Université Constantine 2
جامعة قسنطينة 2

Network Management

– Course 1 –

Chapter 4: TCP/IP services oriented Configuration (1/2)

Dr. Nadira Benlahrache

NTIC Faculty

email@univ-constantine2.dz

Université Constantine 2
جامعة قسنطينة 2

Network Management

– Course 1 –
Chapter 4: TCP/IP services oriented Configuration (1/2)

Dr. Nadira Benlahrache

NTIC Faculty

email@univ-constantine2.dz

Concerned Students :

Faculty	Department	Level	Speciality
NTIC	TLSI	License 3	G.L.

Objectives:

- Presentation of network configuration services,
- Presentation of **Inetd service**,
- Presentation of **DHCP service**,
- Presentation of **FNS service**,
- Presentation of **SAMBA service**.
- Presentation of DNS service.

Problem statement

When connecting to a network, our machine, called the **Client**, must have:

- A **unique IP address** belonging to a logical network and a subnet mask,
- A **DNS address**, to be able to resolve host names, especially on the Internet,
- The address of the gateway that allows access to the Internet,
- Access to a number of **services**: identifying oneself to servers as a client, browsing web pages, downloading files, sending email, etc.

These services must be provided by one or more machines called **Servers**, *configured* to properly and adequately satisfy the requests of clients.

Inetd: Server of Servers

- The **Inetd** daemon is a **"super" server**, listening on multiple ports.

- **Inetd** uses the *tcpd* daemon which intercepts connection requests to a service and checks through the **hosts.allow** and **hosts.deny** files if the client is allowed to use this service.

- It is installed by default on current versions of *Linux*.
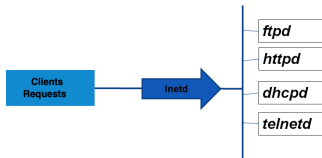
- **Inetd** can secure a machine under *Linux*, but it cannot completely replace a real *firewall*.

Configuration files

- *Inetd* uses the **/etc/services** file which contains the general list of TCP/IP services with their associated port numbers and transport protocol.

Example of /etc/services file:
          ftp 21/tcp
          telnet 23/tcp
          http 80/tcp

- The **/etc/inetd.conf** file contains the list of **enabled** services on a given machine.

- **Inetd** has been replaced by **xinetd** in recent distributions of *Linux* such as Mandrake 10.x, RedHat 9.x... The **only difference**, in */etc/etc/xinetd.d*, is that each service (telnet, ftp, pop3...) has its **own** configuration file.

Dynamic Host Configuration Protocol

- **DHCP** is a protocol that enables a DHCP server (Unix, Linux, Windows, etc.) to assign **temporary** IP addresses (and other parameters) to PCs or terminals during their startup.

- This protocol allows TCP/IP network administrators to configure client machines **automatically**.

- A DHCP server has a **range of addresses** to distribute to its clients. It keeps a database of addresses already in use.

