# Linux: a short presentation

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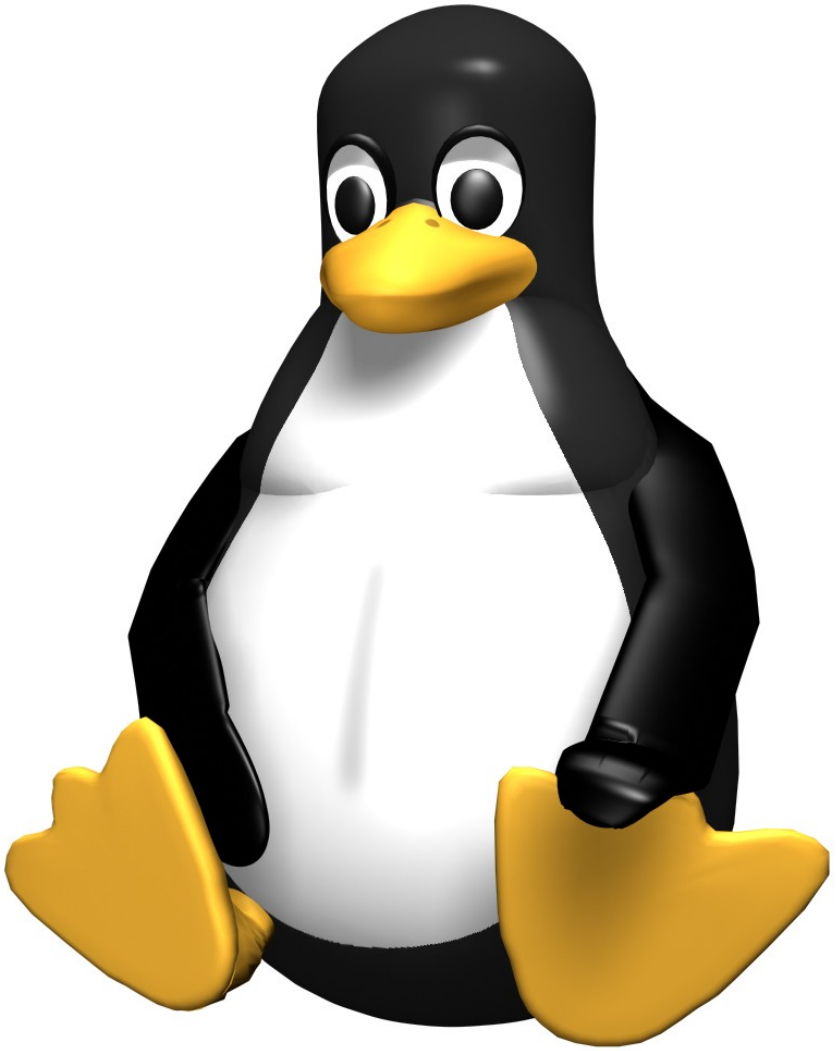


PDP-7 (DEC), Bell Lab.

