

# Lab 4 The Linux File System

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## Question 1

### Question 1.1

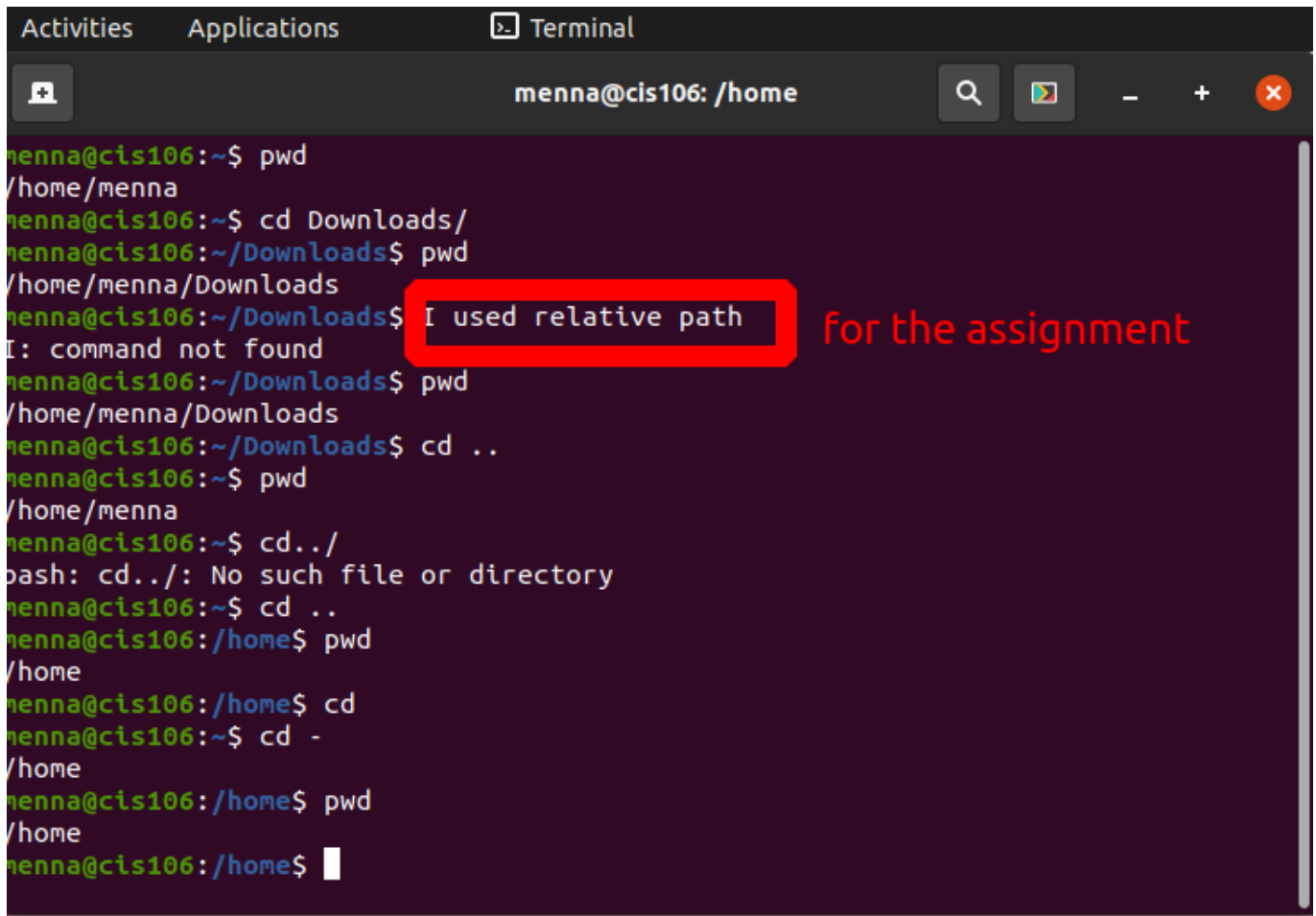
Directory	Function
bin	essential commands
dev	device files
etc	system configuration files
home	user home directions
media	mount point for removable media such as DVD's and floppy disks
opt	add-on software packages
proc	kernel information, process control, system hardware information
srv	information relating 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 files that persist from one boot to the next

