SERVICES ON LINUX AND MANAGING SOME BASIC SERVICES

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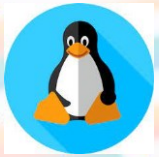
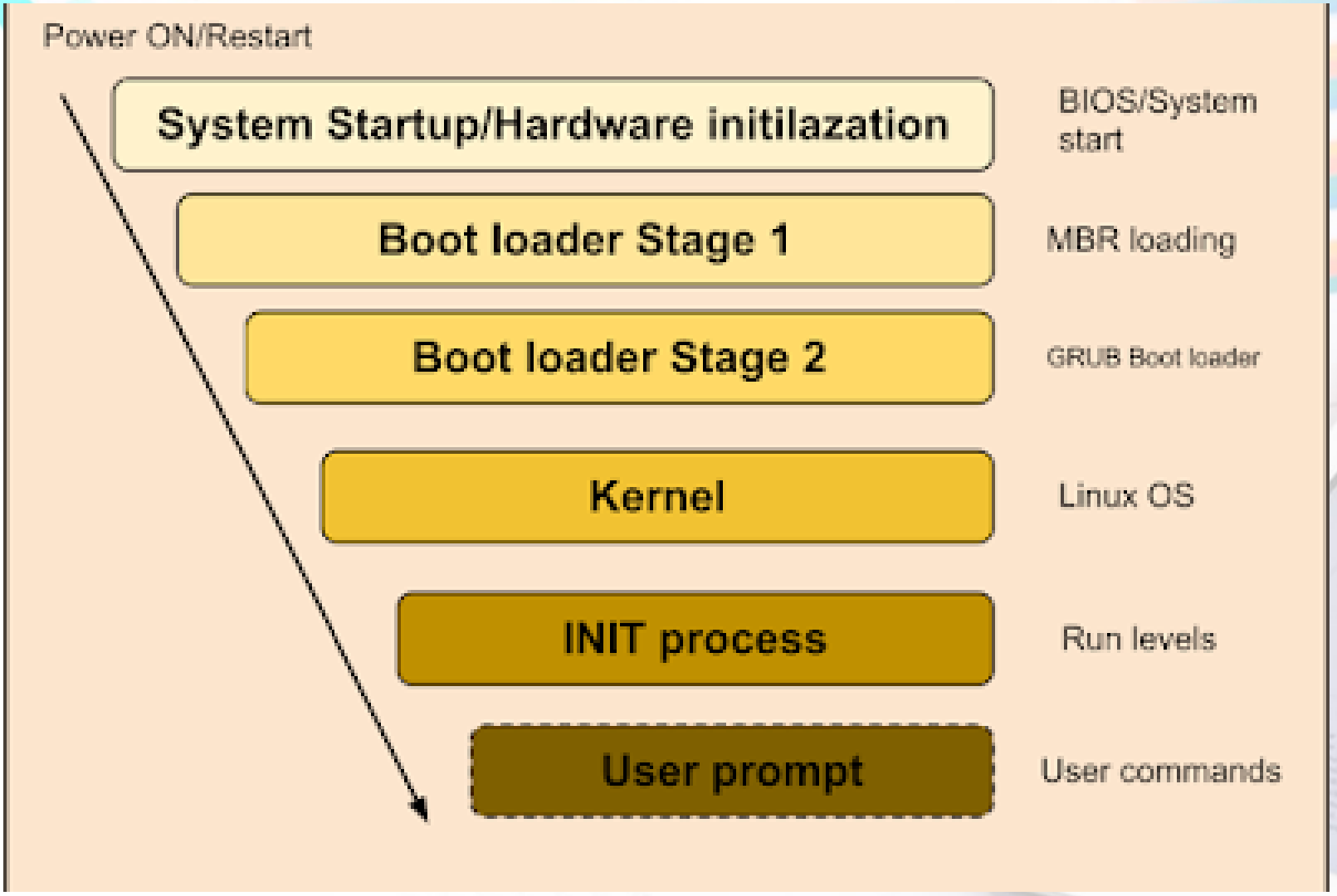


PART 1
SERVICES ON LINUX

Quá trình khởi động linux



Quá trình khởi động linux

Step 1. Kiểm tra BIOS, thực hiện POST

+ Khởi động

+ Kiểm tra máy tính

Step 2. Tìm và nạp MBR (Master Boot Record). MBR chứa các chỉ dẫn cho biết cách nạp trình quản lý khởi động

+ GRUB/LILO cho Linux

+ BOOTMGR cho Windows (7, 8)

Ví dụ /dev/hda hoặc/dev/dsa/.

Quá trình khởi động linux

Step 3: Tìm và nạp Boot Loader (GRUBL hoặc LILO). Boot loader

+ Tìm kiếm phân vùng boot

+ Đọc thông tin cấu hình trong file grub.conf hoặc lilo.conf

+ Hiển thị các hệ điều hành có sẵn trong máy tính cho phép chúng ta lựa chọn để khởi động

Step 4. Nạp kernel: chạy chương trình /sbin/init (cha của mọi tiến trình trong linux) để

+ Kiểm tra hệ thống tập tin,

+ Chạy một số chương trình giúp hệ điều hành hoạt động bình thường

Quá trình khởi động linux

Step 5. Đọc file /etc/inittab xác định runlevel

```
[root@localhost ~]# cat /etc/inittab
# inittab is no longer used.
#
# ADDING CONFIGURATION HERE WILL HAVE NO EFFECT ON YOUR SYSTEM.
#
# Ctrl-Alt-Delete is handled by /usr/lib/systemd/system/ctrl-alt-del.target
#
# systemd uses 'targets' instead of runlevels. By default, there are two main targets:
#
# multi-user.target: analogous to runlevel 3
# graphical.target: analogous to runlevel 5
#
# To view current default target, run:
# systemctl get-default
#
# To set a default target, run:
# systemctl set-default TARGET.target
[root@localhost ~]#
```