UNIX
Kenneth Thompson
1969

UNIX V6
1976

BSD

XNU

iOS

macOS

Playstation 4

UNIX V7
1979

UNIX System V
1983

HP-UX

AIX

Solaris

GNU/Linux
Linus Torvalds
5 Oct 1991

Android

Azure Sphere

## Unix c'est :

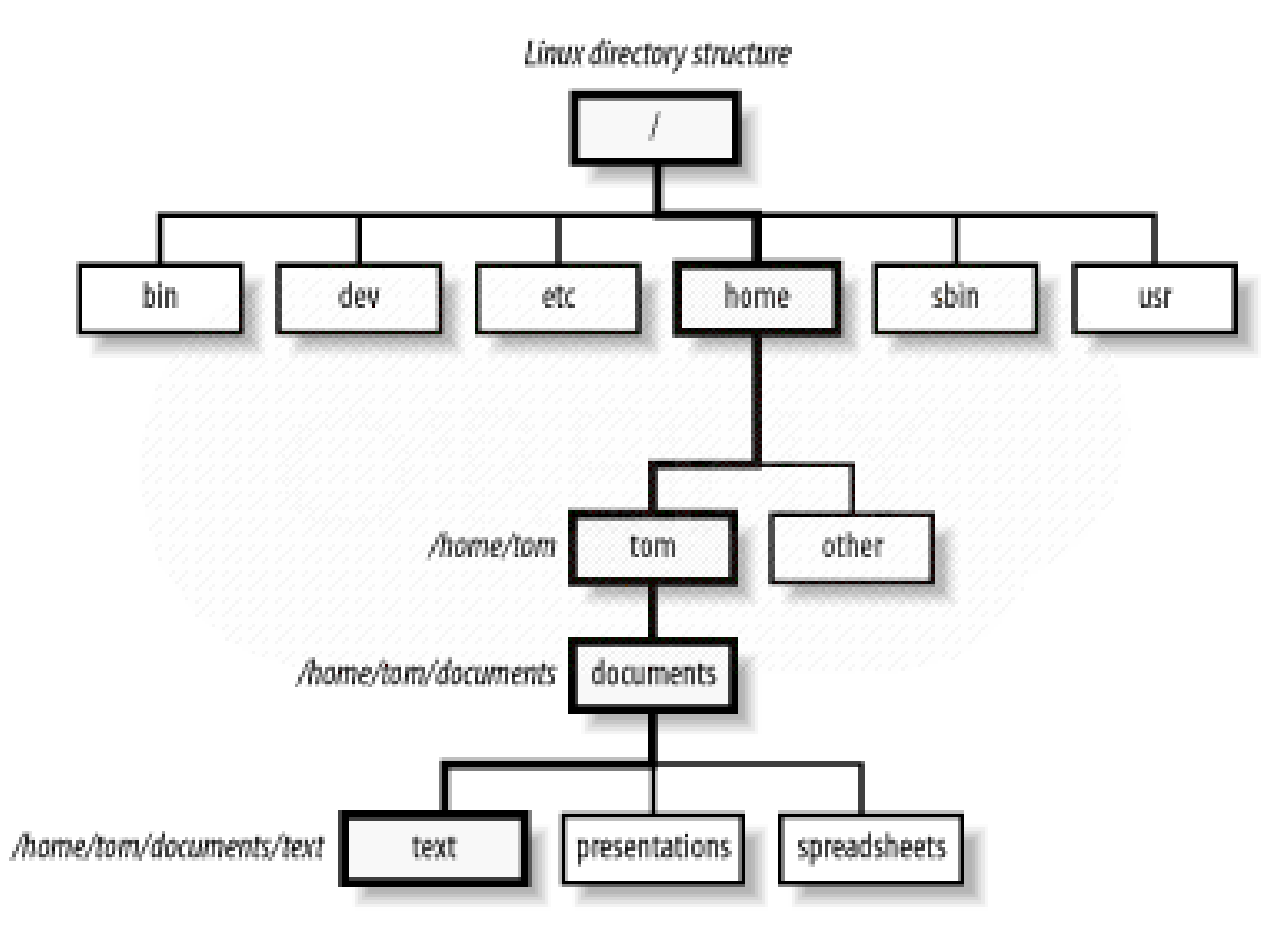
- Un système de fichiers
  - Hiérarchisé
  - Avec gestion de privilèges