### Question 1.2

Command	What it does	Syntax	An example
pwd	Displays current working directory	pwd	pwd
cd	Changes the current working directory	cd + destination	cd/usr/icons/default
ls	Displays all the files inside a given directory	ls + -a + ~/destination	ls -a pictures

### Question 1.3

#### Presentation Practice 1



A terminal window titled "Terminal" with the user "menna@cis106" and the current directory "/home". The terminal shows a series of commands and their outputs:

```
menna@cis106:~$ pwd
/home/menna
menna@cis106:~$ cd Downloads/
menna@cis106:~/Downloads$ pwd
/home/menna/Downloads
menna@cis106:~/Downloads$ I used relative path
I: command not found
menna@cis106:~/Downloads$ pwd
/home/menna/Downloads
menna@cis106:~/Downloads$ cd ..
menna@cis106:~$ pwd
/home/menna
menna@cis106:~$ cd../
bash: cd../: No such file or directory
menna@cis106:~$ cd ..
menna@cis106:/home$ pwd
/home
menna@cis106:/home$ cd
menna@cis106:~$ cd -
/home
menna@cis106:/home$ pwd
/home
menna@cis106:/home$
```

A red rectangular box highlights the text "I used relative path" in the terminal output. To the right of the box, the text "for the assignment" is written in red.

## Presentation Practice 2

```

menna@cis106:~$ wget https://cis106.com/assets/practicels.tar.xz
--2022-03-12 18:05:11-- 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 1.97MB/s in 1.1s

2022-03-12 18:05:12 (1.97 MB/s) - 'practicels.tar.xz' saved [2229212/2229212]

menna@cis106:~$ tar Jxf practicels.tar.xz
menna@cis106:~$ cd practicels/
menna@cis106:~/practicels$ ls
book.txt      history-debian.pdf  movie.mp4      song.mp3      tux-penguin.gif
countries.xml  homework.docx       people.csv     tux-nobg.png
menna@cis106:~/practicels$ ls -a
.              countries.xml      movie.mp4      tux-nobg.png
..             history-debian.pdf people.csv     tux-penguin.gif
book.txt      homework.docx      song.mp3
menna@cis106:~/practicels$ ls -l
total 2932
-rw-rw-r-- 1 menna menna 1043 Feb 27 13:39 book.txt
-rw-rw-r-- 1 menna menna 23972 Feb 27 13:46 countries.xml
-rw-rw-r-- 1 menna menna 163057 Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 menna menna 111303 Feb 22 14:14 homework.docx
-rw-rw-r-- 1 menna menna 1570024 Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 menna menna 284042 Feb 27 13:45 people.csv
-rw-rw-r-- 1 menna menna 764176 Feb 27 13:44 song.mp3
-rw-rw-r-- 1 menna menna 21314 Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 menna menna 44299 Jan 31 2020 tux-penguin.gif
menna@cis106:~/practicels$ ls -lh
total 2.9M
-rw-rw-r-- 1 menna menna 1.1K Feb 27 13:39 book.txt
-rw-rw-r-- 1 menna menna 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 menna menna 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 menna menna 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 menna menna 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 menna menna 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 menna menna 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 menna menna 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 menna menna 44K Jan 31 2020 tux-penguin.gif
menna@cis106:~/practicels$ ls -lht
total 2.9M
-rw-rw-r-- 1 menna menna 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 menna menna 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 menna menna 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 menna menna 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 menna menna 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 menna menna 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 menna menna 1.1K Feb 27 13:39 book.txt
-rw-rw-r-- 1 menna menna 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 menna menna 44K Jan 31 2020 tux-penguin.gif
menna@cis106:~/practicels$ ls -lht
total 2.9M
-rw-rw-r-- 1 menna menna 24K Feb 27 13:46 countries.xml
-rw-rw-r-- 1 menna menna 278K Feb 27 13:45 people.csv
-rw-rw-r-- 1 menna menna 747K Feb 27 13:44 song.mp3
-rw-rw-r-- 1 menna menna 1.5M Feb 27 13:42 movie.mp4
-rw-rw-r-- 1 menna menna 160K Feb 27 13:41 history-debian.pdf
-rw-rw-r-- 1 menna menna 21K Feb 27 13:40 tux-nobg.png
-rw-rw-r-- 1 menna menna 1.1K Feb 27 13:39 book.txt
-rw-rw-r-- 1 menna menna 109K Feb 22 14:14 homework.docx
-rw-rw-r-- 1 menna menna 44K Jan 31 2020 tux-penguin.gif
menna@cis106:~/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
menna@cis106:~/practicels$ ls -nr
tux-penguin.gif, tux-nobg.png, song.mp3, people.csv, movie.mp4, homework.docx,
history-debian.pdf, countries.xml, book.txt
menna@cis106:~/practicels$ ls -lX
people.csv
homework.docx
tux-penguin.gif
song.mp3
movie.mp4
history-debian.pdf
tux-nobg.png
book.txt
countries.xml
menna@cis106:~/practicels$

