

Lab 4 Linux Filesystem

Question 1

Table 1

Directory	Function
bin	Essential commands
dev	Device files
etc	System configuration files
home	User home directories
media	Mount point for removable media, such as Dvds
opt	Add-on software packages
proc	Kernel information, process control, system hardware information
srv	Information relating to services that run on the system
usr	Software not essential for system operation, such as applications
var	Dedicated to variable data, such as logs, databases, websites, and temporary spool (e-mail etc) files that persist from one boot to the next.

Table 2

Command	What it does	Syntax	Example
pwd	Display the current working directory	pwd	pwd
cd	Change the current working directory	cd + destination	cd /home/user/Documents
ls	Display all the files inside a given directory	ls + option + file or dir	ls -a ~/Pictures

Practice / Challenge

Practice

```

student@Cis106vm:~$ wget https://cis106.com/assets/practicels.tar.xz
--2022-03-11 23:26:04-- https://cis106.com/assets/practicels.tar.xz
Resolving cis106.com (cis106.com)... 185.199.108.153
Connecting to cis106.com (cis106.com)|185.199.108.153|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2229212 (2.1M) [application/x-xz]
Saving to: 'practicels.tar.xz'

practicels.tar.xz  100%[=====>] 2.12M  --.-KB/s  in 0.08s

2022-03-11 23:26:04 (25.4 MB/s) - 'practicels.tar.xz' saved [2229212/2229212]

student@Cis106vm:~$ tar Jxf practicels.tar.xz
student@Cis106vm:~$ cd practicels/
student@Cis106vm:~/practicels$ 

```

```

student@Cis106vm:~/practicels$ ls
book.txt      history-debian.pdf  movie.mp4  song.mp3      tux-penguin.gif
countries.xml homework.docx       people.csv  tux-nobg.png
student@Cis106vm:~/practicels$ ls -a
.      countries.xml  movie.mp4  tux-nobg.png
..     history-debian.pdf  people.csv  tux-penguin.gif
book.txt  homework.docx  song.mp3
student@Cis106vm:~/practicels$ 

```

```

student@Cis106vm:~/practicels$ ls -l
total 2932
-rw-rw-r-- 1 student student 1043 Feb 27 13:39 book.txt
-rw-rw-r-- 1 student student 23972 Feb 27 13:46 countries.xml
-rw-rw-r-- 1 student student 163057 Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 student student 111303 Feb 22 14:14 homework.docx
-rw-rw-r-- 1 student student 1570024 Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 student student 284042 Feb 27 13:45 people.csv
-rw-rw-r-- 1 student student 764176 Feb 27 13:44 song.mp3
-rw-rw-r-- 1 student student 21314 Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 student student 44299 Jan 31 2020 tux-penguin.gif
student@Cis106vm:~/practicels$ ls -lh
total 2.9M
-rw-rw-r-- 1 student student 1.1K Feb 27 13:39 book.txt
-rw-rw-r-- 1 student student 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 student student 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 student student 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 student student 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 student student 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 student student 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 student student 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 student student 44K Jan 31 2020 tux-penguin.gif
student@Cis106vm:~/practicels$ 

```

```
student@Cis106vm:~/practicels$ ls -lht
total 2.9M
-rw-rw-r-- 1 student student 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 student student 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 student student 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 student student 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 student student 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 student student 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 student student 1.1K Feb 27 13:39 book.txt
-rw-rw-r-- 1 student student 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 student student 44K Jan 31 2020 tux-penguin.gif
student@Cis106vm:~/practicels$ ls -lhgS
total 2.9M
-rw-rw-r-- 1 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 44K Jan 31 2020 tux-penguin.gif
-rw-rw-r-- 1 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 1.1K Feb 27 13:39 book.txt
student@Cis106vm:~/practicels$ 
student@Cis106vm:~/practicels$ ls -mr
tux-penguin.gif, tux-nobg.png, song.mp3, people.csv, movie.mp4, homework.docx,
history-debian.pdf, countries.xml, book.txt
student@Cis106vm:~/practicels$ ls -lx
book.txt  countries.xml  history-debian.pdf  homework.docx  movie.mp4
people.csv  song.mp3      tux-nobg.png      tux-penguin.gif
student@Cis106vm:~/practicels$
```

