UNIX

The Very[10] Short Howto for beginners

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How old is UNIX?

- Unix originally dates back to 1969 with a group at Bell Lab.
- The original Unix OS was written in assembler.
- In 1973 Ken Thompson and Dennis Ritchie finally rewrite Unix in their new language, C.
- The first Unix installation in 1972 had 3 users and a 500KB diet.

Thompson and Ritchie work at DEC-PDP 11

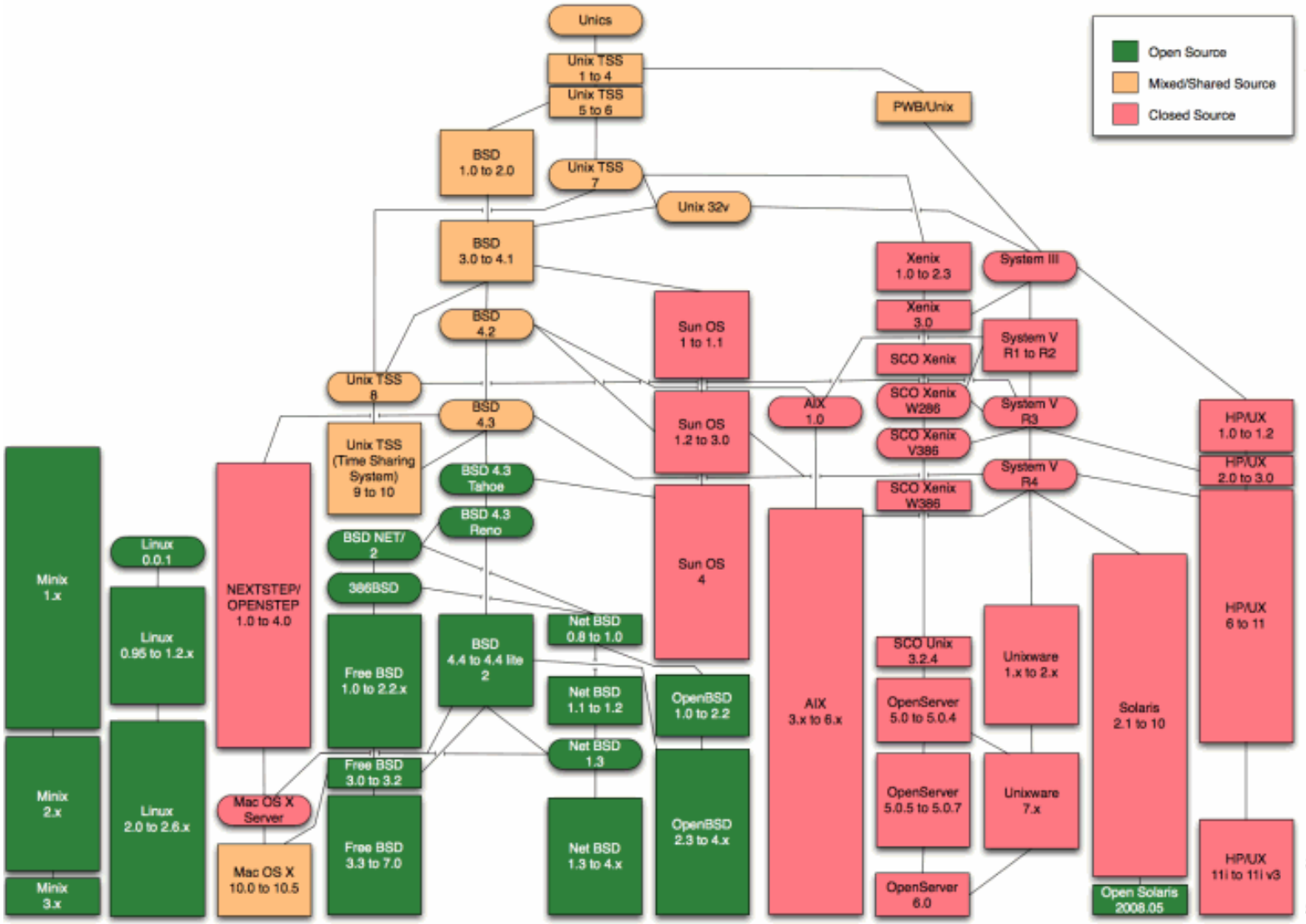
What is UNIX?

- Unix is a multiuser, multitaking operating system (OS).
  - manage hardware resources.
  - manage directories and file systems
  - loading, excuting, suspending programs
- There are many names of Unix:
  - Solaris (Sun)
  - AIX (IBM)
  - True64 (Compaq)
  - IRIX (SGI)
  - System V (from AT&T)
  - BSD (from Berkeley)

