

# Ve 280

Programming and Elementary Data Structures

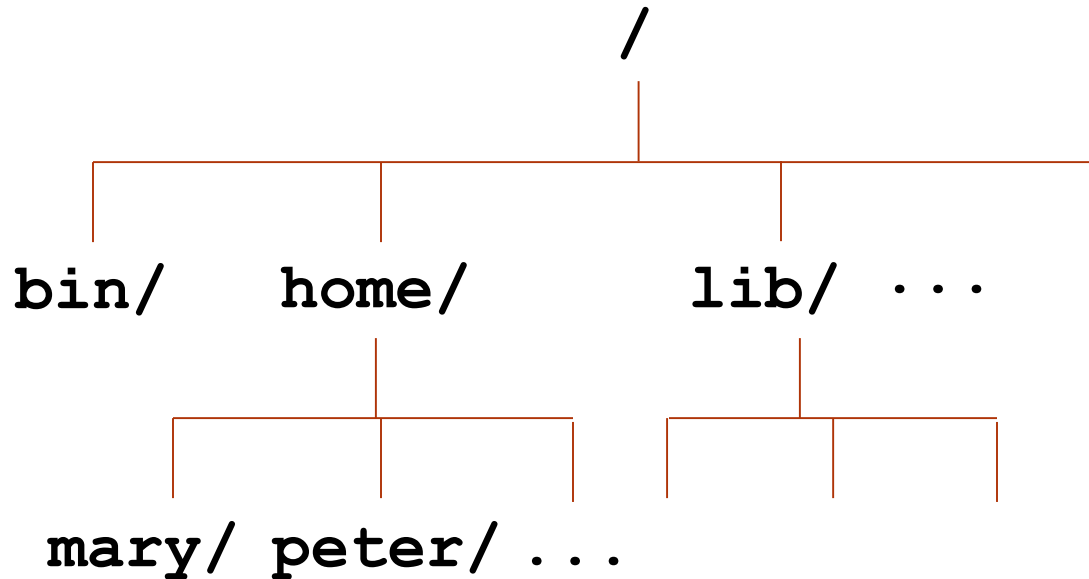
Linux

# Change Directory

- Basic command: `cd pathname`
  - E.g., `cd /usr/bin`  
typical path name format
- Special characters for directories
  - root directory: `/`
  - home directory: `~`
    - Linux is a multi-user operating system. It is the “home directory” of you.
  - current directory: `.`
  - parent directory: `..`

# Aside: Root Directory

- Directory in Linux is organized as a tree
- The topmost directory is root directory “/”



# List Contents of a Directory

- Basic command: `ls directory`
  - E.g., `ls /home`
- `ls` (i.e., “`ls`” alone): list the current working directory



## Options

- `ls -l [directory]`: list in long format
- `ls -a [directory]`: list all files including the hidden files
  - Hidden files: file name begin with a dot. E.g., “.bash\_history”
- In Linux, options can be combined together.
  - “`ls -la`” or “`ls -l -a`”

# Aside: Long Format of File Information

- `ls -l`

group                      modification time

-rw-----	1	john	john	576	Apr 17 1998	weather.txt
drwxr-xr-x	6	john	john	1024	Oct 9 1999	web_page
-rw-rw-r--	1	john	john	276480	Feb 11 20:41	web_site.tar
-rwx-----	1	john	john	5743	Dec 16 1998	my_app

permission

owner

file size  
(in bytes)

file name

- File permission
  - First character: '-' regular file; 'd' directory
  - Next three: read, write, execution permission of the owner
  - Next three: read, write, execution permission of the group
  - Final three: read, write, execution permission of everyone else

# Manipulating Files/Directories

- Create directories: **mkdir** dir
- Delete directories: **rmdir** dir
  - Can only remove **empty** directory
- Create an empty file: **touch** file

# Copy Files/Directories

- Basic command: `cp source dest`
- Variations
  - `cp file1 file2`: copy the content of file1 into file2
  - `cp file1 dir`: copy file into a directory
    - `cp file1 file2 dir`
    - `cp file* dir`
      - \*: wildcard, matches any character
  - `cp -r dir1 dir2`: If dir2 does not exist, copy dir1 as dir2. If dir2 exists, copy dir1 inside dir2

Question: How do you list all the “.cpp” file in the current directory?

# Rename/Move a File

- Basic command: `mv source dest`
- Variations
  - `mv file1 file2`: rename file1 as file2
  - `mv file1 dir`: move file into a directory
  - `mv dir1 dir2`: If dir2 does not exist, then rename dir1 as dir2. If dir2 exists, then move dir1 inside dir2



# Delete Files/Directories

- Basic command: `rm file`
- Variations
  - `rm file`: delete file
  - `rm file1 file2`: delete file1 and file2
  - `rm -r dir`: delete dir along with its contents
  - Useful options
    - `-i`: prompt before every removal
    - `-f`: ignore non-existent files, never prompt

# Edit/Show a File

- Edit file: `nano file`      `gedit file`
  - advanced editor: vim, emacs
- Show file content
  - `cat file`
  - `less file`
    - quit 'less': press 'q'
    - go to the end: press 'G' (shift + g)
    - go to the beginning: press 'g'
    - search: press '/', then enter the thing to be searched
    - press 'n' for the next match; press 'N' for the previous match.

# I/O Redirection

- Most command line programs display their results on the **standard output**.
  - By default, standard output is our display.
- We can redirect from standard output to a file by using '>'.
  - E.g., `ls -l > ls_rst.txt`: the “ls” result is now in `ls_rst.txt`

# I/O Redirection

- Many commands can accept input from a facility called **standard input**.
  - By default, standard input is our keyboard.
- We can redirect standard input from a file instead of keyboard by using '<'.
  - E.g., `sort < fruit.txt`: sort the contents of file fruit.txt.
- Question: what does the following command mean?
  - `sort < fruit.txt > my_favorite.txt`

# Other Commands

- Auto completion: type a few characters; then press ‘Tab’
  - If there is a single match, Linux completes the remaining.
  - If there are multiple matches, hit the second time, Linux show the candidates.
- Compare two files: `diff file1 file2`
  - If files are the same, no output
  - If there are differences: lines after “<” are from the first file; lines after “>” are from the second file
  - In a summary line: ‘c’: change; ‘a’: add; ‘d’: delete
  - Useful option “-w”: ignore white spaces (space, tab)

# Other Commands

- Install a program: `sudo apt-get install program`
  - E.g., `sudo apt-get install emacs`
  - `sudo command`: execute command as a superuser
    - Need you to type your password
- Remove a program: `sudo apt-get autoremove program`
- Looking for help? `man command` E.g., `man ls`
  - Browse the manual using the same command as for 'less'

# Reference

- <http://linuxcommand.org/>