Challenge

```

student@Cis106vm:~$ pwd
/home/student
student@Cis106vm:~$ cd
student@Cis106vm:~$ cd /
student@Cis106vm:/ $ cd ../../
student@Cis106vm:/ $ ls -A ~
.bash_history      .gnupg             .ssh
.bash_logout       .icons             .sudo_as_admin_successful
.bashrc            .lessht            Templates
.blocks-log        .local             .themes
.blocks-progress   .mozilla           .thunderbird
.cache             Music              .vboxclient-clipboard.pid
cis106             Pictures           .vboxclient-display-svg-x11.pid
.cis106.png        .pki               .vboxclient-draganddrop.pid
.config            practicels         .vboxclient-seamless.pid
Desktop            practicels.tar.xz  Videos
Documents          .profile           .vscode
Downloads          Public
.gitconfig         snap
student@Cis106vm:/ $

```

```

student@Cis106vm:/ $ cd; ls -tX cis106/
cheatsheets FinalProject labs WeeklyReports
student@Cis106vm:~$ ls -rR ~/cis106/
/home/student/cis106/:
WeeklyReports labs FinalProject cheatsheets

/home/student/cis106/WeeklyReports:
week4 week3 week2 week1 week0

/home/student/cis106/WeeklyReports/week4:
week4.pdf week4.md

/home/student/cis106/WeeklyReports/week3:
week3.pdf week3.md update.png

/home/student/cis106/WeeklyReports/week2:
Weak_2.pdf Weak_2.md server.png require.png Pi4.png client.png

/home/student/cis106/WeeklyReports/week1:
weak_1.pdf weak_1.md

/home/student/cis106/WeeklyReports/week0:

/home/student/cis106/labs:
lab4 lab3 lab2 lab1 lab0

/home/student/cis106/labs/lab4:
q6.png q5.png q4.png q3.png q2.png q1.png lab4.md

/home/student/cis106/labs/lab3:
q2.1.png 'Linux wiki.odt' lab3.pdf desktop.png
'Linux wiki.pdf' Linux.odp lab3.md date.png

/home/student/cis106/labs/lab2:
p4.png p3.png p2.png p1.png lab2.pdf lab2.md

/home/student/cis106/labs/lab1:
off.PNG lab1_submission.pdf lab1_submission.md kalicommand.PNG kalibase.PNG

/home/student/cis106/labs/lab0:
xubuntu.png whatisubuntu.pdf lubuntu.png core.png
what is ubuntu submission.pdf ubuntu.png kylin.png budgie.png

```

```
what_is_ubuntu_submission.md      studio.png      kubuntu.png
what_is_ubuntu_submission.html    mate.png        desktop.png

/home/student/cis106/FinalProject:

/home/student/cis106/cheatsheets:
'The LS command Cheat Sheet.png'
'Linux Workshop Ubuntu Software installation cheat sheet.png'
student@Cis106vm:~$

student@Cis106vm:~$ ls -lh ~
total 2.2M
drwxrwxr-x 7 student student 4.0K Mar  4 12:34 cis106
drwxr-xr-x 2 student student 4.0K Mar  4 13:21 Desktop
drwxr-xr-x 2 student student 4.0K Mar  4 13:22 Documents
drwxr-xr-x 5 student student 4.0K Mar 11 20:39 Downloads
drwxr-xr-x 2 student student 4.0K Feb 21 15:02 Music
drwxr-xr-x 2 student student 4.0K Feb 21 15:02 Pictures
drwxrwxr-x 2 student student 4.0K Feb 27 13:46 practicels
-rw-rw-r-- 1 student student 2.2M Mar  8 16:39 practicels.tar.xz
drwxr-xr-x 2 student student 4.0K Feb 21 15:02 Public
drwx----- 4 student student 4.0K Feb 21 15:21 snap
drwxr-xr-x 2 student student 4.0K Feb 21 15:02 Templates
drwxr-xr-x 2 student student 4.0K Feb 21 15:02 Videos
student@Cis106vm:~$ ls -lgg -full-time ~
```

Question 2

```
student@Cis106vm:~$ pwd
/home/student
student@Cis106vm:~$ cd /usr/share/themes/
student@Cis106vm:/usr/share/themes$ pwd
/usr/share/themes
student@Cis106vm:/usr/share/themes$ cd /
student@Cis106vm:/$ cd /etc/firefox/
student@Cis106vm:/etc/firefox$
```

```
student@Cis106vm:~$ cd
student@Cis106vm:~$ cd Downloads/
student@Cis106vm:~/Downloads$ cd ../../
student@Cis106vm:/home$ pwd
/home
student@Cis106vm:/home$ cd student/Documents/
student@Cis106vm:~/Documents$
```