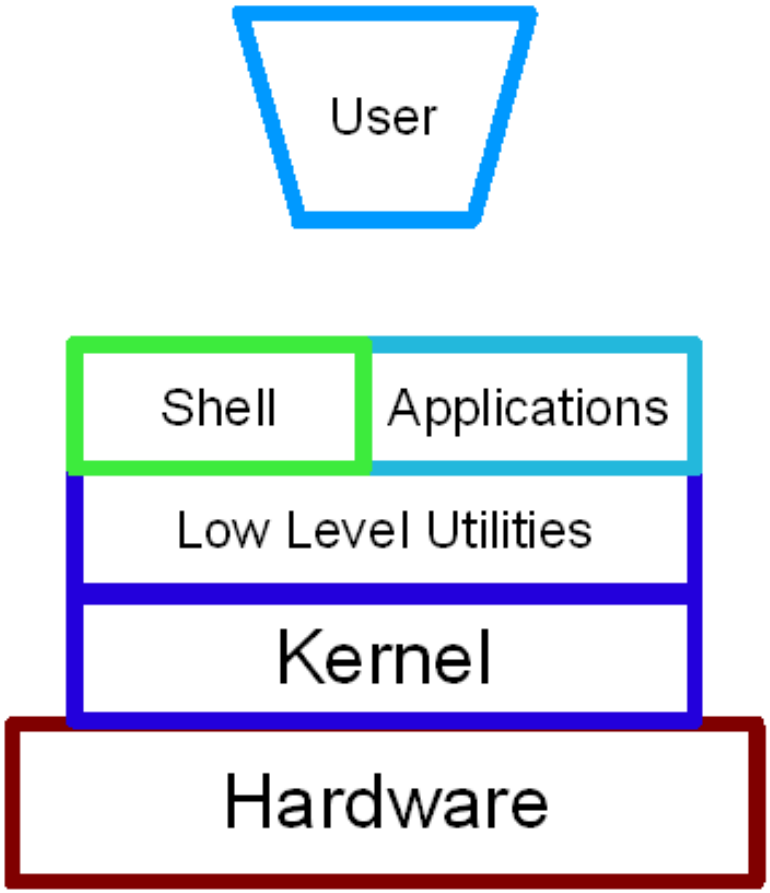
What is Linux?

- Linux is a clone of the Unix OS written from scratch by Linus Torvalds with assistance from developers around the world.
- Developed under the GNU General Public License
- The source of Linux is freely available.
- There are large number of Linux distributors:
  - RedHat, Fedora, CentOS, Sicentific Linux
  - Slackware
  - Debian, Ubuntu, Mint, Lubuntu
  - SUSE, OpenSUSE
  - Gentoo
  - Mandrake
  - Arch
  - KNOPPIX