Quá trình khởi động linux

Step 6. Dựa vào runlevel, tiến trình init sẽ

(1) Duyệt thư mục /etc/rc.d tương ứng

```
[root@localhost ~]# ls -l /etc/rc.d/
total 4
drwxr-xr-x. 2 root root  37 Jul 28 12:05 init.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc0.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc1.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc2.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc3.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc4.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc5.d
drwxr-xr-x. 2 root root   6 Jul 28 12:05 rc6.d
-rw-r--r--. 1 root root 474 Oct  5 22:08 rc.local
[root@localhost ~]#
```

Mode	Directory	Run Level Description
0	/etc/rc.d/rc0.d	Halt
1	/etc/rc.d/rc1.d	Single-user mode
2	/etc/rc.d/rc2.d	Not used (user-definable)
3	/etc/rc.d/rc3.d	Full multi-user mode (no GUI interface)
4	/etc/rc.d/rc4.d	Not used (user-definable)
5	/etc/rc.d/rc5.d	Full multiuser mode (with GUI interface)
6	/etc/rc.d/rc6.d	Reboot

Quá trình khởi động linux

Step 6. Dựa vào runlevel, tiến trình init sẽ

(2) Thực thi tất cả các file kịch bản (script) dành cho khởi động

+ "/etc/init.d/": chứa nội dung các script

```
linux2021@linux2021-VirtualBox:~/Desktop$ ls -l /etc/init.d
total 168
-rwxr-xr-x 1 root root 2269 Thg 11 28  2019 acpid
-rwxr-xr-x 1 root root 5574 Thg 11  5  2019 alsa-utils
-rwxr-xr-x 1 root root 2055 Thg 7  17  2019 anacron
-rwxr-xr-x 1 root root 3740 Thg 4   1  2020 apparmor
-rwxr-xr-x 1 root root 2964 Thg 12  7  2019 apport
-rwxr-xr-x 1 root root 2401 Thg 8  21  2018 avahi-daemon
```

+ Tập tin bắt đầu bằng chữ S: chạy khi khởi động
+ Tập tin bắt đầu bằng chữ K: chạy khi tắt máy
+ Thứ tự chạy: từ lớn đến bé

```
linux2021@linux2021-VirtualBox:~/Desktop$ ls  /etc/rc3.d
K01speech-dispatcher  S01cups-browsed                 S01rsync
S01acpid              S01dbus                         S01rsyslog
S01anacron            S01gdm3                         S01saned
S01apport             S01grub-common                  S01spice-vdagent
```

Service

Các tiến trình chạy với init

- Là các chương trình cung cấp những chức năng quan trọng để máy tính có thể làm việc
- Đều là các tiến trình daemon
- Được khởi chạy mặc định để sẵn sàng phục vụ dù không có ai đăng nhập

Nhóm	Tên dịch vụ
Người dùng	Mạng, wifi, bluetooth, x- windows, power, firewall, antivirus,…
Mạng nội bộ	file server, in ấn, dhcp,…
Mạng internet	http, ftp, email, dns,…

Service management on Ubuntu

Cách 1: Vì các script được đặt trong /etc/init.d/ nên ta có thể tác động đến các dịch vụ này bằng cách gọi trực tiếp script và tham số hợp lý

/etc/init.d/<Service Name> <Option>

Cách 2:

service <Service Name> <Option>

Option:

- start: Khởi động dịch vụ
- stop: Tắt dịch vụ
- restart: Khởi động lại dịch vụ
- reload: Nạp lại dịch vụ
- status: Xem trạng thái dịch vụ