- DHCP was used by cable Internet service providers but has been replaced by a point-to-point connection such as PPP (Point-to-Point Protocol) for ADSL.
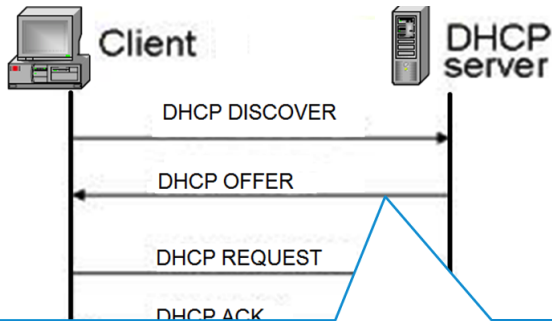
DHCP Server-Client Dialogue
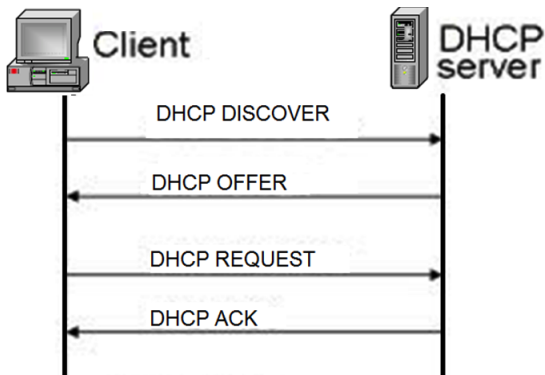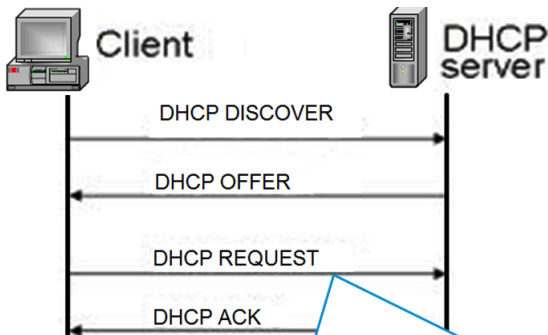
DHCP Server-Client Dialogue
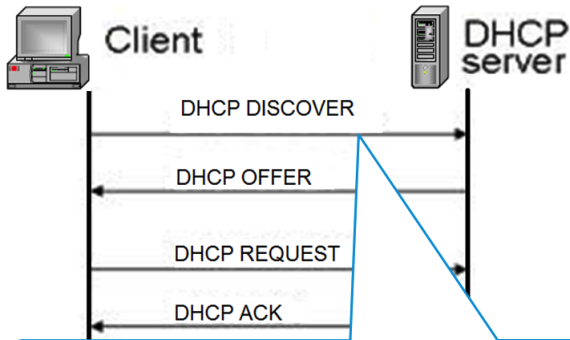
A DHCP client sends a broadcast request message (**DHCPDISCOVER**) to discover available DHCP servers. This message contains the client's **MAC-address** and the source IP address (**0.0.0.0**).
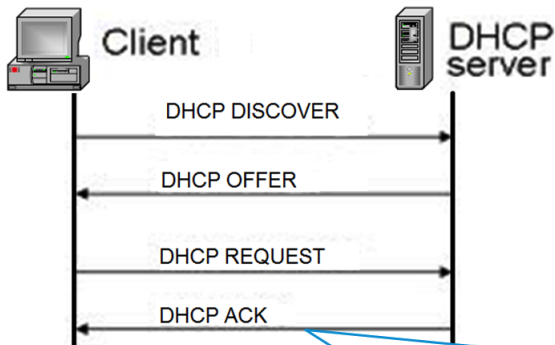
DHCP Server-Client Dialogue

DHCP Server-Client Dialogue

DHCP Server-Client Dialogue

The server in question definitely responds with "**DHCPACK**", which confirms the lease.
The client's address is then marked as **used** and will **not be offered** to another client for the **duration of the lease**.

DHCP Configuration

On the client side: Most Linux distributions provide at least one package for the DHCP client, such as the precompiled **dhcpcd**.

Static Address

♯ File: /etc/sysconfig/network-scripts/ifcfg-eth0
DEVICE=eth0
BOOTPROTO=static
IPADDR=192.168.0.254
NETMASK=255.255.255.0
NETWORK=192.168.0.0
BROADCAST=192.168.0.255
ONBOOT=yes

Dynamic Address

♯ File: /etc/sysconfig/network-scripts/ifcfg-eth0
DEVICE=eth0
BOOTPROTO=dhcp
ONBOOT=yes

DHCP Configuration

On the Server Side

It involves creating two files:

1. **/etc/dhcp3/dhcpd.conf**: used for configuring the DHCP
server (address range, distributed parameters),

2. **/var/lib/dhcp3/dhcpd.leases**: used for client registration. It
enables monitoring and statistics of the server's activities.

DHCP Configuration (File: dhcpd.conf)

♯ For a 192.168.0.0 network:
>> subnet 192.168.0.0 netmask 255.255.255.0;

♯ The range of available addresses for clients:
>> range 192.168.0.10 192.168.0.20;

♯ The default gateway address:
>> option routers 192.168.0.254;

♯ Then, we specify the name servers:
>> option domain-name-servers 192.168.0.1;

♯ Finally, we give them the domain name:
>> option domain-name "uc2.educ.org";

♯ The broadcast address is:
>> option broadcast-address 192.168.0.255;

♯ The lease has a default duration of 86400s (24h):
>> default-lease-time 86400;

DHCP Configuration

File: dhcpd.leases

In this file, the DHCP server stores information about already-served clients.

Example of this file after the insertion of the first client:

♯ more /var/lib/dhcp3/dhcpd.leases
     lease 192.168.0.12
     starts 1 2023/01/12 9:33:45;
     ends 1 2023/01/12 10:34:22;
     hardware ethernet 00:40:33:2c:ba:6d;
     uid 01:00:40:33:2c:ba:6d;
     client-hostname "MyPC";

DHCP Configuration

File: dhcpd.leases

In this file, the DHCP server keeps track of the clients it has already served.

Example of this file after the insertion of the first client:

♯ more /var/lib/dhcp3/dhcpd.leases
    lease 192.168.0.12
    starts 1 2012/11/12 9:33:45; ⟶ *Start of the lease,*
    ends 1 2012/11/12 10:34:22; ⟶ *End of the lease*
    hardware ethernet 00:40:33:2c:ba:6d; → *MAC address*
    uid 01:00:40:33:2c:ba:6d;
    client-hostname "MyPC"; ⟶ Client hostname.