Question 3

```
student@Cis106vm: ~/lab4files

student@Cis106vm:~$ cd /usr/share
student@Cis106vm:/usr/share$ ls /home/student/lab4files/
countries.json  document.docx  helloWorld.c  sample.xls  Ubuntu.pdf
csvfile.csv     globe.avi      Linux.pdf     Tux.png     website.html
student@Cis106vm:/usr/share$ cd ~/lab4files/
student@Cis106vm:~/lab4files$ ls -lh
total 6.5M
-rw-rw-r-- 1 student student 20K Feb 22 14:16 countries.json
-rw-rw-r-- 1 student student 278K Feb 22 14:15 csvfile.csv
-rw-rw-r-- 1 student student 747K Feb 22 14:13 document.docx
-rw-rw-r-- 1 student student 726K Feb 22 14:12 globe.avi
-rw-rw-r-- 1 student student 76 Feb 22 14:18 helloWorld.c
-rw-rw-r-- 1 student student 2.5M Feb 22 14:10 Linux.pdf
-rw-rw-r-- 1 student student 8.5K Feb 22 14:12 sample.xls
-rw-rw-r-- 1 student student 42K Feb 22 14:10 Tux.png
-rw-rw-r-- 1 student student 2.1M Feb 22 14:11 Ubuntu.pdf
-rw-rw-r-- 1 student student 135K Feb 22 14:16 website.html
student@Cis106vm:~/lab4files$ ls -lhs
total 6.5M
-rw-rw-r-- 1 student student 2.5M Feb 22 14:10 Linux.pdf
-rw-rw-r-- 1 student student 2.1M Feb 22 14:11 Ubuntu.pdf
-rw-rw-r-- 1 student student 747K Feb 22 14:13 document.docx
-rw-rw-r-- 1 student student 726K Feb 22 14:12 globe.avi
-rw-rw-r-- 1 student student 278K Feb 22 14:15 csvfile.csv
-rw-rw-r-- 1 student student 135K Feb 22 14:16 website.html
-rw-rw-r-- 1 student student 42K Feb 22 14:10 Tux.png
-rw-rw-r-- 1 student student 20K Feb 22 14:16 countries.json
-rw-rw-r-- 1 student student 8.5K Feb 22 14:12 sample.xls
-rw-rw-r-- 1 student student 76 Feb 22 14:18 helloWorld.c
student@Cis106vm:~/lab4files$

student@Cis106vm:~/lab4files$ ls -lhSgGi
total 6.5M
2890739 -rw-rw-r-- 1 2.5M Feb 22 14:10 Linux.pdf
2890741 -rw-rw-r-- 1 2.1M Feb 22 14:11 Ubuntu.pdf
2890744 -rw-rw-r-- 1 747K Feb 22 14:13 document.docx
2890745 -rw-rw-r-- 1 726K Feb 22 14:12 globe.avi
2890743 -rw-rw-r-- 1 278K Feb 22 14:15 csvfile.csv
2890749 -rw-rw-r-- 1 135K Feb 22 14:16 website.html
2890740 -rw-rw-r-- 1 42K Feb 22 14:10 Tux.png
2890742 -rw-rw-r-- 1 20K Feb 22 14:16 countries.json
2890748 -rw-rw-r-- 1 8.5K Feb 22 14:12 sample.xls
2890747 -rw-rw-r-- 1 76 Feb 22 14:18 helloWorld.c
student@Cis106vm:~/lab4files$ ls -xr
website.html  Ubuntu.pdf  Tux.png     sample.xls  Linux.pdf  helloWorld.c
globe.avi     document.docx  csvfile.csv  countries.json
student@Cis106vm:~/lab4files$
```

