:33:00 +01; 4s
   Docs: man:dhcpd(8)
   Process: 3849 ExecStart=/bin/sh -ec          CONFIG_FILE=/etc/dhcp/dhcpd.conf;
   Main PID: 3849 (code=exited, status=1/FAILURE)
   CPU: 22ms

11:33:00 06 ملبس codebind dhcpd[3849]:
11:33:00 06 ملبس codebind dhcpd[3849]: If you think you have received this mes
11:33:00 06 ملبس codebind dhcpd[3849]: than a configuration issue please read
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11:33:00 06 ملبس codebind dhcpd[3849]:
11:33:00 06 ملبس codebind dhcpd[3849]: exiting.
11:33:00 06 ملبس codebind systemd[1]: isc-dhcp-server.service: Main process ex
11:33:00 06 ملبس codebind systemd[1]: isc-dhcp-server.service: Failed with res
lines 1-18/18 (END)
```

```
codebind@codebind:~$ systemctl restart isc-dhcp-server
codebind@codebind:~$ systemctl status isc-dhcp-server
```

- 1st command starts the DHCP server service, allowing it to begin offering IP addresses to clients on the network.
- 2nd command displays the current status of the DHCP server service, indicating whether it is running properly or encountering any issues.

IV.Troubleshooting Example: Resolving DHCP Service Startup Issue :

```
codebind@codebind:~$ systemctl restart isc-dhcp-server
codebind@codebind:~$ systemctl status isc-dhcp-server
* isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; ven>
   Active: failed (Result: exit-code) since Wed 2024-03-06 11:33:00 +01; 4s>
   Docs: man:dhcpd(8)
   Process: 3849 ExecStart=/bin/sh -ec          CONFIG_FILE=/etc/dhcp/dhcpd.conf;>
   Main PID: 3849 (code=exited, status=1/FAILURE)
   CPU: 22ms

11:33:00 06 مایس codebind dhcpd[3849]:
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11:33:00 06 مایس codebind dhcpd[3849]: process and the information we find hel>
11:33:00 06 مایس codebind dhcpd[3849]: exiting.
11:33:00 06 مایس codebind systemd[1]: isc-dhcp-server.service: Main process ex>
11:33:00 06 مایس codebind systemd[1]: isc-dhcp-server.service: Failed with res>
lines 1-18/18 (END)
```

- Upon configuring the DHCP server and attempting to start the service, an unexpected issue arose hindering the service's proper startup. Investigation revealed that an error occurred after deleting the primary DNS server (8.8.8.8) from the DHCP configuration, leaving only the secondary DNS server (8.8.4.4).
- To rectify this issue, the DHCP server's configuration was adjusted to include a valid primary DNS server. Following this, the DHCP service was restarted to implement the changes. Here are the steps taken to resolve the problem:


```
codebind@codebind: ~  
GNU nano 6.2 /etc/dhcp/dhcpd.conf  
# dhcpd.conf  
#  
# Sample configuration file for ISC dhcpd  
#  
# Attention: If /etc/ltsp/dhcpd.conf exists, that will be used as  
# configuration file instead of this file.  
#  
# option definitions common to all supported networks...  
  
# The ddns-updates-style parameter controls whether or not the server will  
# attempt to do a DNS update when a lease is confirmed. We default to the  
# behavior of the version 2 packages ('none', since DHCP v2 didn't  
# have support for DDNS.)  
  
subnet 192.168.1.0 netmask 255.255.255.0 {  
    range 192.168.1.100 192.168.1.200;  
    option routers 192.168.1.1;  
    option domain-name-servers 8.8.4.4;  
    default-lease-time 600;  
    max-lease-time 7200;  
}  
  
# If this DHCP server is the official DHCP server for the local  
# network, the authoritative directive should be uncommented.  
[ Read 113 lines ]
```

```
codebind@codebind:~$ ifconfig  
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 192.168.1.1 netmask 255.255.255.0 broadcast 192.168.1.255  
    ether 08:00:27:32:be:d9 txqueuelen 1000 (Ethernet)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 524 bytes 85722 (85.7 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 14875 bytes 1069683 (1.0 MB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 14875 bytes 1069683 (1.0 MB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

1. Configure the default gateway (router) IP address:

```
codebind@codebind:~$ sudo ifconfig enp0s3 192.168.1.1
codebind@codebind:~$
```