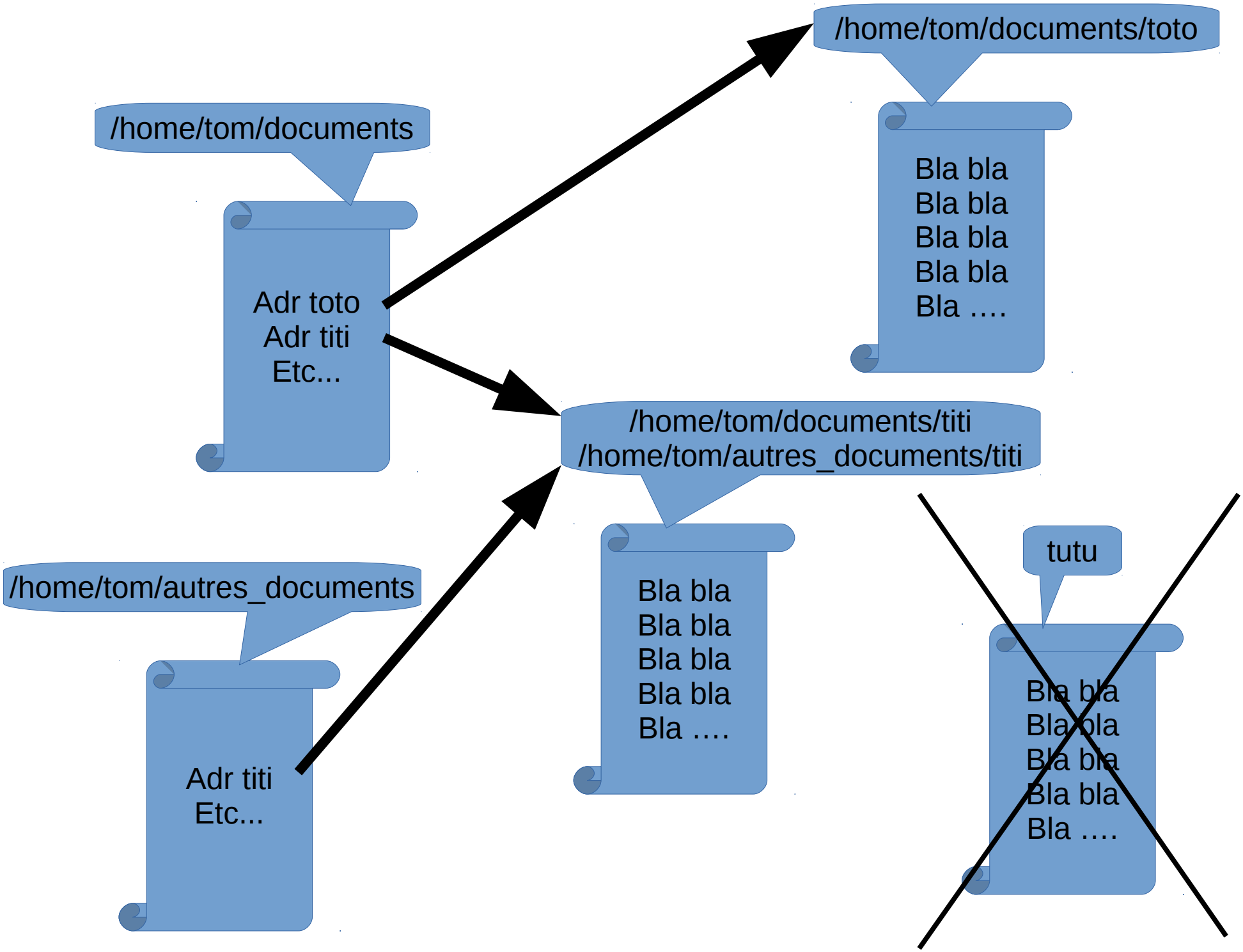
- Un interpréteur de commande : le shell

- Une collection d'outils de base : les commandes

- Un compilateur C K&R

L'ensemble des commandes (shell compris) sont écrites en C K&R
→ pour un nouveau matériel, il suffit de
  - Réécrire le compilateur C K&R
  - Recompiler les commandes


Linux directory structure
/
bin
dev
etc
home
sbin
usr
/home/tom
tom
other
/home/tom/documents
documents
/home/tom/documents/text
text
presentations
spreadsheets


/home/tom/documents/toto
Bla bla
Bla bla
Bla bla
Bla bla
Bla ….
/home/tom/documents
Adr toto
Adr titi
Etc...
/home/tom/documents/titi
/home/tom/autres_documents/titi
Bla bla
Bla bla
Bla bla
Bla bla
Bla ….
/home/tom/autres_documents
Adr titi
Etc...
tutu
Bla bla
Bla bla
Bla bla
Bla bla
Bla ….

**/** is the root directory
**/boot** is where Linux keeps files needed for booting up
**/etc** contains the configuration files for the system:
- **/etc/inittab** is a file that describes the processes started on boot
- **/etc/fstab** contains descriptive information about CD-roms...
- **/etc/passwd** contains the user definitions

**/bin**, **/usr/bin** contain the most important system programs (binaries)
**/sbin**, **/usr/sbin** contains system admin programs
**/usr** is the directory that stores user applications
- **/usr/doc** contains documentation for user apps
- **/usr/share** contains configuration files for user apps
- **/usr/src** contains source files for user apps
- **/usr/include** contains header files for the C compiler
- **/usr/local** apps and files on the local machine

**/lib** shared libraries for programs that are dynamically linked
**/home/"username"** is where the users keep their personal files
**/root** is the super user's home directory
**/var** variable data that, changing while the system is running
- **/var/log** contains log files (error reports, etc.)
- **/var/mail** – incoming/outgoing mail is stored here
- **/var/spool** – holds files that are queued for some process

**/tmp** contains temporary files
**/dev** holds the devices
**/media/"username"** is a directory used to mount external devices
**/proc** virtual directory that contains information about the kernel
**/lost+found** is where Linux keeps files after a system crash

# Special directories

The present directory: `.`

The directory above: `..`

Hiden files: `.file_name` (use `ls -a`)

Absolute path starts with “/”

`/home/tom/documents/toto` (wherever you are)

Relative path: no “/” at beginning:

`documents/toto` (assuming you are in `/home/tom`)

Default path exist, for commands, libraries, ...

