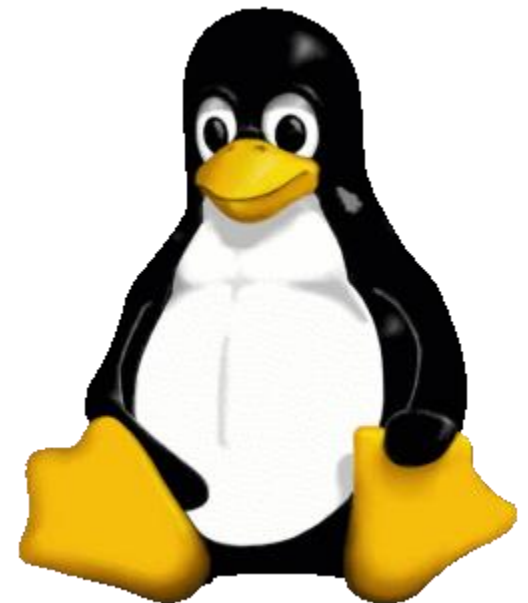# GNU/Linux

An Introduction to printing && Networking

Lesson 11

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lp file(s), lpr file(s)

Printing files

command | lp

These commands can read from a pipe, so you can print the output of commands using

Status of print jobs

```
davy:~> lp /etc/profile
request id is blob-253 (1 file(s))
```

```
davy:~> lpq
blob is ready and printing
Rank        Owner       Job         File(s)             Total Size
active      davy        253         profile             1024 bytes
davy:~> lpstat
blob-253                davy        1024        Tue 25 Jul 2006 10:20_01 AM CEST
```

lpstat -d

Which is the default printer on a system that has access to multiple printers?

```
davy:~> lpstat -d
system default destination: blob
```

lpstat -p

What is the status of my printer(s)?

```
davy:~> lpstat -p
printer blob now printing blob-253. enabled since Jan 01 18:01
```

lprm 253

To remove a job from printer

CUPS

Until some years ago, the choice for Linux users was simple: everyone ran the same old LPD from BSD's Net-2 code. Then LPRng became more popular, but nowadays most modern Linux distributions use CUPS, the Common UNIX Printing System. CUPS is an implementation of the Internet Printing Protocol (IPP), an HTTP-like RFC standard replacement protocol for the venerable (and clunky) LPD protocol.

Printing related commands

Command	Meaning
lpr or **lp**	Print file
lpq or **lpstat**	Query print queue
lprm or **cancel**	Remove print job
acroread	PDF viewer
groff	Formatting tool
gv	PostScript viewer
printconf	Configure printers
xdvi	DVI viewer
xpdf	PDF viewer
*2ps	Convert file to PostScript

Networking

- Protocols
- Communication layers

Application	• User ID/Password Sniffing
Presentation	• SSL/TLS Session Sniffing
Session	• Telnet and FTP Sniffing
Transport	• TCP Session Sniffing, UDP Sniffing
Network	• IP, Port Sniffing
Datalink	• MAC / ARP Sniffing
Physical	• Surveillance Sniffing

Some Networking Protocols

Linux supports many different networking protocols.

TCP/IP: The Transport Control Protocol and the Internet Protocol are the two most popular ways of communicating

on the Internet.

TCP/IP v6: IP version 6 was deviced to meet the needs of today's

Internet.

ppp: Point to point protocol

SLIP: Serial Line IP

PLIP: Parallel Line IP

PPP is the most popular way individual users access their ISP (Internet Service Provider)

PPPOE: (Asymmetric Digital Subscriber Line) the protocol used for ADSL connections.