Hierarchy of Unix Systems



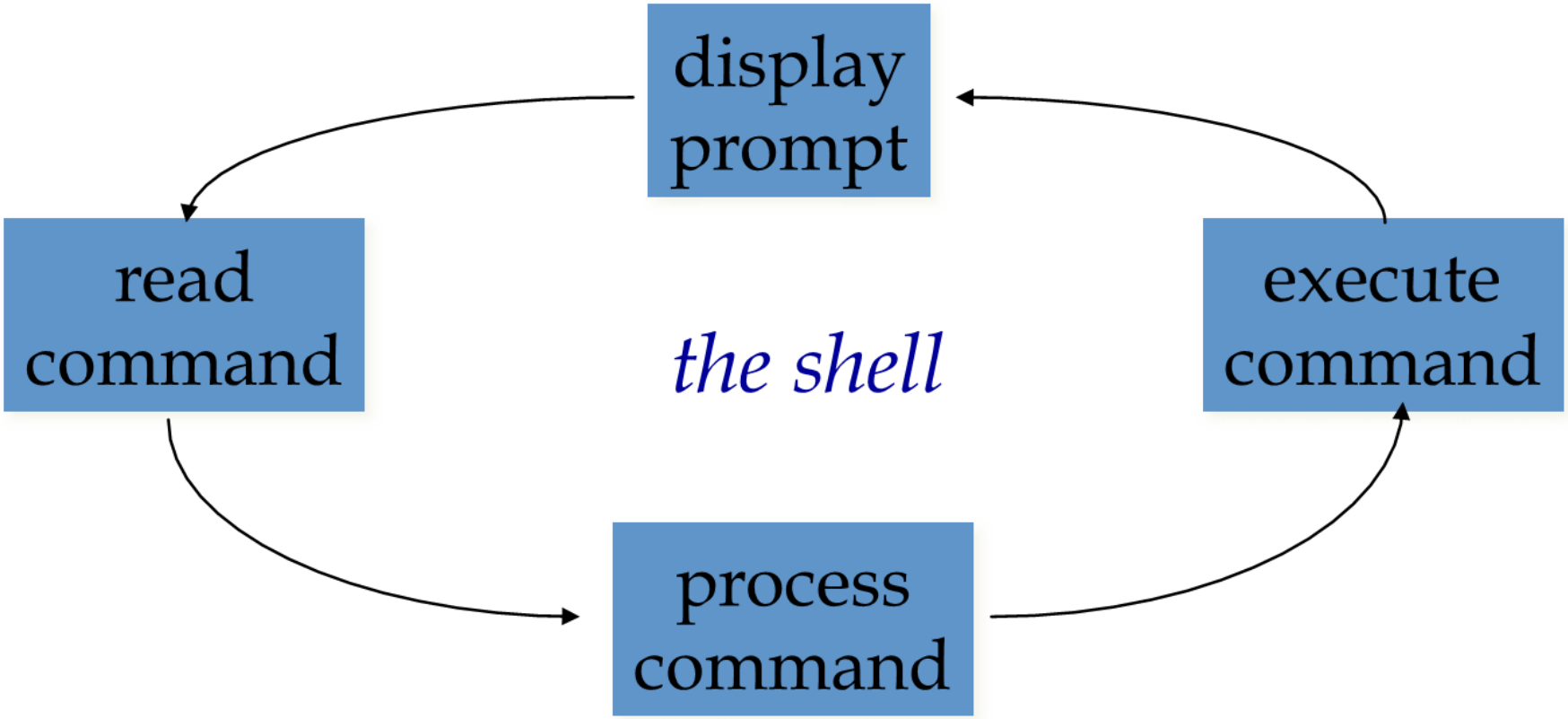
Kernel



- The kernel is the core of OS
- Kernel receives tasks from the shell and performs them.
- Users interact with the shell.
- Shells
  - csh, tcsh
  - bash
  - ksh (Korn shell)
  - sh (Bourne shell)
  - etc.
- Everything in Unix is either a *file* or a *process*.
- A process is an executing program identified by a unique PID (process identifier).
- make a shell script

What does the shell do?

- The Unix user interface is called the shell.
- The shell tends to do 4 jobs repeatedly:



User Interface

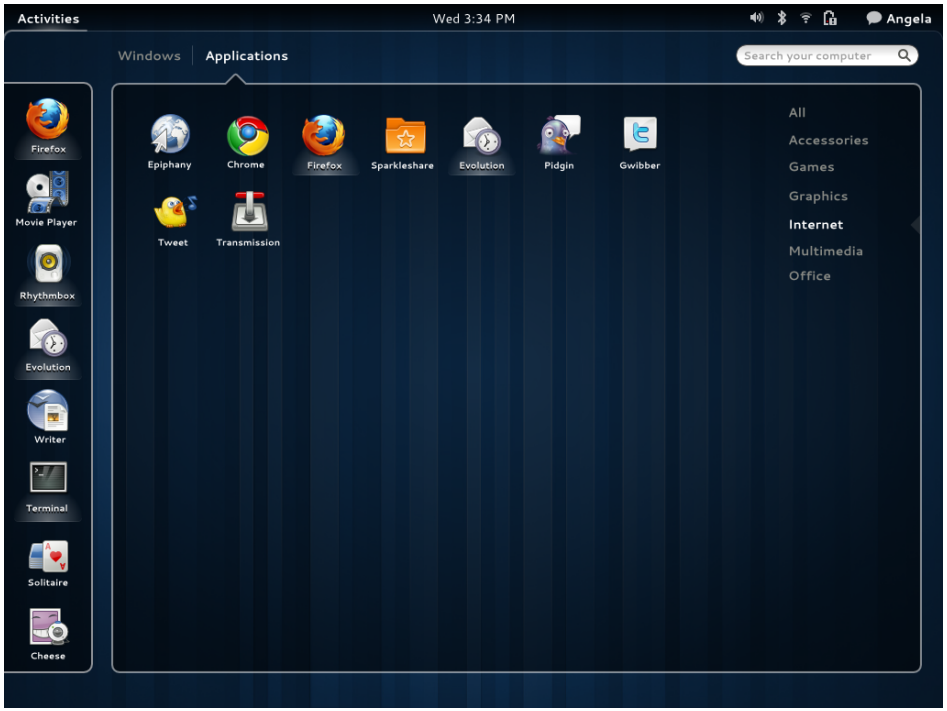
- Graphical User Interface (GUI): X-Windows.
- Command Line Interface (CLI): text based shell.
- Basically, the user interacts with UNIX through a shell.
- Remote access a shell: using telnet, ssh

X-Windows

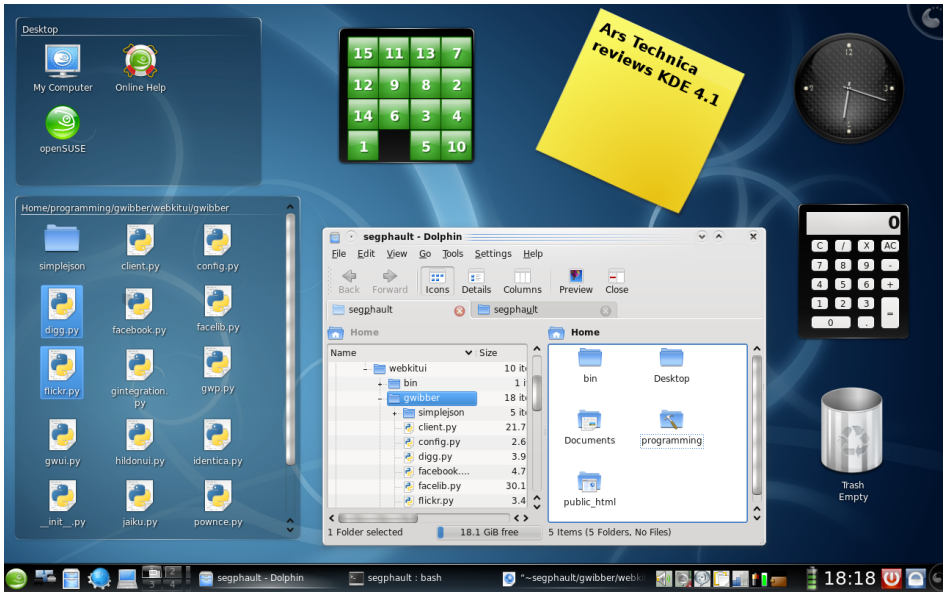
- X-Windows is the standard graphical layer for Unix systems
- Server-client
- X supports remote connectivity.
- Windows manager/Desktop Environments
  - WM: fvwm, window maker, open box, owm, etc
  - DE: Gnome, KDE, MATE, XFCE, LXDE, etc.