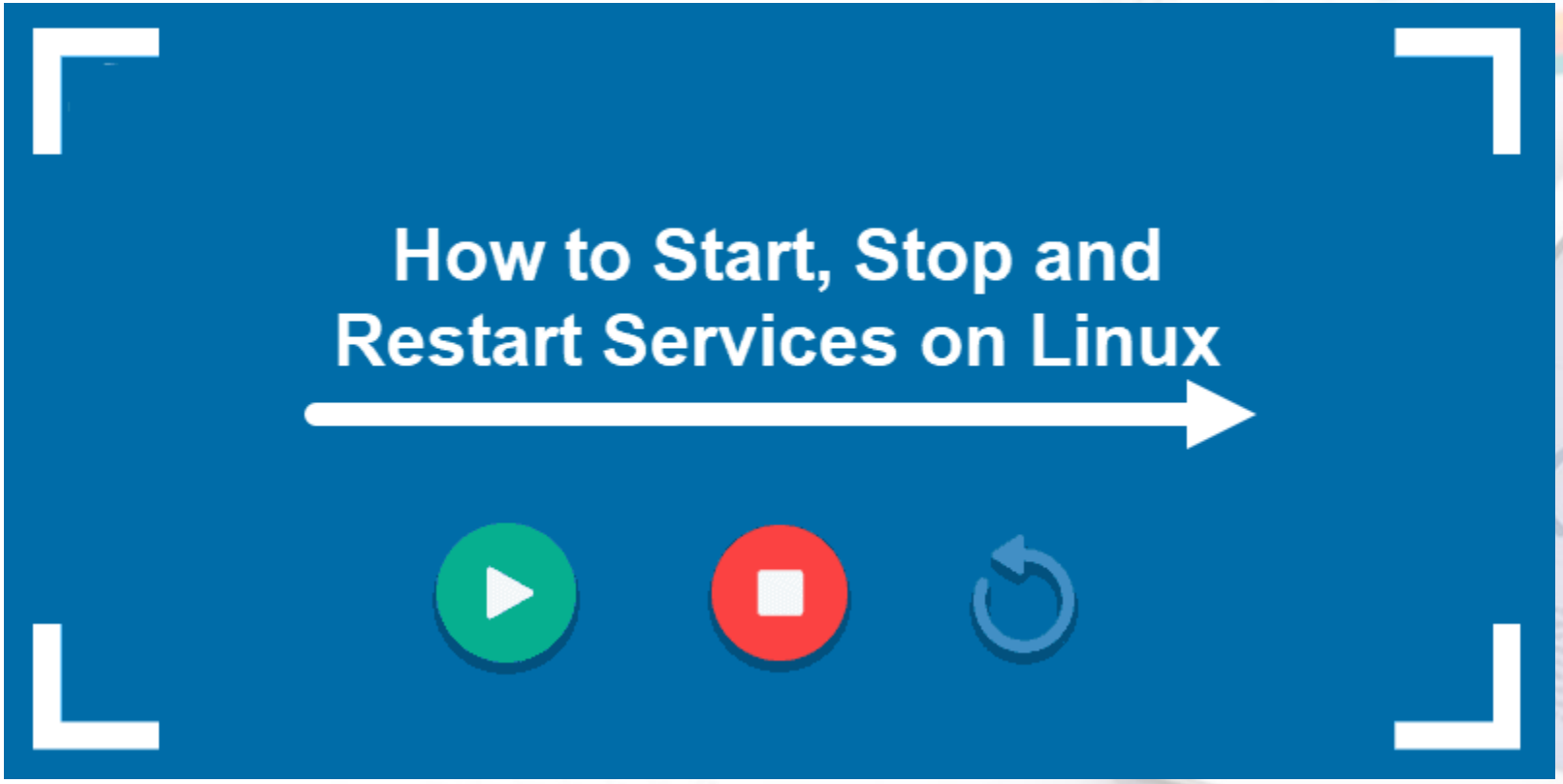
Service management on Ubuntu

```
linux2021@linux2021-VirtualBox:~/Desktop$ ls /etc/init.d
acpid             cups-browsed       openvpn                    spice-vdagent
alsa-utils        dbus               plymouth                   udev
anacron           gdm3               plymouth-log               ufw
apparmor          grub-common        pppd-dns                   unattended-upgrades
apport            hwclock.sh         procps                     uuidd
avahi-daemon      irqbalance         pulseaudio-enable-autospawn whoopsie
bluetooth         kerneloops         rsync                      x11-common
console-setup.sh  keyboard-setup.sh  rsyslog
cron              kmod               saned
cups              network-manager    speech-dispatcher
linux2021@linux2021-VirtualBox:~/Desktop$ /etc/init.d/gdm3 status
● gdm.service - GNOME Display Manager
     Loaded: loaded (/lib/systemd/system/gdm.service; static; vendor preset: enabled)
     Active: active (running) since Mon 2021-12-20 22:36:28 +07; 35min ago
    Process: 886 ExecStartPre=/usr/share/gdm/generate-config (code=exited, status=0/SUCCESS)
    Process: 892 ExecStartPre=/usr/lib/gdm3/gdm-wait-for-drm (code=exited, status=0/SUCCESS)
   Main PID: 895 (gdm3)
      Tasks: 3 (limit: 2242)
     Memory: 4.9M
     CGroup: /system.slice/gdm.service
             └─895 /usr/sbin/gdm3
```

```
linux2021@linux2021-VirtualBox:~/Desktop$ service gdm3 status
● gdm.service - GNOME Display Manager
     Loaded: loaded (/lib/systemd/system/gdm.service; static; vendor preset: enabled)
     Active: active (running) since Mon 2021-12-20 22:36:28 +07; 37min ago
    Process: 886 ExecStartPre=/usr/share/gdm/generate-config (code=exited, status=0/SUCCESS)
    Process: 892 ExecStartPre=/usr/lib/gdm3/gdm-wait-for-drm (code=exited, status=0/SUCCESS)
   Main PID: 895 (gdm3)
      Tasks: 3 (limit: 2242)
     Memory: 4.9M
     CGroup: /system.slice/gdm.service
             └─895 /usr/sbin/gdm3
```

Service management on an old distribution

In the old CentOS distribution, use the service command or directly run a service on system



Service management on an old distribution

Command	Meaning
chkconfig --list	list current status of all system services
chkconfig --list <name>	view current status of a particular services
chkconfig --add <name>	add a Service
chkconfig --del <name>	delete a Service
chkconfig <name> off	disable certain run levels only
chkconfig <name> on	enable certain run levels only

```
[root@localhost etc]# chkconfig --list

Note: This output shows SysV services only and does not include native
      systemd services. SysV configuration data might be overridden by native
      systemd configuration.

      If you want to list systemd services use 'systemctl list-unit-files'.
      To see services enabled on particular target use
      'systemctl list-dependencies [target]'.

netconsole      0:off   1:off   2:off   3:off   4:off   5:off   6:off
network         0:off   1:off   2:on    3:on    4:on    5:on    6:off
vesta           0:off   1:off   2:on    3:on    4:on    5:on    6:off
[root@localhost etc]# _
```

Service management on the modern distribution

- In modern distributions (CentOS 8), it is easy to start, stop or restart a service on your CentOS system using the **systemctl** command.
- The systemctl command is a very useful to examine and control the service manager and systemd system.