Question 4


```
student@Cis106vm:~/lab4files$ cd /etc/  
student@Cis106vm:/etc$ tree ~/lab4files/  
/home/student/lab4files/  
├── countries.json  
├── csvfile.csv  
├── document.docx  
├── globe.avi  
├── helloWorld.c  
├── Linux.pdf  
├── sample.xls  
├── Tux.png  
├── Ubuntu.pdf  
└── website.html  
  
0 directories, 10 files  
student@Cis106vm:/etc$
```

```
student@Cis106vm:/etc$ cd ~/Downloads/  
student@Cis106vm:~/Downloads$ tree ../lab4files/ -fph  
../lab4files  
├── [-rw-rw-r-- 20K] ../lab4files/countries.json  
├── [-rw-rw-r-- 277K] ../lab4files/csvfile.csv  
├── [-rw-rw-r-- 746K] ../lab4files/document.docx  
├── [-rw-rw-r-- 725K] ../lab4files/globe.avi  
├── [-rw-rw-r-- 76] ../lab4files/helloWorld.c  
├── [-rw-rw-r-- 2.5M] ../lab4files/Linux.pdf  
├── [-rw-rw-r-- 8.5K] ../lab4files/sample.xls  
├── [-rw-rw-r-- 42K] ../lab4files/Tux.png  
├── [-rw-rw-r-- 2.0M] ../lab4files/Ubuntu.pdf  
└── [-rw-rw-r-- 134K] ../lab4files/website.html  
  
0 directories, 10 files
```



```
student@Cis106vm: ~/Downloads
0 directories, 10 files
student@Cis106vm:~/Downloads$ tree ../lab4files/ -fpt
../lab4files
├── [-rw-rw-r--] ../lab4files/Linux.pdf
├── [-rw-rw-r--] ../lab4files/Tux.png
├── [-rw-rw-r--] ../lab4files/Ubuntu.pdf
├── [-rw-rw-r--] ../lab4files/sample.xls
├── [-rw-rw-r--] ../lab4files/globe.avi
├── [-rw-rw-r--] ../lab4files/document.docx
├── [-rw-rw-r--] ../lab4files/csvfile.csv
├── [-rw-rw-r--] ../lab4files/countries.json
├── [-rw-rw-r--] ../lab4files/website.html
└── [-rw-rw-r--] ../lab4files/helloWorld.c

0 directories, 10 files
student@Cis106vm:~/Downloads$ tree ../lab4files/ -fpx
../lab4files
├── [-rw-rw-r--] ../lab4files/countries.json
├── [-rw-rw-r--] ../lab4files/csvfile.csv
├── [-rw-rw-r--] ../lab4files/document.docx
├── [-rw-rw-r--] ../lab4files/globe.avi
├── [-rw-rw-r--] ../lab4files/helloWorld.c
├── [-rw-rw-r--] ../lab4files/Linux.pdf
├── [-rw-rw-r--] ../lab4files/sample.xls
├── [-rw-rw-r--] ../lab4files/Tux.png
├── [-rw-rw-r--] ../lab4files/Ubuntu.pdf
└── [-rw-rw-r--] ../lab4files/website.html

0 directories, 10 files
student@Cis106vm:~/Downloads$ tree ../lab4files/ -fpj
tree: Invalid argument -`j'.
usage: tree [-acdfghilnpqrstuvxACDFJQNSUX] [-H baseHREF] [-T title ]
        [-L level [-R]] [-P pattern] [-I pattern] [-o filename] [--version]
        [--help] [--inodes] [--device] [--noreport] [--nolinks] [--dirsfirst]
        [--charset charset] [--filelimit[=]#] [--si] [--timefmt[=]<f>]
        [--sort[=]<name>] [--matchdirs] [--ignore-case] [--fromfile] [--]
        [<directory list>]
```

