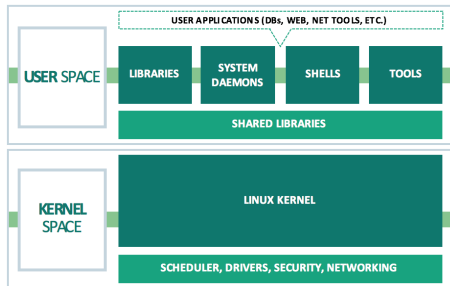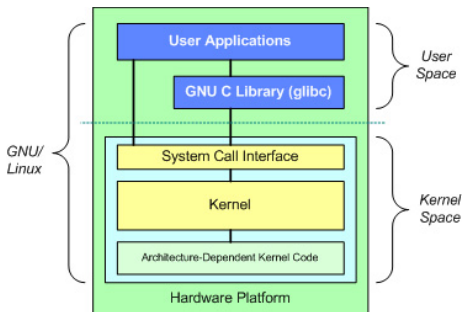# Introduction to Linux

December 4, 2018

What is Linux?

The kernel

Richard Stallman 1983

Linus Torvalds 1992

What is free software?

Free software vs. Proprietary Software

```
http:
//audio-video.gnu.org/video/TEDxGE2014_Stallman05_LQ.webm
```

4 essential freedoms:

- Freedom to run the program as you wish
- Study the source code of the program and change it
- Freedom to redistribute exact copies
- Freedom to redistribute with changes

Free Software == Real Research

Accessibility & Reproducibility

Stats:

- The top 500 supercomputers run on Linux
- The ISS migrated key functions to Linux
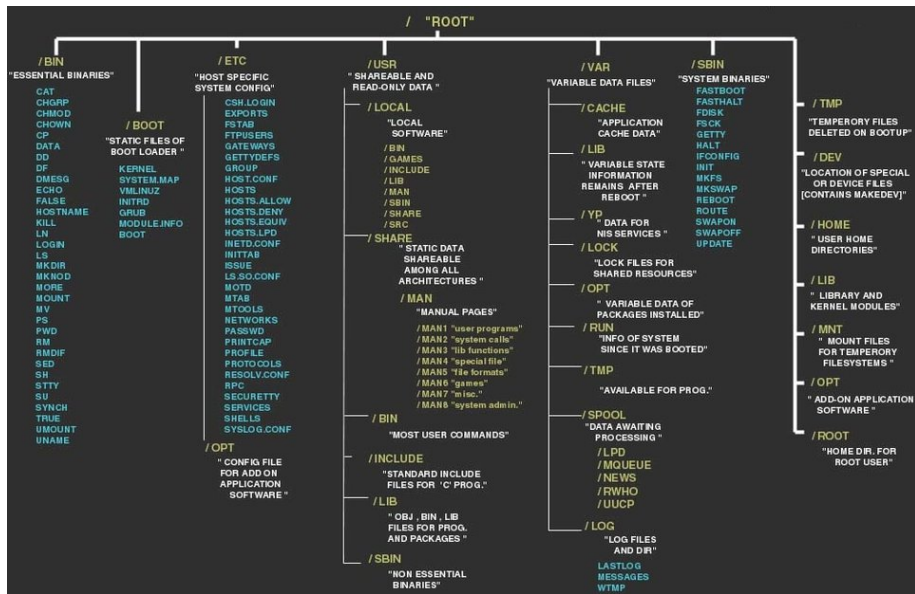- Most web servers run on Linux

Distros:

Over a 1000 of them!

Debian-based Distros

- Ubuntu and its spins:
  - Lubuntu
  - Kubuntu
  - Xubuntu
  - Peppermint
- Linux Mint

Red-Hat-based Distros

- Fedora
- CentOS

Structure

/ "ROOT"

/ BIN
"ESSENTIAL BINARIES"

CAT
CHGRP
CHMOD
CHOWN
CP
DATA
DD
DF
DMESG
ECHO
FALSE
HOSTNAME
KILL
LN
LOGIN
LS
MKDIR
MKNOD
MORE
MOUNT
MV
PS
PWD
RM
RMDIF
SED
SH
STTY
SU
SYNCH
TRUE
UMOUNT
UNAME

/ BOOT
"STATIC FILES OF
BOOT LOADER "

KERNEL
SYSTEM.MAP
VMLINUZ
INITRD
GRUB
MODULE.INFO
BOOT

/ ETC
"HOST SPECIFIC
SYSTEM CONFIG"

CSH.LOGIN
EXPORTS
FSTAB
FTPUSERS
GATEWAYS
GETTYDEFS
GROUP
HOST.CONF
HOSTS
HOSTS.ALLOW
HOSTS.DENY
HOSTS.EQUIV
HOSTS.LPD
INETD.CONF
INITTAB
ISSUE
LS.SO.CONF
MOTD
MTAB
MTOOLS
NETWORKS
PASSWD
PRINTCAP
PROFILE
PROTOCOLS
RESOLV.CONF
RPC
SECURETTY
SERVICES
SHELLS
SYSLOG.CONF

/ OPT
" CONFIG FILE
FOR ADD ON
APPLICATION
SOFTWARE "

/ USR
" SHAREABLE AND
READ-ONLY DATA "

/ LOCAL
"LOCAL
SOFTWARE"

/ BIN
/ GAMES
/ INCLUDE
/ LIB
/ MAN
/ SBIN
/ SHARE
/ SRC

/ SHARE
" STATIC DATA
SHAREABLE
AMONG ALL
ARCHITECTURES "

/ MAN
"MANUAL PAGES"

/ MAN1 "user programs"
/ MAN2 "system calls"
/ MAN3 "lib functions"
/ MAN4 "special file"
/ MAN5 "file formats"
/ MAN6 "games"
/ MAN7 "misc."
/ MAN8 "system admin."