Network File System: NFS

- *NFS*: Network File System developed by *Sun*.

- *NFS* allows you to **mount** a **remote** directory (use it as if it were part of the local machine) to access files from a computer connected to the network.

- Similar to Microsoft's network neighborhood.
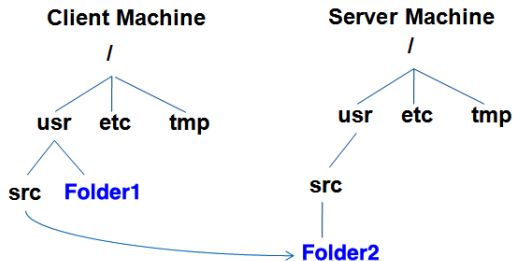
Network File System: NFS
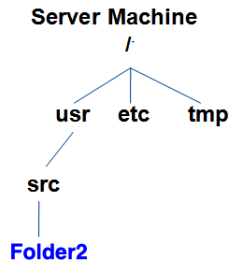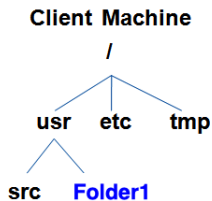
Network File System: NFS

Advantages of an NFS Server

- Storing data and work on an *NFS* server provides more freedom of movement,
- Limiting the use of removable storage devices in the network (disk drives, USB, etc.),
- Can be used as a centralized storage for backups and archiving (more secure).

Configuration of an NFS Server

The necessary daemons to run **NFS** are:

Server side:

- **nfsd [nservers]** (*nservers*: number of daemons to start, generally 8).
- **rpc.mountd**: its role is to handle **mount** requests from clients.

The server configuration is located in the file */etc/exports* and the command *exportfs* allows the sharing to take effect.

Client side:

biod [nservers]: The client uses the Linux command **mount** to mount a remote file system on a local directory.

Samba

- **Samba** is a file server that allows resources (directories and printers) to be shared using the same protocols as **Windows** machines (*Netbios*).

- **Samba**, *running on Linux*, allows *Windows* computers to access computers that implement a domain controller (*Microsoft's Active Directory*) in a transparent and stable manner.

- It works on most Unix systems, such as *GNU/Linux*, as well as Apple's *Mac OS*.

- *Samba* gets its name from the **SMB** (Server Message Block) protocol.

Configuration

Two daemons are necessary:

- **Smbd**, the server kernel, providing authentication, sharing, and access to resources services.

- **Nmbd** ensures *NetBIOS* name resolution, allowing **Samba** services to be shown in the network neighborhood.

- For the configuration of this service, the main file to modify is:

    /etc/samba/smb.conf.

- Start the service with the command:

    /etc/init.d/samba start

Samba Configuration File

```
.................................
[homes]
  comment = Home Directories
  browseable = yes
  read only = no
  create mask = 0700
  directory mask = 0700
  valid users = %S
[public]
  comment = public anonymous access
  path = /var/samba/
  browsable =yes
  create mask = 0660
  directory mask = 0771
  writable = yes
  guest ok = yes
[printers]
  comment = All Printers
  browseable = no
  path = /var/spool/samba
  printable = yes
  guest ok = no
  read only = yes
  create mask = 0700
.................................
```

Creating Samba users

- User accounts must already be created in Linux using the *adduser* command.

- To create Samba user accounts, use the command:

  smbpasswd -a MyUser MyPassword

Conclusion

The aim of this course was to:

- Introduce the main network services that the administrators must consider to ensure the proper functioning of their network and other services.
- The services covered are **Inetd**, **DHCP**, **NFS** and **Samba**.
- These services may not be visible to a network user, but they are essential to ensure the sharing and proper functioning of other network services.

References

- Cricket Liu , Paul Albitz , "DNS and BIND ", Paperback , Jun 2006
- Michel DUTREIX - Pierre FAUQUEMBERGUE, "Debian GNU/Linux - Services réseau (DHCP, DNS, Apache, CUPS, NFS, Samba, Puppet, Nagios...)", Editions ENI, jannuary 2018, ISBN : 9782409012068
- Julien Rouxel, "SAMBA", Editions ENI, ISBN : 9782746066526E12
- Sujata Biswas, "Understanding NFS: Network File System on Linux", Kindle Edition,

Some useful links

- https://www.it-connect.fr/cours/dhcp-du-protocole-a-la-configuration/
- www.frameip.com/dhcp/
- https://www.frameip.com/dns/