Service management on the modern distribution

Prerequisites

- Access to a user account with **sudo** or **root** privileges
- Access to a terminal/command line
- The systemctl tool, included in Linux

Service management on the modern distribution

Listing all loaded services on your system (whether active; running, exited or failed

systemctl list-units --type=service

```
[root@localhost ~]# systemctl list-units --type=service
UNIT                                LOAD   ACTIVE SUB     DESCRIPTION
auditd.service                      loaded active running Security Auditing Service
avahi-daemon.service                loaded active running Avahi mDNS/DNS-SD Stack
chronyd.service                     loaded active running NTP client/server
crond.service                       loaded active running Command Scheduler
dbus.service                        loaded active running D-Bus System Message Bus
dracut-shutdown.service             loaded active exited  Restore /run/initramfs on shutdown
firewalld.service                   loaded active running firewalld - dynamic firewall daemon
getty@tty1.service                  loaded active running Getty on tty1
gssproxy.service                    loaded active running GSSAPI Proxy Daemon
import-state.service                loaded active exited  Import network configuration from initramfs
iscsi-shutdown.service              loaded active exited  Logout off all iSCSI sessions on shutdown
kdump.service                       loaded active exited  Crash recovery kernel arming
kmod-static-nodes.service           loaded active exited  Create list of required static device node
ksm.service                         loaded active exited  Kernel Samepage Merging

LOAD   = Reflects whether the unit definition was properly loaded.
ACTIVE = The high-level unit activation state, i.e. generalization of SUB.
SUB    = The low-level unit activation state, values depend on unit type.

49 loaded units listed. Pass --all to see loaded but inactive units, too.
To show all installed unit files use 'systemctl list-unit-files'.
lines 22-57/57 (END)
```

Service management on the modern distribution

- Geting a quick glance of all running services

systemctl list-units --type=service --state=running

```
[root@localhost ~]# systemctl list-units --type=service --state=running
UNIT                      LOAD   ACTIVE SUB     DESCRIPTION
auditd.service            loaded active running Security Auditing Service
avahi-daemon.service      loaded active running Avahi mDNS/DNS-SD Stack
chronyd.service           loaded active running NTP client/server
crond.service             loaded active running Command Scheduler
dbus.service              loaded active running D-Bus System Message Bus
firewalld.service         loaded active running firewalld - dynamic firewall daemon
getty@tty1.service        loaded active running Getty on tty1
gssproxy.service          loaded active running GSSAPI Proxy Daemon
ksmtuned.service          loaded active running Kernel Samepage Merging (KSM) Tuning Daemon
ModemManager.service      loaded active running Modem Manager
NetworkManager.service    loaded active running Network Manager
polkit.service            loaded active running Authorization Manager
rpcbind.service           loaded active running RPC Bind
rsyslog.service           loaded active running System Logging Service
sshd.service              loaded active running OpenSSH server daemon
sssd.service              loaded active running System Security Services Daemon
systemd-journald.service  loaded active running Journal Service
systemd-logind.service    loaded active running Login Service
systemd-machined.service  loaded active running Virtual Machine and Container Registration Service
systemd-udevd.service     loaded active running udev Kernel Device Manager
tuned.service             loaded active running Dynamic System Tuning Daemon
user@0.service            loaded active running User Manager for UID 0
```

Service management on the modern distribution

Verifying whether a service is active or not

systemctl status <service_name>

```
[root@localhost ~]# systemctl status crond
● crond.service - Command Scheduler
   Loaded: loaded (/usr/lib/systemd/system/crond.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2021-12-03 23:16:27 +07; 15min ago
 Main PID: 1115 (crond)
    Tasks: 1 (limit: 11084)
   Memory: 1.1M
   CGroup: /system.slice/crond.service
           └─1115 /usr/sbin/crond -n

Dec 03 23:16:27 localhost.localdomain systemd[1]: Started Command Scheduler.
Dec 03 23:16:28 localhost.localdomain crond[1115]: (CRON) STARTUP (1.5.2)
Dec 03 23:16:28 localhost.localdomain crond[1115]: (CRON) INFO (Syslog will be used instead of send>
Dec 03 23:16:28 localhost.localdomain crond[1115]: (CRON) INFO (RANDOM_DELAY will be scaled with fa>
Dec 03 23:16:28 localhost.localdomain crond[1115]: (CRON) INFO (running with inotify support)
lines 1-14/14 (END)
```