/ BIN
"MOST USER COMMANDS"

/ INCLUDE
"STANDARD INCLUDE
FILES FOR 'C' PROG."

/ LIB
" OBJ , BIN , LIB
FILES FOR PROG.
AND PACKAGES "

/ SBIN
"NON ESSENTIAL
BINARIES"

/ VAR
"VARIABLE DATA FILES"

/ CACHE
"APPLICATION
CACHE DATA"

/ LIB
" VARIABLE STATE
INFORMATION
REMAINS AFTER
REBOOT "

/ YP
" DATA FOR
NIS SERVICES "

/ LOCK
"LOCK FILES FOR
SHARED RESOURCES"

/ OPT
" VARIABLE DATA OF
PACKAGES INSTALLED"

/ RUN
"INFO OF SYSTEM
SINCE IT WAS BOOTED"

/ TMP
"AVAILABLE FOR PROG."

/ SPOOL
"DATA AWAITING
PROCESSING "

/ LPD
/ MQUEUE
/ NEWS
/ RWHO
/ UUCP

/ LOG
"LOG FILES
AND DIR"

LASTLOG
MESSAGES
WTMP

/ SBIN
"SYSTEM BINARIES"
FASTBOOT
FASTHALT
FDISK
FSCK
GETTY
HALT
IFCONFIG
INIT
MKFS
MKSWAP
REBOOT
ROUTE
SWAPON
SWAPOFF
UPDATE

/ TMP
"TEMPERORY FILES
DELETED ON BOOTUP"

/ DEV
"LOCATION OF SPECIAL
OR DEVICE FILES
[CONTAINS MAKEDEV]"

/ HOME
" USER HOME
DIRECTORIES"

/ LIB
" LIBRARY AND
KERNEL MODULES"

/ MNT
" MOUNT FILES
FOR TEMPERORY
FILESYSTEMS "

/ OPT
" ADD-ON APPLICATION
SOFTWARE "

/ ROOT
"HOME DIR. FOR
ROOT USER"

CLI programs

Don't fear the terminal!

- man ls
- man curl
- ls –help / ls -h

sudo

Superuser do

cd

Change Directory

ls

List

```
ls -a
ls -l
ls -la
```

```
total       4568
-rw-rw-r--.  1  main  main    58239  Oct  26  22:54  433px-TUX$_{G2.png}$
-rw-rw-r--.  1  main  main     5677  Oct  26  23:00  gnu.jpeg
-rw-rw-r--.  1  main  main  2238058  Oct  26  23:23  gnu.png
-rw-rw-r--.  1  main  main    14799  Oct  26  21:26  linuxpresentation.html
-rw-rw-r--.  1  main  main     1663  Oct  26  21:30  linuxpresentation.md
-rw-rw-r--.  1  main  main    10454  Oct  26  23:41  #linuxpresentation.org#
-rw-rw-r--.  1  main  main     1149  Oct  26  23:20  linuxpresentation.org
-rw-rw-r--.  1  main  main      872  Oct  26  23:01  linuxpresentation.org~
-rw-rw-r--.  1  main  main  2284440  Oct  26  23:32  linuxpresentation.pdf
-rw-rw-r--.  1  main  main     2794  Oct  26  23:32  linuxpresentation.tex
-rw-rw-r--.  1  main  main     2791  Oct  26  23:31  linuxpresentation.tex~
-rw-rw-r--.  1  main  main        0  Oct  26  15:38  modified.txt
-rw-rw-r--.  1  main  main        0  Oct  26  16:04  test2.txt
-rw-rw-r--.  1  main  main        0  Oct  26  16:04  test3.txt
-rw-rw-r--.  1  main  main        0  Oct  26  16:04  test.txt
-rw-rw-r--.  1  main  main    16720  Oct  26  22:52  TUX$_{G2.svg.png}$
```

mkdir

Make Directory

touch

```
touch test.txt
touch test2.txt
touch test3.txt

ls | grep txt
```

mv

```
mv test.txt modified.txt

ls | grep txt
```

cp

```
cp test.txt test4.txt

ls | grep txt
```

find

```
find -name "*.txt"
```

```
tar cvf files.tar test2.txt test3.txt
ls | grep tar
```

> test2.txt
> test3.txt
> files.tar

curl

curl wttr.in

grep

```
echo "hello there!" > test3.txt
echo "This is a file" > test3.txt
grep "there" test3.txt
grep "This" test3.txt
```

```
use single quotes!

ps aux | grep nano | grep -v grep | awk '{print $2}' | xargs $2
```

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Installing software

apt-get update

Update your repository, so apt will know there are programs to be upgraded.

apt-get upgrade

Upgrade your programs

apt-get install

Nano

Basic terminal-based text editor, probably the most user-friendly.

`htop`

- h
- F3
- F5
- F9
- q

Funny terminal stuff

- telnet towel.blinkenlights.nl
- cowsay
- fortune-mod
- cmatrix

youtube-dl

- hollywood
- thefuck
- bastet
- aview