```

## Presentation Challenge

```

menna@c1s106: ~$ pwd
/home/menna
menna@c1s106:~$ cd
menna@c1s106:~$ cd /
menna@c1s106:/$ cd usr/share/themes
menna@c1s106:/usr/share/themes$ cd ../../
menna@c1s106:/usr$ ls -A ~
.bash_history      .gnupg             .ssh
.bash_logout       .icons             .sudo_as_admin_successful
.bashrc            .local             Templates
.cache             .mozilla           .themes
cis106             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
menna@c1s106:/usr$ cd; ls -tx cis106/
'Cheat sheets' 'final project' labs weeklyreports
menna@c1s106:~$ ls -RR ~/cis106/
/home/menna/cis106/:
weeklyreports  labs  'final project'  'Cheat sheets'

/home/menna/cis106/weeklyreports:
weekreport4.pdf weekreport3.md weekreport1.pdf weekreport0.md
weekreport4.md  weekreport2.pdf weekreport1.md  ubuntu.update.png
weekreport3.pdf weekreport2.md  weekreport0.pdf github.png

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

/home/menna/cis106/labs/lab4:
'presentation practice2.2.png.png' 'presentation pactice1.png'
'presentation practice2.1.png'      lab4.md

/home/menna/cis106/labs/lab3:
'Sugar glider.pdf' 'Sugar glider.odp' q1.2.png lab3.pdf
'Sugar glider.odt' q2.1.png q1.1.png lab3.md

/home/menna/cis106/labs/lab2:
question2.3.png Question2.2.png question2.1.png lab2.pdf lab2.md

/home/menna/cis106/labs/lab1:
'# Ubuntu.pdf' '# Ubuntu.html' lab1-submission.md
'# Ubuntu.md'  lab1-submission.pdf

/home/menna/cis106/labs/lab0:
ubuntu.png question6.2.png lubuntu.png desktop.png
studio.png question6.1.png kylin.png core.png
question6.3.png mate.png kubuntu.png budgie.png

/home/menna/cis106/final project':

/home/menna/cis106/Cheat sheets':
'The LS command Cheat Sheet.png'
'Linux Workshop _ Ubuntu Software installation cheat sheet.png'
'Absolute Path VS Relative Path Cheat sheet.png'
menna@c1s106:~$ ls -lh ~
total 2.2M
drwxrwxr-x 7 menna menna 4.0K Mar  1 16:46 cis106
drwxrwxr-x 3 menna menna 4.0K Mar  2 22:05 Cis106
drwxr-xr-x 2 menna menna 4.0K Mar  2 21:17 Desktop
drwxr-xr-x 2 menna menna 4.0K Feb 22 20:58 Documents
drwxr-xr-x 2 menna menna 4.0K Mar 10 19:01 Downloads
drwxr-xr-x 2 menna menna 4.0K Feb 22 20:58 Music
drwxr-xr-x 2 menna menna 4.0K Mar  2 21:10 Pictures
drwxrwxr-x 2 menna menna 4.0K Feb 27 13:46 practicels
-rw-rw-r-- 1 menna menna 2.2M Mar  8 16:39 practicels.tar.xz
drwxr-xr-x 2 menna menna 4.0K Feb 22 20:58 Public
drwx----- 4 menna menna 4.0K Feb 22 21:43 snap
drwxr-xr-x 2 menna menna 4.0K Feb 22 20:58 Templates
drwxr-xr-x 2 menna menna 4.0K Feb 22 20:58 Videos
menna@c1s106:~$ ls -lgG -full-time ~
ls: invalid option -- '-'
Try 'ls --help' for more information.