Service management on the modern distribution

Stoping an active service

systemctl stop <service_name>

```
[root@localhost ~]# systemctl stop crond
[root@localhost ~]# systemctl status crond
● crond.service - Command Scheduler
   Loaded: loaded (/usr/lib/systemd/system/crond.service; enabled; vendor preset: enabled)
   Active: inactive (dead) since Fri 2021-12-03 23:52:04 +07; 5s ago
  Process: 2000 ExecStart=/usr/sbin/crond -n $CRONDARGS (code=exited, status=0/SUCCESS)
 Main PID: 2000 (code=exited, status=0/SUCCESS)

Dec 03 23:51:32 localhost.localdomain systemd[1]: Started Command Scheduler.
Dec 03 23:51:32 localhost.localdomain crond[2000]: (CRON) STARTUP (1.5.2)
Dec 03 23:51:32 localhost.localdomain crond[2000]: (CRON) INFO (Syslog will be used instead of send>
Dec 03 23:51:32 localhost.localdomain crond[2000]: (CRON) INFO (RANDOM_DELAY will be scaled with fa>
Dec 03 23:51:32 localhost.localdomain crond[2000]: (CRON) INFO (running with inotify support)
Dec 03 23:51:32 localhost.localdomain crond[2000]: (CRON) INFO (@reboot jobs will be run at compute>
Dec 03 23:52:04 localhost.localdomain systemd[1]: Stopping Command Scheduler...
Dec 03 23:52:04 localhost.localdomain systemd[1]: crond.service: Succeeded.
Dec 03 23:52:04 localhost.localdomain systemd[1]: Stopped Command Scheduler.
lines 1-15/15 (END)
```

Service management on the modern distribution

Starting a service

systemctl start <service_name>

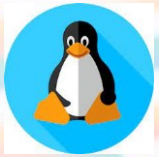
```
[root@localhost ~]# systemctl start crond
[root@localhost ~]# systemctl status crond
● crond.service - Command Scheduler
   Loaded: loaded (/usr/lib/systemd/system/crond.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2021-12-03 23:55:06 +07; 3s ago
 Main PID: 2035 (crond)
    Tasks: 1 (limit: 11084)
   Memory: 1.0M
   CGroup: /system.slice/crond.service
           └─2035 /usr/sbin/crond -n

Dec 03 23:55:06 localhost.localdomain systemd[1]: Started Command Scheduler.
Dec 03 23:55:06 localhost.localdomain crond[2035]: (CRON) STARTUP (1.5.2)
Dec 03 23:55:06 localhost.localdomain crond[2035]: (CRON) INFO (Syslog will be used instead of send>
Dec 03 23:55:06 localhost.localdomain crond[2035]: (CRON) INFO (RANDOM_DELAY will be scaled with fa>
Dec 03 23:55:06 localhost.localdomain crond[2035]: (CRON) INFO (running with inotify support)
Dec 03 23:55:06 localhost.localdomain crond[2035]: (CRON) INFO (@reboot jobs will be run at compute>
lines 1-15/15 (END)
```

Service management on the modern distribution

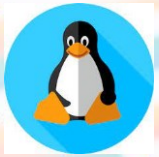
systemctl <options> <service_name>

Options	Meaning
restart	stop and restart the service
reload	force the service to reload its configuration files
enable	configure a service to start when the system boots
disable	prevent the service from starting at boot



PART 2:

MANAGING SOME BASIC SERVICES



PART 2.1:
MỘT SỐ KHÁI NIỆM VÀ DỊCH VỤ MẠNG

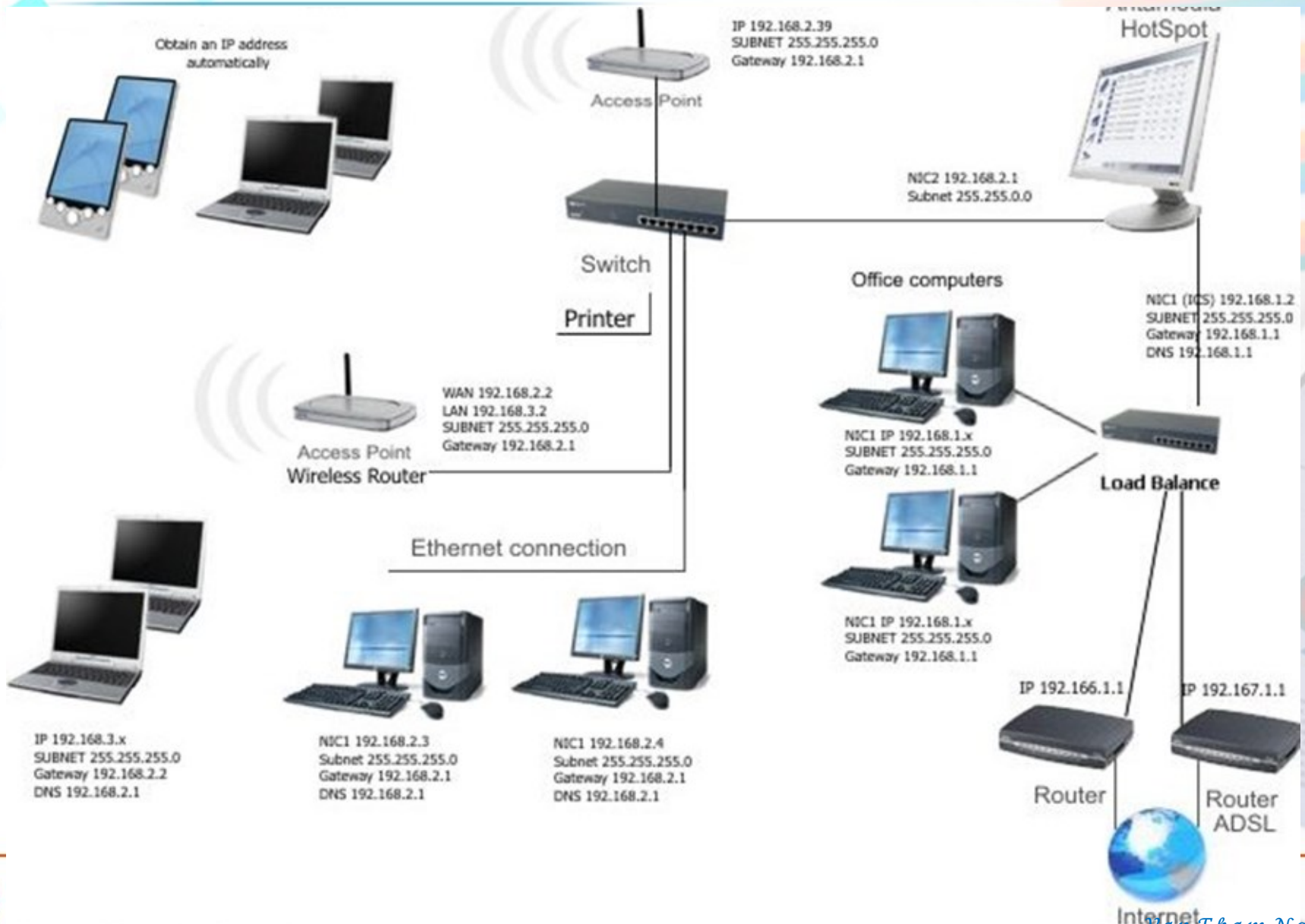
Một số khái niệm về mạng IP

- IP = Internet Protocol, là giao thức truyền dữ liệu cho mạng Internet (và thống trị các giao thức truyền dữ liệu trong mạng nội bộ)
- Một số khái niệm cần nhớ:
  - Địa chỉ MAC
  - Địa chỉ IP (IP address)
  - IP4 và IP6
  - Cổng (port)
  - Gateway
  - DHCP server (Dynamic Host Configuration Protocol)
  - Máy chủ tên miền (DNS server)

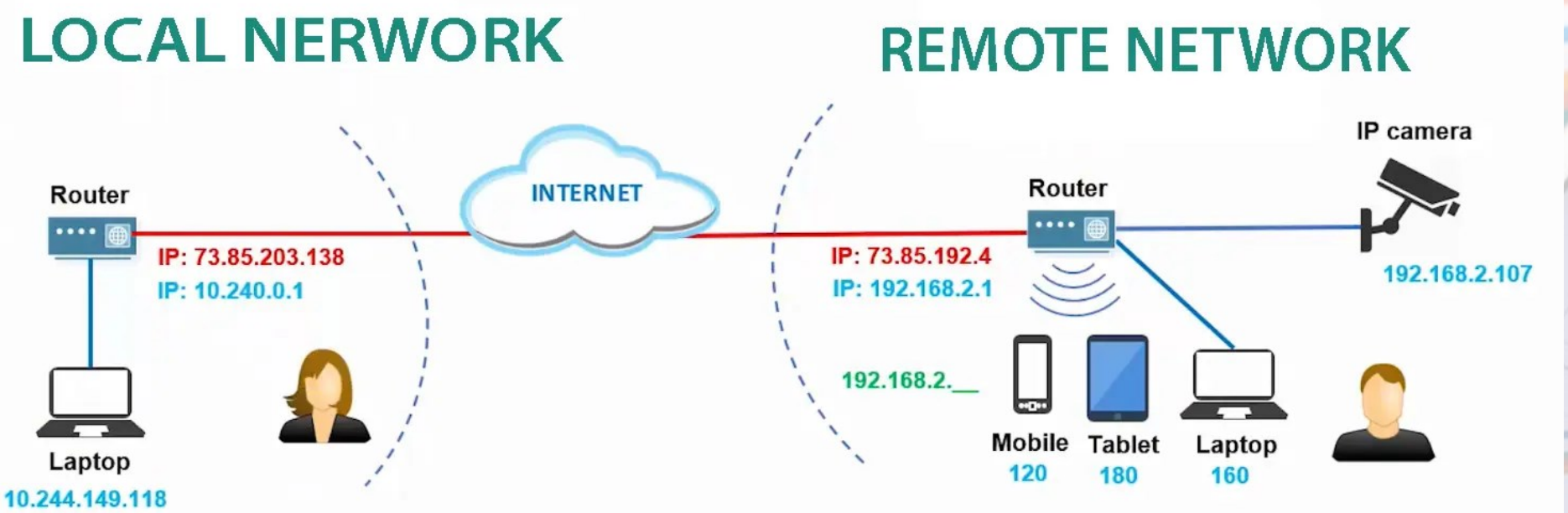
Một số khái niệm về mạng IP

- Địa chỉ IP: 172.29.9.9/255.255.255.0
- Tên máy (hostname): oscar
- Tên đầy đủ cả tên miền (FQDN): oscar.tlu.edu.vn
- Phân giải tên: ánh xạ tên sang địa chỉ IP (DNS)
- Giao thức mạng: TCP, UDP, ICMP, ARP, DHCP, DNS, FTP, HTTP, NFS, ...
- Địa chỉ dùng riêng: 172.16.0.0 – 172.16.31.0, 192.168.0.0 – 192.168.255.0, 10.0.0.0/8
- Địa chỉ loopback: 127.0.0.1

Một số khái niệm về mạng IP



Một số khái niệm về mạng IP



Một số khái niệm về mạng IP

IPv4	vs.	IPv6
Deployed 1981		Deployed 1998
32-bit IP address		128-bit IP address
4.3 billion addresses Addresses must be reused and masked		7.9×10^{28} addresses Every device can have a unique address
Numeric dot-decimal notation 192.168.5.18		Alphanumeric hexadecimal notation 50b2:6400:0000:0000:6c3a:b17d:0000:10a9 (Simplified - 50b2:6400::6c3a:b17d:0:10a9)
DHCP or manual configuration		Supports autoconfiguration