# Running commands

Starting point: find a terminal

Konsole, xterm, or whatever

User interface:

the shell (sh, csh, bash, …)

Scripted language to interact with the system

At the prompt of the terminal, in GUIs, ...

Commands

```
command_name    [options]    arguments...
```

Help

```
man   command_name
```

# Commands for files/directories handling

`pwd` shows what directory (folder) you are in

`cd` changes directories

`mkdir` creates a directory

`ls` lists files in the present directory

- `ls -l` lists all attributes
- `ls -a` show hidden files

`rm` deletes a file

- `rm -rf` delete recursively

`rmdir` deletes an empty directory

`cp` copy a file

- `cp file1 file2`

`mv` moves a file

`ln` creates links

- `ln -s file_name link_name`

# Let give a try...

*French keyboard,*
*Open terminal*

```
pwd

ls -l

mkdir documents

touch toto

ls -l
```

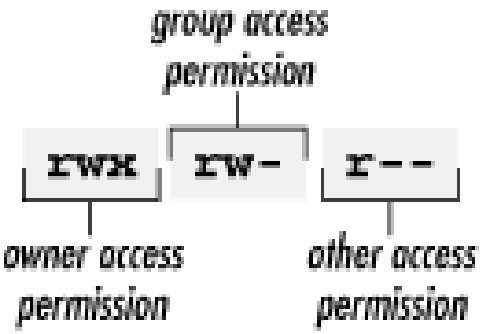
# File attributes as shown by the `ls` command

```
[root@desktop/root]# ls -l
total 1524
drwxr-xr-x    5 root     root         1024 Dec 23 13:48 GNUstep
-rw-r--r--    1 root     root          331 Feb 11 10:19 Xrootenv.0
```

access modes — owner — group

```
chown     new_user   file_name
chgrp     new_grp    file_name
```

# Access modes specify three permissions




```
chmod     644        file_name
```

# More commands

| | |
|---|---|
| `top` | dynamic list of running jobs |
| `ps` | full list of running jobs |
| `ps -ef` | |
| `du` | disk usage |
| `df` | disk space available |
| `df -sh` | |
| `grep` | find a character chain |
| `more/less` | output the content of a file |
| `find` | find a file |
| `find . -name "*.img"` | |
| `file` | file type |
| `wc` | lines/characters number in a file |
| `whoami` | if you don't know… |
| `shutdown` | shutdown the system (requires root privileges) |
| `shutdown -h 0` | |
| `reboot` | restart the system (requires root privileges) |

# The vi editor

| | |
|---|---|
| `vi` | text editor |
| `i` | insertion mode |
| `a` | addition mode |
| `o` | open line after the cursor |
| `Esc` | back to command mode |

In the command mode

| | |
|---|---|
| `x` | delete a character |
| `:d` | delete line |
| `:w` | save |
| `:q` | quit |
| `:q!` | force quit |
| `yy` | copy line |
| `p` | paste line |

# Let give a try...

*Open terminal*

```
alias llt ls -rtl

cd
mkdir test
cd test

ln -s /home/tp/DATA-RX/lyso-Gd_15May2013/img img
mkdir xds
cd xds
cp /home/tp/DATA-RX/lyso-Gd_15May2013/xds_step0_all/XDS.INP ./

vi XDS.INP
  <Esc>
  :q!

module load xds
xds
```

# Let give a try...

```
vi XDS.INP
  <Esc>
  :q!
```

Ou

```
nedit XDS.INP &
```

```
module load xds

xds
```

# Let give a try...

```
cd test
cd xds
ls
ls -lrt

top
   Ctrl C
man kill
kill -9 jobId

rm *
cd ..
rmdir xds
rm img
cd ..
pwd
rm -rf test

shutdown -h 0
```