```

## Question 2

### 2.1 Absolute path

```
menna@cis106: /etc/firefox

menna@cis106:~$ pwd
/home/menna
menna@cis106:~$ cd /usr/share/themes/
menna@cis106:/usr/share/themes$ pwd
/usr/share/themes
menna@cis106:/usr/share/themes$ cd /
menna@cis106:/$ cd /etc/firefox/
menna@cis106:/etc/firefox$
```

## 2.2 Relative path

```
menna@cis106: ~/Documents

menna@cis106:/etc/firefox$ cd
menna@cis106:~$ cd Downloads/
menna@cis106:~/Downloads$ cd ../../
menna@cis106:/home$ pwd
/home
menna@cis106:/home$ cd menna/Documents/
menna@cis106:~/Documents$
```

## Question 3

```
menna@cis106: ~/lab4files

menna@cis106:~$ cd /usr/share/
menna@cis106:/usr/share$ ls /home/menna/lab4files/
countries.json  document.docx  helloWorld.c  sample.xls  Ubuntu.pdf
csvfile.csv    globe.avi      Linux.pdf     Tux.png     website.html
menna@cis106:/usr/share$ cd ~/lab4files/
menna@cis106:~/lab4files$ ls -lh
total 6.5M
-rw-rw-r-- 1 menna menna 20K Feb 22 14:16 countries.json
-rw-rw-r-- 1 menna menna 278K Feb 22 14:15 csvfile.csv
-rw-rw-r-- 1 menna menna 747K Feb 22 14:13 document.docx
-rw-rw-r-- 1 menna menna 726K Feb 22 14:12 globe.avi
-rw-rw-r-- 1 menna menna 76 Feb 22 14:18 helloWorld.c
-rw-rw-r-- 1 menna menna 2.5M Feb 22 14:10 Linux.pdf
-rw-rw-r-- 1 menna menna 8.5K Feb 22 14:12 sample.xls
-rw-rw-r-- 1 menna menna 42K Feb 22 14:10 Tux.png
-rw-rw-r-- 1 menna menna 2.1M Feb 22 14:11 Ubuntu.pdf
-rw-rw-r-- 1 menna menna 135K Feb 22 14:16 website.html
menna@cis106:~/lab4files$ ls -lhs
total 6.5M
-rw-rw-r-- 1 menna menna 2.5M Feb 22 14:10 Linux.pdf
-rw-rw-r-- 1 menna menna 2.1M Feb 22 14:11 Ubuntu.pdf
-rw-rw-r-- 1 menna menna 747K Feb 22 14:13 document.docx
-rw-rw-r-- 1 menna menna 726K Feb 22 14:12 globe.avi
-rw-rw-r-- 1 menna menna 278K Feb 22 14:15 csvfile.csv
-rw-rw-r-- 1 menna menna 135K Feb 22 14:16 website.html
-rw-rw-r-- 1 menna menna 42K Feb 22 14:10 Tux.png
-rw-rw-r-- 1 menna menna 20K Feb 22 14:16 countries.json
-rw-rw-r-- 1 menna menna 8.5K Feb 22 14:12 sample.xls
-rw-rw-r-- 1 menna menna 76 Feb 22 14:18 helloWorld.c
menna@cis106:~/lab4files$ ls -lhSgGi
total 6.5M
1720400 -rw-rw-r-- 1 2.5M Feb 22 14:10 Linux.pdf
1720402 -rw-rw-r-- 1 2.1M Feb 22 14:11 Ubuntu.pdf
1720405 -rw-rw-r-- 1 747K Feb 22 14:13 document.docx
1720407 -rw-rw-r-- 1 726K Feb 22 14:12 globe.avi
1720404 -rw-rw-r-- 1 278K Feb 22 14:15 csvfile.csv
1720410 -rw-rw-r-- 1 135K Feb 22 14:16 website.html
1720401 -rw-rw-r-- 1 42K Feb 22 14:10 Tux.png
1720403 -rw-rw-r-- 1 20K Feb 22 14:16 countries.json
1720409 -rw-rw-r-- 1 8.5K Feb 22 14:12 sample.xls
1720408 -rw-rw-r-- 1 76 Feb 22 14:18 helloWorld.c
menna@cis106:~/lab4files$ ls -Xr
sample.xls  Tux.png  Ubuntu.pdf  Linux.pdf  countries.json  website.html  document.docx  csvfile.csv  helloWorld.c  globe.avi
menna@cis106:~/lab4files$
```