Examples of X-windows systems

Gnome



KDE



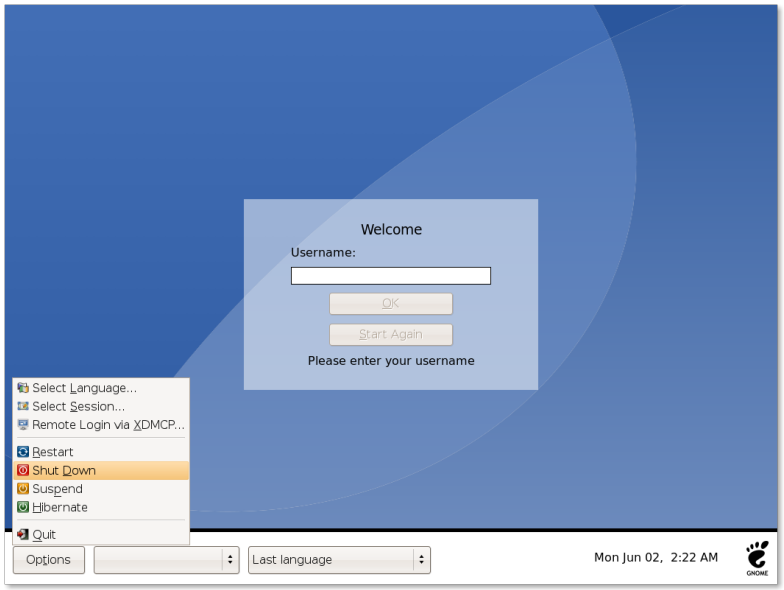
Unix Accounts

User Accounts

- To access a Unix system you need to have an account.
- Unix account includes:
  - username and password
  - userid and groupid
  - home directory
  - a default shell preference
  - other unimportant informations
  - "/etc/passwd"
- Username is a sequence of alphanumeric characters.
- Password should be a secrete string that only the user knows.
  - Not even the system (or administrator) knows a user's password.
  - Password is encrypted.
  - Strong recommendation: use the special characters and/or numbers.

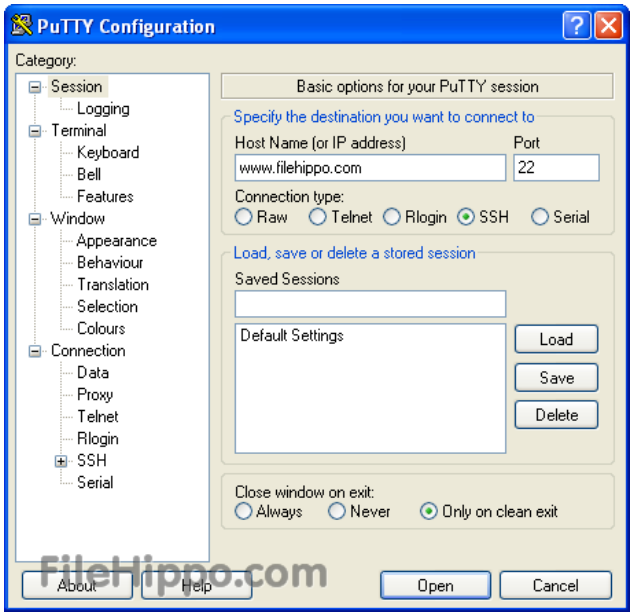
Let's Login

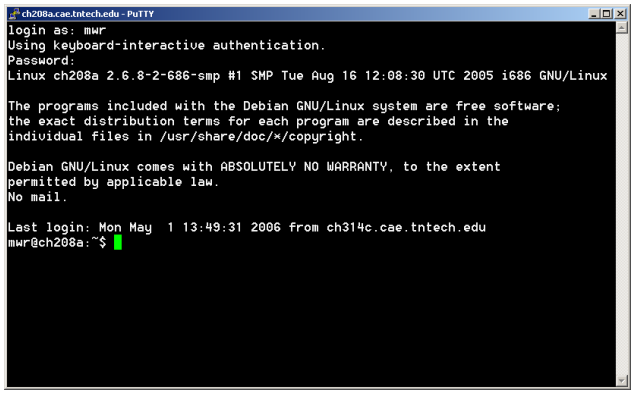
GDM



Remote Login

- Use ssh for security reason.
- Windows client programs:
  - putty
  - Xshell
  - other ssh-client programs