Một số khái niệm về mạng IP

- Thiết bị:
  - loopback: lo
  - Ethernet: eth0, eth1
- Trình điều khiển thiết bị mạng:
- /lib/modules/kernel-version/kernel/driver/net/
- Công cụ:
  - ifconfig/route `ifconfig -a`
  - host/nslookup/dig `host www.google.com`
  - Ping `ping 172.29.2.1`
  - traceroute `traceroute student`
  - Netstat `netstat -an`

Dịch vụ mạng

- Khởi động dịch vụ mạng:

  service network start

  /etc/init.d/network start

- Tắt dịch vụ mạng:

  service network stop

  /etc/init.d/network stop

- Khởi động lại dịch vụ mạng:

  service network restart

  /etc/init.d/network restart

- Cấu hình mạng: ifconfig

PART 2.2
QUẢN LÝ CẤU HÌNH MẠNG

Tệp tin cấu hình mạng

Tập tin cấu hình tương ứng với card mạng:

/etc/sysconfig/network-scripts/ifcfg-<tên card>

```
[root@localhost ~]# ls -l  /etc/sysconfig/network-scripts
total 4
-rw-r--r--. 1 root root 248 Oct 25 15:47 ifcfg-enp0s3
```

```
[root@localhost ~]# cat  /etc/sysconfig/network-scripts/ifcfg-enp0s3
TYPE=Ethernet
PROXY_METHOD=none
BROWSER_ONLY=no
BOOTPROTO=dhcp
DEFROUTE=yes
IPV4_FAILURE_FATAL=no
IPV6INIT=yes
IPV6_AUTOCONF=yes
IPV6_DEFROUTE=yes
IPV6_FAILURE_FATAL=no
NAME=enp0s3
UUID=ba62b700-c2d0-46cb-bc50-1aeab9c12883
DEVICE=enp0s3
ONBOOT=yes
[root@localhost ~]#
```

Tệp tin cấu hình mạng

- Danh sách các cổng mạng được mở và các service sử dụng những cổng này

/etc/services

- Khi cung cấp một dịch vụ mới, cần thêm vào file một cặp service name và port number tương ứng

Một số cổng thường gặp (tùy vào ứng dụng):

- ftp-data 20/tcp
- ftp 21/tcp
- ssh 22/tcp
- telnet 23/tcp
- smtp 25/tcp
- domain 53/tcp
- domain 53/udp
- http 80/tcp
- pop3 110/tcp

Tập tin cấu hình mạng

```
[root@localhost ~]# cat /etc/services | grep -i ^http
http            80/tcp          www www-http    # WorldWideWeb HTTP
http            80/udp          www www-http    # HyperText Transfer Protocol
http            80/sctp                         # HyperText Transfer Protocol
https           443/tcp                         # http protocol over TLS/SSL
https           443/udp                         # http protocol over TLS/SSL
https           443/sctp                        # http protocol over TLS/SSL
http-mgmt       280/tcp                 # http-mgmt
http-mgmt       280/udp                 # http-mgmt
http-rpc-epmap  593/tcp                 # HTTP RPC Ep Map
http-rpc-epmap  593/udp                 # HTTP RPC Ep Map
httpx           4180/tcp                # HTTPX
httpx           4180/udp                # HTTPX
http-wmap       8990/tcp                # webmail HTTP service
http-wmap       8990/udp                # webmail HTTP service
https-wmap      8991/tcp                # webmail HTTPS service
https-wmap      8991/udp                # webmail HTTPS service
[root@localhost ~]# cat /etc/services | grep -i ^domain
domain          53/tcp                          # name-domain server
domain          53/udp
domain-s        853/tcp                 # DNS query-response protocol
domain-s        853/udp                 # DNS query-response protocol
domaintime      9909/tcp                # domaintime
domaintime      9909/udp                # domaintime
[root@localhost ~]#
```

Công cụ cấu hình mạng

- Hai công cụ:

+ net-tools:

+ iproute2

- Bộ công cụ iproute2 đã được thay thế mặc định cho net-tools ở các bản phân phối Linux mới như RHEL7, CentOS 7.

- Cài đặt gói net-tools:

net-tools	iproute2
arp -na	ip neigh
ifconfig	ip link
ifconfig -a	ip addr show
ifconfig --help	ip help
ifconfig -s	ip -s link
ifconfig eth0 up	ip link set eth0 up
ipmaddr	ip maddr
iptunnel	ip tunnel
netstat	ss
netstat -i	ip -s link
netstat -g	ip maddr
netstat -l	ss -l
netstat -r	ip route
route add	ip route add
route del	ip route del
route -n	ip route show
vconfig	ip link

```
[root@localhost ~]# ifconfig
bash: ifconfig: command not found...
Install package 'net-tools' to provide command 'ifconfig'? [N/y] y_
```

Thông tin cấu hình mạng

- Xem thông tin các card mạng hiện tại:

Cách 1: ifconfig [Name]

Cách 2: /sbin/ifconfig

Cách 3: ip a show

```
[root@localhost ~]# 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::a00:27ff:fef3:297b  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:f3:29:7b  txqueuelen 1000  (Ethernet)
        RX packets 285  bytes 352576 (344.3 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 112  bytes 10382 (10.1 KiB)
        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 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:0e:de:f2  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Tên card mạng ?
Địa chỉ IP ?

Thông tin cấu hình mạng