## Question 4

menna@cis106: ~/Downloads

```
menna@cis106:~$ cd /etc/
menna@cis106:/etc$ tree ~/lab4files/
/home/menna/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
menna@cis106:/etc$ cd ~/Downloads/
menna@cis106:~/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
```

```
menna@cis106:~/Downloads$ tree -Dug
.
├── [menna menna Mar 12 19:30] lab4files.zip

0 directories, 1 file
menna@cis106:~/Downloads$ tree -X
<?xml version="1.0" encoding="UTF-8"?>
<tree>
  <directory name=".">
    <file name="lab4files.zip"></file>
  </directory>
  <report>
    <directories>0</directories>
    <files>1</files>
  </report>
</tree>
menna@cis106:~/Downloads$ tree -J
[{"type":"directory","name": ".","contents":[
  {"type":"file","name":"lab4files.zip"}
]},
{"type":"report","directories":0,"files":1}
]
```

## Question 5

```
menna@cis106: ~
menna@cis106:~$ 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
menna@cis106:~$
```

```
menna@cis106: ~
menna@cis106:~$ exa -l lab4files/
-rw-rw-r-- 20k menna 22 Feb 14:16 countries.json
-rw-rw-r-- 284k menna 22 Feb 14:15 csvfile.csv
-rw-rw-r-- 764k menna 22 Feb 14:13 document.docx
-rw-rw-r-- 742k menna 22 Feb 14:12 globe.avi
-rw-rw-r-- 76 menna 22 Feb 14:18 helloWorld.c
-rw-rw-r-- 2.6M menna 22 Feb 14:10 Linux.pdf
-rw-rw-r-- 8.7k menna 22 Feb 14:12 sample.xls
-rw-rw-r-- 43k menna 22 Feb 14:10 Tux.png
-rw-rw-r-- 2.1M menna 22 Feb 14:11 Ubuntu.pdf
-rw-rw-r-- 137k menna 22 Feb 14:16 website.html
menna@cis106:~$ exa -T lab4files/
lab4files
├── countries.json
├── csvfile.csv
├── document.docx
├── globe.avi
├── helloWorld.c
├── Linux.pdf
├── sample.xls
├── Tux.png
├── Ubuntu.pdf
└── website.html
menna@cis106:~$ exa -h lab4files/
countries.json document.docx helloWorld.c sample.xls Ubuntu.pdf
csvfile.csv    globe.avi    Linux.pdf    Tux.png    website.html
menna@cis106:~$ exa -ht lab4files/
cis106 cis106 Desktop Documents Downloads lab4files Music Pictures practicels practicels.tar.xz Public snap Templates Videos
menna@cis106:~$
```