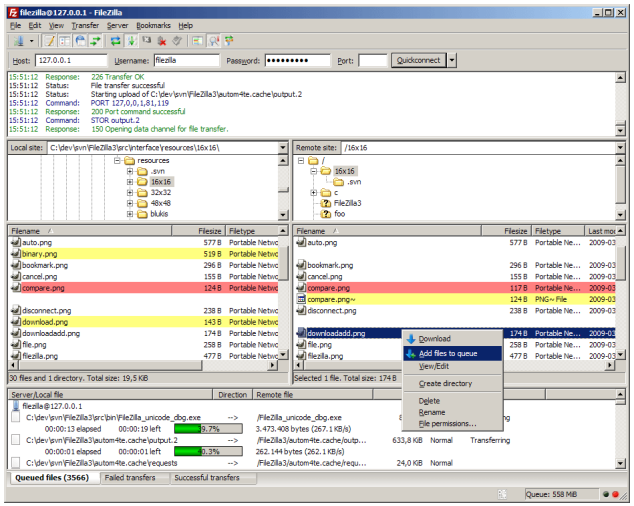


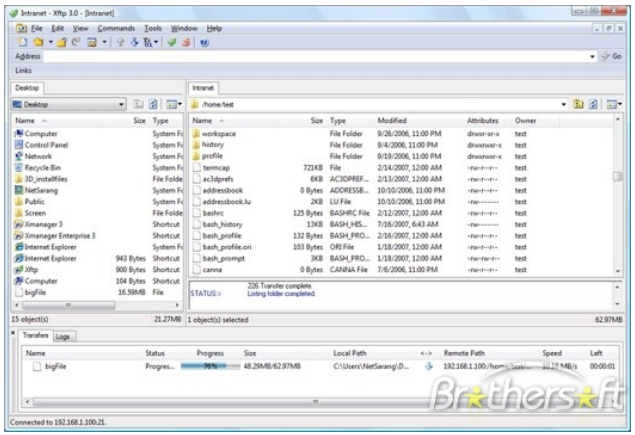
File Transfer

scp

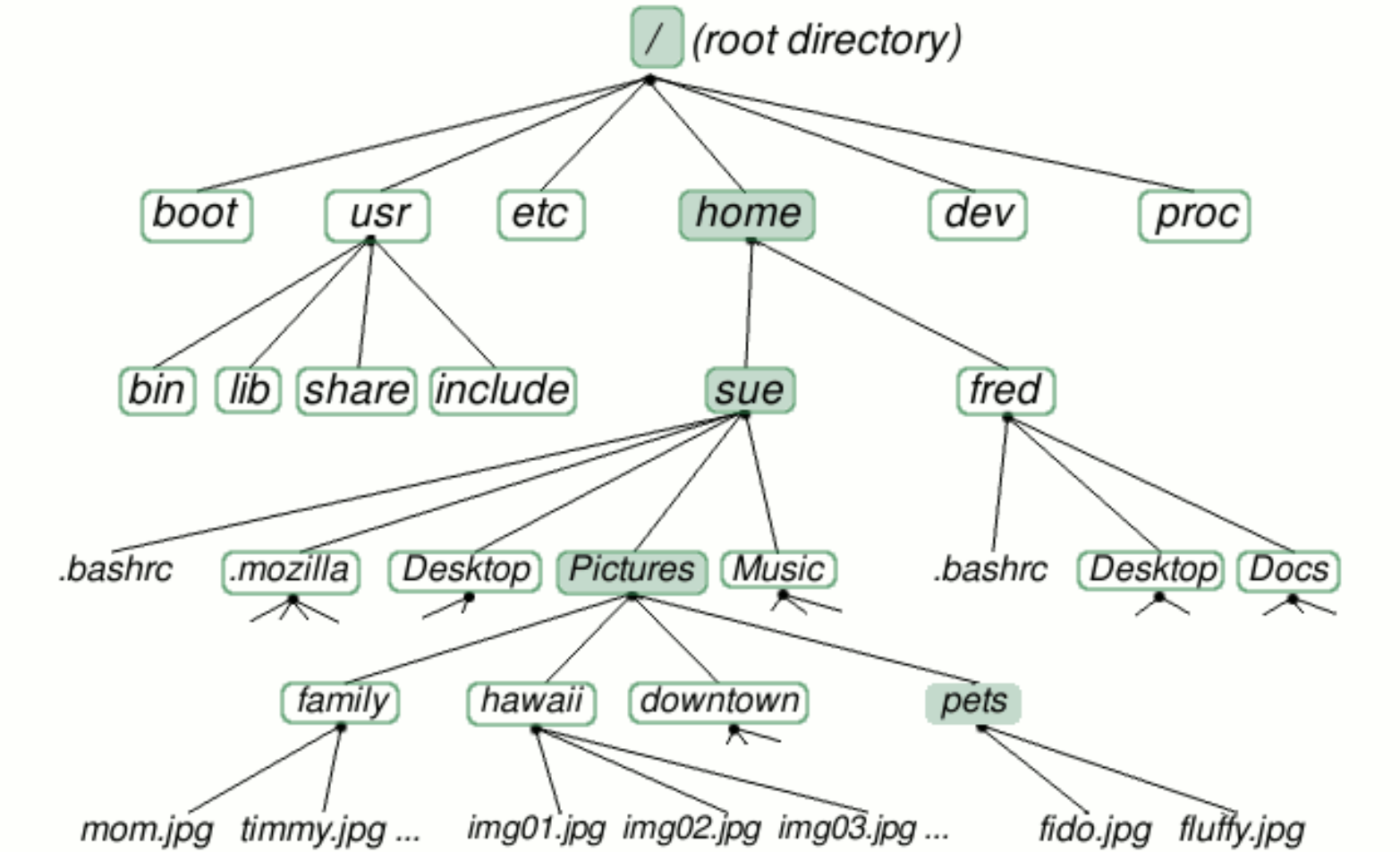
```
scp syook@163.180.1.1:/home/syook/test.txt ./
scp ./test.txt syook@163.180.1.1:/home/syook/tmp
```