Connecting to Network

The /etc/hosts file always contains the localhost IP address, 127.0.0.1, which is used for interprocess communication.

```
# Do not remove the following line, or various programs
# that require network functionality will fail.
127.0.0.1          localhost.localdomain     localhost
192.168.52.10      tux.mylan.com             tux
192.168.52.11      winxp.mylan.com           winxp
```

/etc/resolve.conf

The /etc/resolv.conf file configures access to a DNS server. This file contains your domain name and the name server(s) to contact:

```
search mylan.com
nameserver 193.134.20.4
```

/etc/nsswitch.conf

The /etc/nsswitch.conf file defines the order in which to contact different name services. For Internet use, it is important that dns shows up in the "hosts" line:

```
[bob@tux ~] grep hosts /etc/nsswitch.conf
hosts:    files dns
```

This instructs your computer to look up hostnames and IP addresses first in the /etc/hosts file, and to

contact the DNS server if a given host does not occur in the local hosts file.

ip, ipconf

The ip command is used for assigning IP addresses to interfaces, for setting up routes to the Internet and to other networks, for displaying TCP/IP configurations etcetera.

```
benny@home benny> ip addr show
1: lo: <LOOPBACK,UP> mtu 16436 qdisc noqueue
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 127.255.255.255 scope host lo
    inet6 ::1/128 scope host
2: eth0: <BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast qlen 100
    link/ether 00:50:bf:7e:54:9a brd ff:ff:ff:ff:ff:ff
    inet 192.168.42.15/24 brd 192.168.42.255 scope global eth0
    inet6 fe80::250:bfff:fe7e:549a/10 scope link

benny@home benny> ip route show
192.168.42.0/24 dev eth0   scope link
127.0.0.0/8 dev lo   scope link
default via 192.168.42.1 dev eth0
```

Explanation:

two network interfaces, even on a system that has only one network interface card: "lo" is the local loop, used for internal network communication; "eth0" is a common name for a real interface.

Do not ever change the local loop configuration, or your machine will start mallfunctioning! Wireless interfaces are usually defined as "wlan0"; modem interfaces as "ppp0", but there might be other names as well.

IP addresses, marked with "inet": the local loop always has 127.0.0.1, the physical interface can have any other combination.

ifconfig

While ip is the most novel way to configure a Linux system, ifconfig is still very popular. Use it without option for displaying network interface information:

- The IP address is marked with "inet addr".
- The hardware address follows the "HWaddr" tag.

```
els@asus:~$ /sbin/ifconfig
eth0      Link encap:Ethernet  HWaddr 00:50:70:31:2C:14
          inet addr:60.138.67.31  Bcast:66.255.255.255  Mask:255.255.255.192
          inet6 addr: fe80::250:70ff:fe31:2c14/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:31977764 errors:0 dropped:0 overruns:0 frame:0
          TX packets:51896866 errors:0 dropped:0 overruns:0 carrier:0
          collisions:802207 txqueuelen:1000
          RX bytes:2806974916 (2.6 GiB)  TX bytes:2874632613 (2.6 GiB)
          Interrupt:11 Base address:0xec00

          inet addr:127.0.0.1  Mask:255.0.0.0
```

netstat, ip route show

Routing information can be displayed with the
-nr option to the netstat command:

```
bob:~> netstat -nr
Kernel IP routing table
Destination     Gateway         Genmask         Flags MSS Window  irtt Iface
192.168.42.0    0.0.0.0         255.255.255.0   U      40 0          0 eth0
127.0.0.0       0.0.0.0         255.0.0.0       U      40 0          0 lo
0.0.0.0         192.168.42.1    0.0.0.0         UG     40 0          0 eth0
```

host

To display information on hosts or domains, use the host command:

```
[emmy@pc10 emmy]$ host www.eunet.be
www.eunet.be. has address 193.74.208.177

[emmy@pc10 emmy]$ host -t any eunet.be
eunet.be. SOA dns.eunet.be. hostmaster.Belgium.EU.net.
   2002021300 28800 7200 604800 86400
eunet.be. mail is handled by 50 pophost.eunet.be.
eunet.be. name server ns.EU.net.
eunet.be. name server dns.eunet.be.
```