2. Restart the DHCP service to apply the configuration changes:

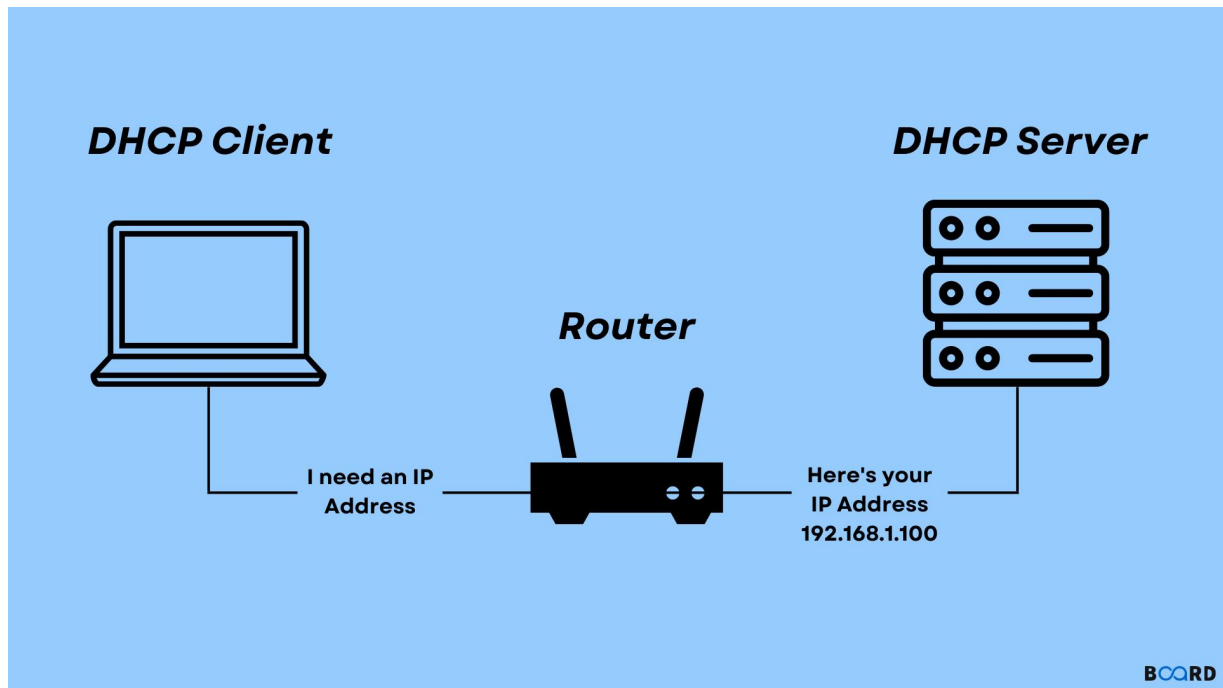
```
codebind@codebind:~$ systemctl restart isc-dhcp-server
codebind@codebind:~$
```

3. Verify the status of the DHCP service to ensure it started successfully:

```
codebind@codebind:~$ systemctl status isc-dhcp-server
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; ven>
   Active: active (running) since Wed 2024-03-06 11:34:45 +01; 6min ago
     Docs: man:dhcpcd(8)
   Main PID: 3920 (dhcpcd)
    Tasks: 4 (limit: 5845)
   Memory: 4.5M
      CPU: 20ms
   CGroup: /system.slice/isc-dhcp-server.service
           └─3920 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/>

11:34:45 06 مليس codebind dhcpcd[3920]: Database file: /var/lib/dhcp/dhcpcd.lease>
11:34:45 06 مليس codebind dhcpcd[3920]: PID file: /run/dhcp-server/dhcpcd.pid
11:34:45 06 مليس codebind dhcpcd[3920]: Wrote 0 leases to leases file.
11:34:45 06 مليس codebind dhcpcd[3920]: Listening on LPF/enp0s3/08:00:27:32:be:>
11:34:45 06 مليس codebind sh[3920]: Listening on LPF/enp0s3/08:00:27:32:be:d9/>
11:34:45 06 مليس codebind sh[3920]: Sending on LPF/enp0s3/08:00:27:32:be:d9/>
11:34:45 06 مليس codebind sh[3920]: Sending on Socket/fallback/fallback-net
11:34:45 06 مليس codebind dhcpcd[3920]: Sending on LPF/enp0s3/08:00:27:32:be:>
11:34:45 06 مليس codebind dhcpcd[3920]: Sending on Socket/fallback/fallback-n>
11:34:45 06 مليس codebind dhcpcd[3920]: Server starting service.
...skipping...
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; ven>
   Active: active (running) since Wed 2024-03-06 11:34:45 +01; 6min ago
     Docs: man:dhcpcd(8)
```

V- CONCLUSION :



- In conclusion, the installation and configuration of a DHCP server on a Debian-based distribution is a crucial task for managing network resources efficiently. Throughout this report, we have outlined the step-by-step process of installing the DHCP server package, configuring the DHCP server to assign IP addresses and other network parameters to clients dynamically, and managing the DHCP service.
- Additionally, we encountered and successfully resolved a common issue related to DHCP service startup, demonstrating the importance of proper configuration and troubleshooting techniques.
- By following the instructions provided in this report, network administrators can effectively deploy and manage DHCP servers, ensuring smooth network operations and seamless connectivity for all devices within the network. DHCP simplifies network administration by automating the assignment of IP addresses, default gateways, and DNS servers, thereby reducing manual configuration efforts

and potential errors.

- Overall, the implementation of a DHCP server enhances network scalability, flexibility, and reliability, making it an essential component of modern network infrastructures.