- Windows client programs:
  - Filezilla
  - Xftp
  - winscp
  - other scp-client programs





Unix Directory Tree



Directory and Files

Directory

- A directory is a special kind of file
- Unix uses a directory to hold inforamtion abount other files
- The directory often regarded as a container having other files and directories
- Folder in MS-windows systems

File name

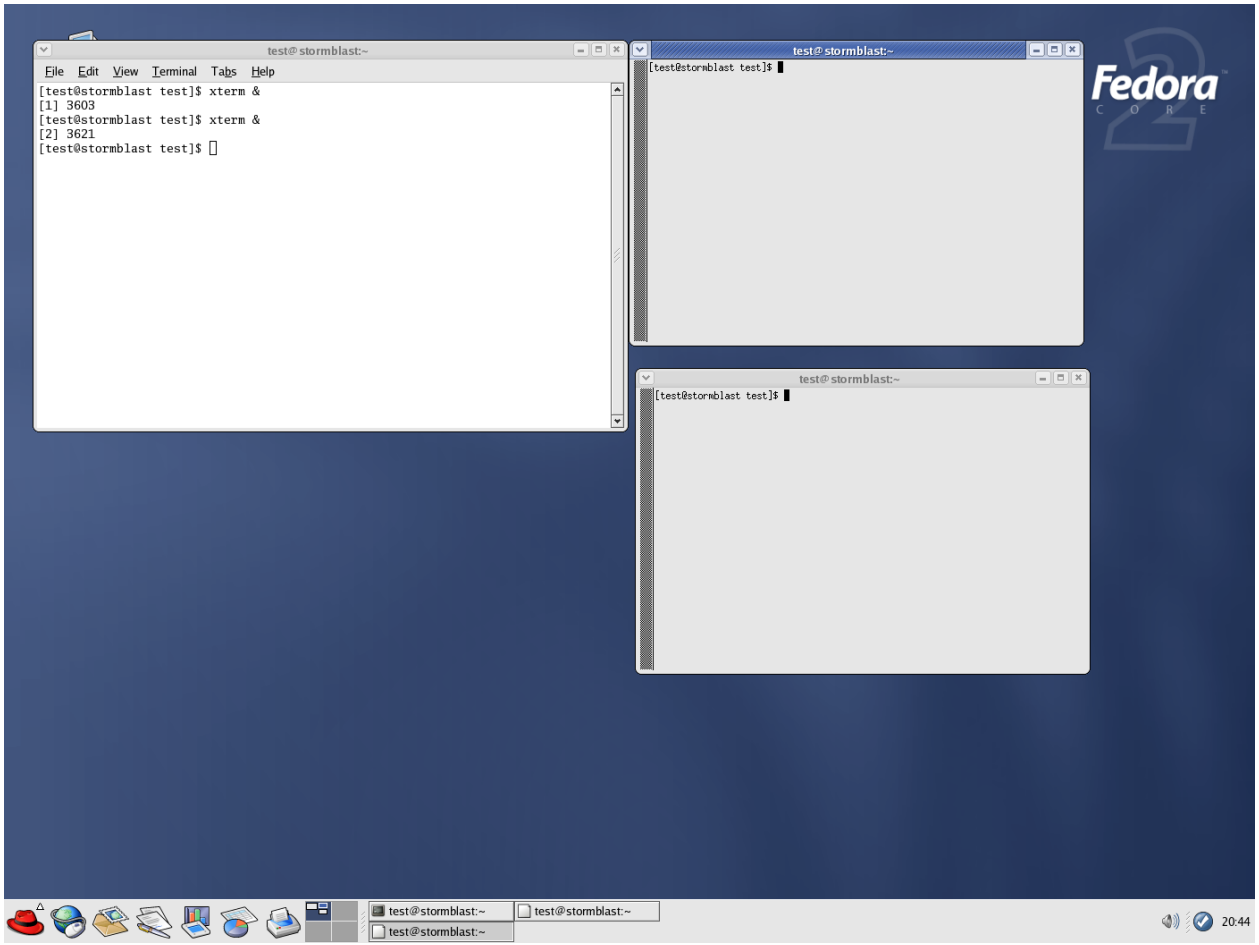
- Each file should have a unique name
- The file name in UNIX is case sensitive
- Devices are regarded as a file

Pathname

- The heirarchical path from the root: Absolute path
- The heirarchical path from the current directory: relative path

Basic Command

- If you are using the X-windows system, run xterm or gnome-terminal, etc.