```
[root@localhost ~]# ifconfig enp0s3
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::a00:27ff:fef3:297b  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:f3:29:7b  txqueuelen 1000  (Ethernet)
        RX packets 914  bytes 427500 (417.4 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 911  bytes 81499 (79.5 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

[root@localhost ~]# ifconfig virbr0
virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:0e:de:f2  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Thông tin cấu hình mạng

- Xem thông tin các card mạng hiện tại:

ip addr

```
[root@localhost ~]# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 100
0
    link/ether 08:00:27:f3:29:7b brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 82525sec preferred_lft 82525sec
    inet6 fe80::a00:27ff:fef3:297b/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default qlen
1000
    link/ether 52:54:00:0e:de:f2 brd ff:ff:ff:ff:ff:ff
    inet 192.168.122.1/24 brd 192.168.122.255 scope global virbr0
       valid_lft forever preferred_lft forever
4: virbr0-nic: <BROADCAST,MULTICAST> mtu 1500 qdisc fq_codel master virbr0 state DOWN group default
qlen 1000
    link/ether 52:54:00:0e:de:f2 brd ff:ff:ff:ff:ff:ff
```

Tên card mạng ?
Địa chỉ IP ?

Thông tin cấu hình mạng

- Xem thông tin máy chủ:

hostname

```
[root@localhost ~]# hostname
localhost.localdomain
[root@localhost ~]# _
```

Kiểm tra kết nối mạng

- Lệnh PING (Packet Internet Groper) là ứng dụng dùng để kiểm tra tình trạng kết nối mạng giữa một nguồn và thiết bị cuối trong một mạng IP

ping [option] <hostname/IP address/a name of a website>

- Press **Ctrl + C** on your keyboard to stop the process.

```
[root@localhost ~]# ping google.com
PING google.com (172.217.31.14) 56(84) bytes of data.
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=1 ttl=113 time=63.3 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=2 ttl=113 time=64.8 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=3 ttl=113 time=63.6 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=4 ttl=113 time=64.3 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=5 ttl=113 time=65.1 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=6 ttl=113 time=65.3 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=7 ttl=113 time=64.4 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=8 ttl=113 time=63.7 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=9 ttl=113 time=64.7 ms
64 bytes from del03s01-in-f14.1e100.net (172.217.31.14): icmp_seq=10 ttl=113 time=65.3 ms
^C
--- google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9017ms
rtt min/avg/max/mdev = 63.272/64.441/65.320/0.701 ms
[root@localhost ~]#
```

Kiểm tra kết nối mạng

```
[root@localhost ~]# ping localhost
PING localhost(localhost (::1)) 56 data bytes
64 bytes from localhost (::1): icmp_seq=1 ttl=64 time=0.085 ms
64 bytes from localhost (::1): icmp_seq=2 ttl=64 time=0.157 ms
64 bytes from localhost (::1): icmp_seq=3 ttl=64 time=0.283 ms
64 bytes from localhost (::1): icmp_seq=4 ttl=64 time=0.153 ms
64 bytes from localhost (::1): icmp_seq=5 ttl=64 time=0.153 ms
^C
--- localhost ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4056ms
rtt min/avg/max/mdev = 0.085/0.166/0.283/0.064 ms
[root@localhost ~]#
```

```
[root@localhost ~]# ping tlu.edu.vn
PING tlu.edu.vn (203.113.135.55) 56(84) bytes of data.
^C
--- tlu.edu.vn ping statistics ---
18 packets transmitted, 0 received, 100% packet loss, time 17398ms

[root@localhost ~]# ping 203.113.135.55
PING 203.113.135.55 (203.113.135.55) 56(84) bytes of data.
^C
--- 203.113.135.55 ping statistics ---
7 packets transmitted, 0 received, 100% packet loss, time 6171ms

[root@localhost ~]#
```

Cấu hình kết nối mạng

Cách 1: Cấu hình lại ngay trong quá trình hoạt động

ifconfig <card name> <IP Address> netmask <Netmask>

Ví dụ:

Step 1: Cấu hình

ifconfig eth0 192.168.2.122 netmask 255.255.255.0

Step 2: Khởi động lại dịch vụ mạng

service network restart

Cấu hình kết nối mạng

```
[root@localhost ~]# 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::a00:27ff:fef3:297b  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:f3:29:7b  txqueuelen 1000  (Ethernet)
        RX packets 23  bytes 4356 (4.2 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 43  bytes 5116 (4.9 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
[root@localhost ~]# ifconfig enp0s3 192.168.2.122 netmask 255.255.255.0
[root@localhost ~]# ifconfig
enp0s3  flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.2.122  netmask 255.255.255.0  broadcast 192.168.2.255
        inet6 fe80::a00:27ff:fef3:297b  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:f3:29:7b  txqueuelen 1000  (Ethernet)
        RX packets 46  bytes 8874 (8.6 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 78  bytes 8790 (8.5 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Cấu hình kết nối mạng

Cách 2: Cấu hình trong file cấu hình

- Step 1: Vào thư mục chứa file cấu hình thiết b

```
cd /etc/sysconfig/network-scripts
```

- Step 2: Soạn thảo file cấu hình của thiết bị enp0s3

```
vi ifcfg-enp0s3
ONBOOT=yes
DHCP=yes
```

Tắt thiết bị: "ifdown enp0s3"

Bật lại thiết bị: "ifup enp0s3"

Kiểm tra lại xem hệ thống mạng đã sẵn sàng chưa

- "ping 8.8.8.8"