ping

To check if a host is alive, use ping. If your system is configured to send more than one packet, interrupt ping with the Ctrl+C key combination:

```
[emmy@pc10 emmy]$ ping a.host.be
PING a.host.be (1.2.8.3) from 80.20.84.26: 56(84) bytes of data.
64 bytes from a.host.be(1.2.8.3):icmp_seq=0 ttl=244 time=99.977msec
--- a.host.be ping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
round-trip min/avg/max/mdev = 99.977/99.977/99.977/0.000 ms
```

traceroute

To check the route that packets follow to a network host, use the traceroute command. In some systems has renamed as "tracepath"

```
[emmy@pc10 emmy]$ /usr/sbin/traceroute www.eunet.be
traceroute to www.eunet.be(193.74.208.177),30 hops max,38b packets
1 blob (10.0.0.1)
       0.297ms  0.257ms  0.174ms
2 adsl-65.myprovider.be (217.136.111.1)
       12.120ms 13.058ms 13.009ms
3 194.78.255.177 (194.78.255.177)
       13.845ms 14.308ms 12.756ms
4 gigabitethernet2-2.intl2.gam.brussels.skynet.be (195.238.2.226)
       13.123ms 13.164ms 12.527ms
5 pecbru2.car.belbone.be (194.78.255.118)
       16.336ms 13.889ms 13.028ms
6 ser-2-1-110-ias-be-vil-ar01.kpnbelgium.be (194.119.224.9)
       14.602ms 15.546ms 15.959ms
7 unknown-195-207-939.eunet.be (195.207.93.49)
       16.514ms 17.661ms 18.889ms
8 S0-1-0.Leuven.Belgium.EU.net (195.207.129.1)
       22.714ms 19.193ms 18.432ms
9 dukat.Belgium.EU.net (193.74.208.178) 22.758ms * 25.263ms
```

whois

Specific domain name information can be queried using the whois command, as is explained by many whois servers, like the one below:

```
[emmy@pc10 emmy]$ whois cnn.com
[whois.crsnic.net]

Whois Server Version 1.3

        $<--snap server message-->

    Domain Name: CNN.COM
    Registrar: NETWORK SOLUTIONS, INC.
    Whois Server: whois.networksolutions.com
    Referral URL: http://www.networksolutions.com
    Name Server: TWDNS-01.NS.AOL.COM
    Name Server: TWDNS-02.NS.AOL.COM
    Name Server: TWDNS-03.NS.AOL.COM
    Name Server: TWDNS-04.NS.AOL.COM
    Updated Date: 12-mar-2002
>>> Last update of whois database: Fri, 5 Apr 2002 05:04:55 EST <<<

The Registry database contains ONLY .COM, .NET, .ORG, .EDU domains
and Registrars.
```

ftp (File Transfer Protocol)

Most Linux distributions include ncftp, an improved version of the common UNIX ftp command, which you may also know from the Windows command line.

! **FTP is insecure!**

Don't use the File Transfer Protocol for non-anonymous login unless you know what you are doing.

telnet, ssh

Telnet, on the other hand, is still commonly used, often by system and network administrators. Telnet is one of the most powerful tools for remote access to files and remote administration, allowing connections from anywhere on the Internet.

Because the entire connection is unencrypted, allowing telnet connections involves taking high security risks. For normal remote execution of programs, Secure SHell or ssh is advised.

Command	Meaning
>	Redirect output
>>	Append to file
<	Redirect input
<<	"Here" document (redirect input)
|	Pipe output
&	Run process in background.
;	Separate commands on same line
*	Match any character(s) in filename
?	Match single character in filename
[ ]	Match any characters enclosed
( )	Execute in subshell
` `	Substitute output of enclosed command
" "	Partial quote (allows variable and command expansion)

' '	Full quote (no expansion)
\	Quote following character
$var	Use value for variable
$$	Process id
$0	Command name
$n	nth argument (n from 0 to 9)
$*	All arguments as a simple word
#	Begin comment
bg	Background execution
break	Break from loop statements
cd	Change directories
continue	Resume a program loop
echo	Display output
eval	Evaluate arguments
exec	Execute a new shell