Basic Command

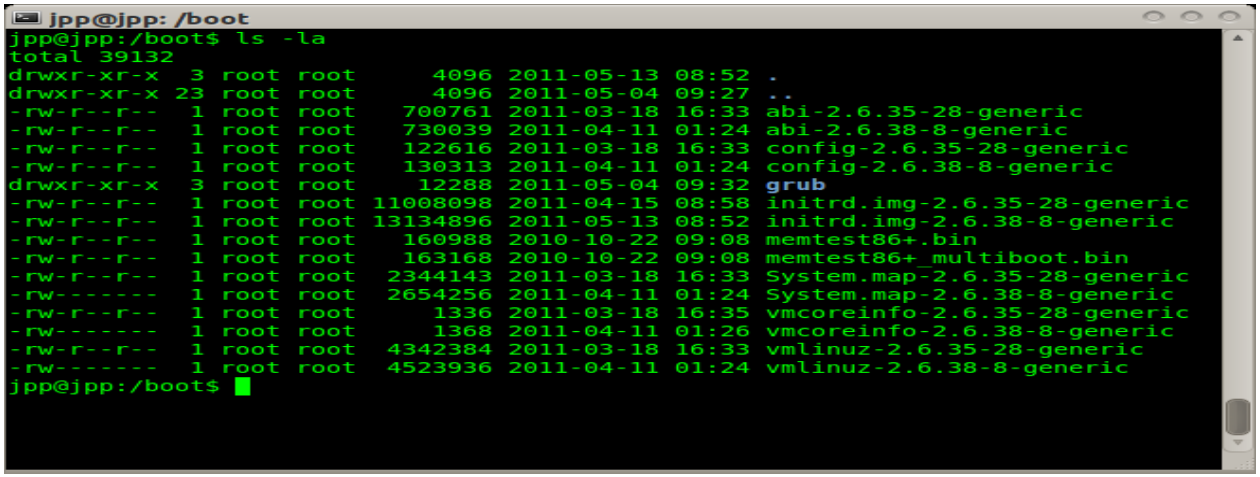
man: display the manual page (RTFM)!

man ls

ls: displays the names of files and directories.

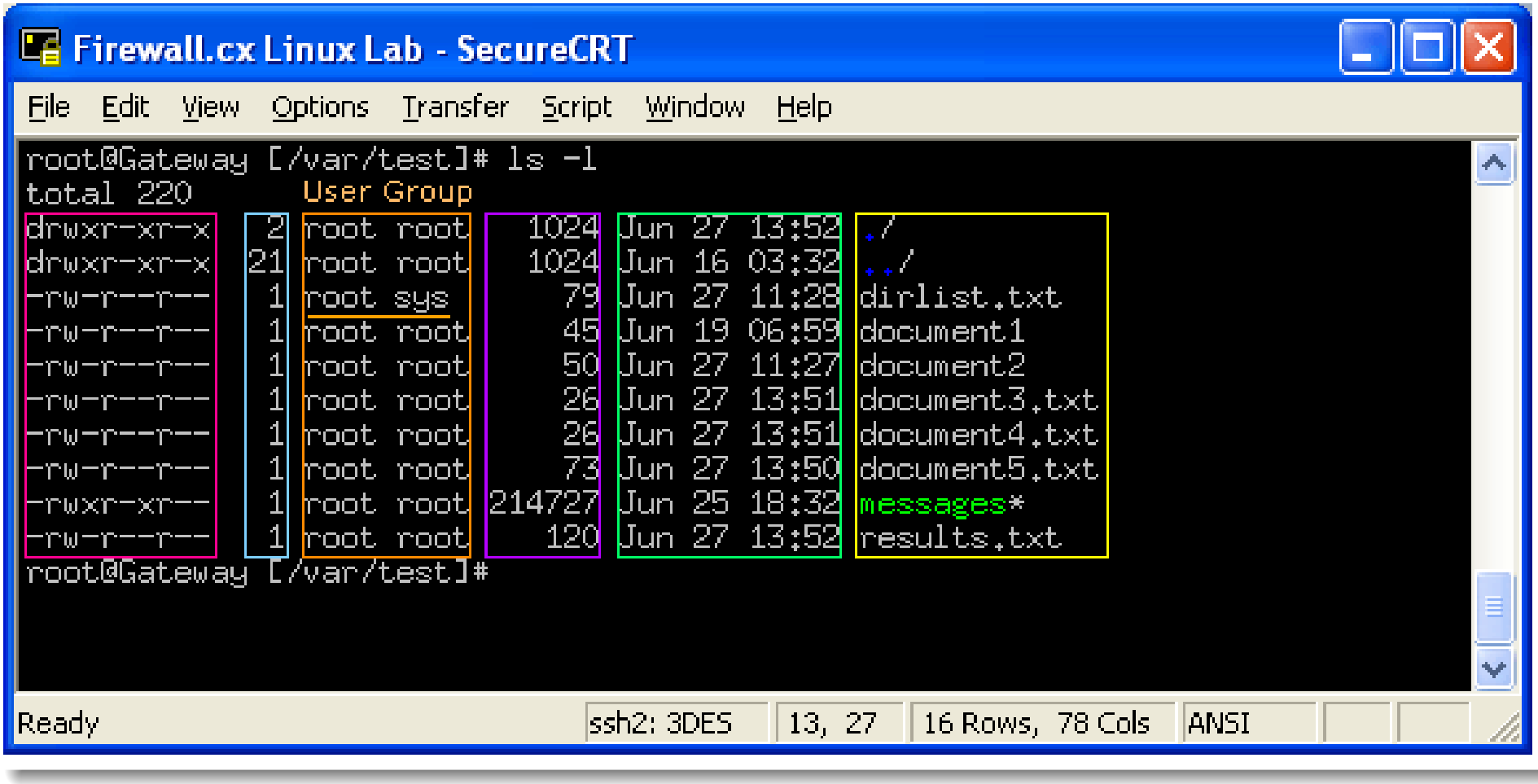
- options l, a, etc.