Question 5

```

student@Cis106vm:~$ exa --help
Usage:
  exa [options] [files...]

META OPTIONS
  -?, --help          show list of command-line options
  -V, --version       show version of exa

DISPLAY OPTIONS
  -1, --oneline       display one entry per line
  -l, --long          display extended file metadata as a table
  -G, --grid          display entries as a grid (default)
  -x, --across        sort the grid across, rather than downwards
  -R, --recurse       recurse into directories
  -T, --tree          recurse into directories as a tree
  -F, --classify      display type indicator by file names
  --colo[u]r=WHEN    when to use terminal colours (always, auto, never)
  --colo[u]r-scale    highlight levels of file sizes distinctly
  --icons            display icons
  --no-icons         don't display icons (always overrides --icons)

FILTERING AND SORTING OPTIONS
  -a, --all          show hidden and 'dot' files
  -d, --list-dirs    list directories as files; don't list their contents
  -L, --level DEPTH limit the depth of recursion
  -r, --reverse      reverse the sort order
  -s, --sort SORT_FIELD which field to sort by
  --group-directories-first list directories before other files
  -D, --only-dirs    list only directories
  -I, --ignore-glob GLOBS glob patterns (pipe-separated) of files to ignore
  --git-ignore       ignore files mentioned in '.gitignore'
Valid sort fields:
  name, Name, extension, Extension, size, type,
  modified, accessed, created, inode, and none.
  date, time, old, and new all refer to modified.

LONG VIEW OPTIONS
  -b, --binary       list file sizes with binary prefixes
  -B, --bytes        list file sizes in bytes, without any prefixes
  -g, --group        list each file's group
  -h, --header       add a header row to each column
  -H, --links        list each file's number of hard links
  -i, --inode        list each file's inode number
  -m, --modified     use the modified timestamp field
  -n, --numeric      list numeric user and group IDs
  -S, --blocks       show number of file system blocks
  -t, --time FIELD   which timestamp field to list (modified, accessed, created)
  -u, --accessed     use the accessed timestamp field
  -U, --created      use the created timestamp field
  --changed          use the changed timestamp field
  --time-style       how to format timestamps (default, iso, long-iso, full-iso)
  --no-permissions   suppress the permissions field
  --octal-permissions list each file's permission in octal format
  --no-filesize      suppress the filesize field
  --no-user          suppress the user field
  --no-time          suppress the time field
  --git              list each file's Git status, if tracked or ignored
  -@, --extended     list each file's extended attributes and sizes

```

```

student@Cis106vm:~$ exa -l lab4files/
.rw-rw-r-- 20k student 22 Feb 14:16 countries.json
.rw-rw-r-- 284k student 22 Feb 14:15 csvfile.csv
.rw-rw-r-- 764k student 22 Feb 14:13 document.docx
.rw-rw-r-- 742k student 22 Feb 14:12 globe.avi
.rw-rw-r-- 76 student 22 Feb 14:18 helloWorld.c
.rw-rw-r-- 2.6M student 22 Feb 14:10 Linux.pdf
.rw-rw-r-- 8.7k student 22 Feb 14:12 sample.xls
.rw-rw-r-- 43k student 22 Feb 14:10 Tux.png
.rw-rw-r-- 2.1M student 22 Feb 14:11 Ubuntu.pdf
.rw-rw-r-- 137k student 22 Feb 14:16 website.html

```

```

student@Cis106vm:~$ exa -T lab4files/
lab4files

```

```

├── countries.json
├── csvfile.csv
├── document.docx
├── globe.avi
├── helloWorld.c
├── Linux.pdf
├── sample.xls
├── Tux.png
├── Ubuntu.pdf
└── website.html

```

```

student@Cis106vm:~$ exa -lh lab4files/
Permissions Size User Date Modified Name
.rw-rw-r-- 20k student 22 Feb 14:16 countries.json
.rw-rw-r-- 284k student 22 Feb 14:15 csvfile.csv
.rw-rw-r-- 764k student 22 Feb 14:13 document.docx
.rw-rw-r-- 742k student 22 Feb 14:12 globe.avi
.rw-rw-r-- 76 student 22 Feb 14:18 helloWorld.c

```

```
.rw-rw-r-- 2.6M student 22 Feb 14:10 Linux.pdf  
.rw-rw-r-- 8.7k student 22 Feb 14:12 sample.xls  
.rw-rw-r-- 43k student 22 Feb 14:10 Tux.png  
.rw-rw-r-- 2.1M student 22 Feb 14:11 Ubuntu.pdf  
.rw-rw-r-- 137k student 22 Feb 14:16 website.html
```

```
student@Cis106vm:~$ exa -lh --no-user lab4files/  
Permissions Size Date Modified Name  
.rw-rw-r-- 20k 22 Feb 14:16 countries.json  
.rw-rw-r-- 284k 22 Feb 14:15 csvfile.csv  
.rw-rw-r-- 764k 22 Feb 14:13 document.docx  
.rw-rw-r-- 742k 22 Feb 14:12 globe.avi  
.rw-rw-r-- 76 22 Feb 14:18 helloWorld.c  
.rw-rw-r-- 2.6M 22 Feb 14:10 Linux.pdf  
.rw-rw-r-- 8.7k 22 Feb 14:12 sample.xls  
.rw-rw-r-- 43k 22 Feb 14:10 Tux.png  
.rw-rw-r-- 2.1M 22 Feb 14:11 Ubuntu.pdf  
.rw-rw-r-- 137k 22 Feb 14:16 website.html  
student@Cis106vm:~$
```