ls -l -a



Basic Command

permission



Basic Command

pwd

where am I?
pwd

chmod

change the permission
chmod 755 test.txt

chown

change the ownership
chown -R syook:statphys test.txt

Basic Command

cd

change the directory
absolute and relative path
cd /usr/bin
cd ../../download

touch

make an empty file
touch 111.txt

mkdir

make a directory
mkdir tmp

Basic Command

cp

copy the file
cp *.dat ../data/
cp 111.txt 123.txt

mv

move the file
used to change the name of the file/directory
mv *.dat ../data/
mv 111.txt 123.txt

rm

remove the file
unrecoverable unlike the windows!
rm *.dat
rm 111.txt
rm *

Basic Command

passwd

change the password
passwd

ps

display the processes on the machine
ps aux | grep syook

kill

Kill the process
kill -9 [PID]

more (less)

more test.txt

Basic Command

cat

#cat test.txt

wc

count the word
wc -l test .txt

Job suspension and background running

Run a backgraound process

use &

```
# xterm &
```

Suspend a process

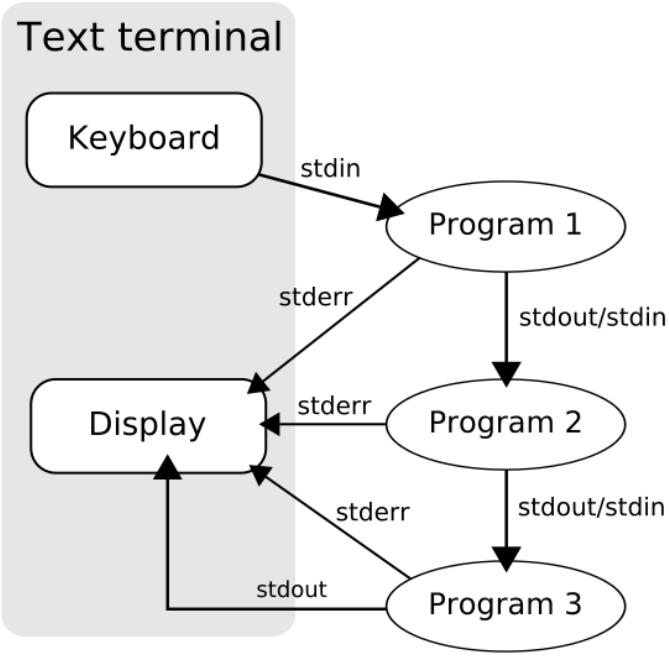
use ^Z (Ctrl+Z)

Change the state of suspended job into the background job

just type bg

```
# bg
```

pipeline



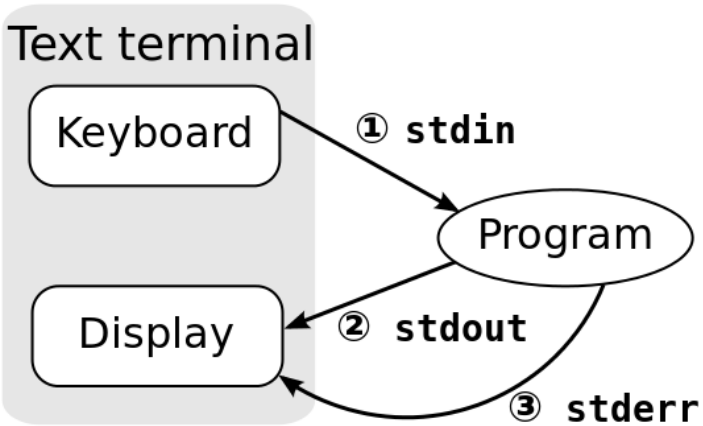
A pipe line of three programs run on a text terminal (wikipedia).

- a set of processes chained by their standard streams
- the output of each process (stdout) feeds directly as input (stdin) to the next one

program 1 |program2 |program3

ls |grep test |less

redirection



The standard streams for input, output and error (wikipedia).

- redirection is a function common to most command-line interpreters, including the Unix shells.
- redirect the starndard streams to user-specified locations

```
# ls >res.txt
# command < file
# command1 < infile > outfile
# command1 >> file (append to the file)
# command 2> file (save the stderr to the file)
# command 2>&1 (redirect the stderr to stdout)
```

Text Editors

- GUI (X-wiondows): anjuta, gedit, nedit, etc.
  - pretty much like the text editors on MS-Windows
- CLI: vi, vim, emacs
  - We will learn vi in more detail.

Logout

logout

logout
or
exit
or
^D (Ctrl+D)