Outline

- Introduction - history
- ➢Command line basics – getting help
- File system
- Working with files and directories
- More file handling
- The shell revisited
- Monitoring resources

Command line basics
Getting Help

Commands, Options, and Arguments

- A Linux command normally consists of 3 parts: the **command itself**, the command **options**, and its **arguments**.
  `command [OPTIONS prefixed with – or --] [ARG1] […ARGX]`
  - To execute the command, press enter.
  - When it runs, it may (or may not!) print output to the screen.
  - When completed, the command prompt is displayed again
- Check: https://explainshell.com/
  - https://www.makeuseof.com/explain-shell-linux-man-pages-alternative/

Commands, Options, and Arguments

- **command** – the executable (program or package) that is to be run.
  - Most commands that come packaged with the OS or are installed by the package manager (executables often located in /bin or /usr/bin) do not need the path because they have already been added to the environment variable `$PATH`.
  - Check with `whereis ls`
  - If you are running your own application, you must include either the full path or the relative path as part of the command. (`/path/to/executable/name_of_prog`)

```
$ ./my_hello_world
```

https://cvw.cac.cornell.edu/Linux/shells

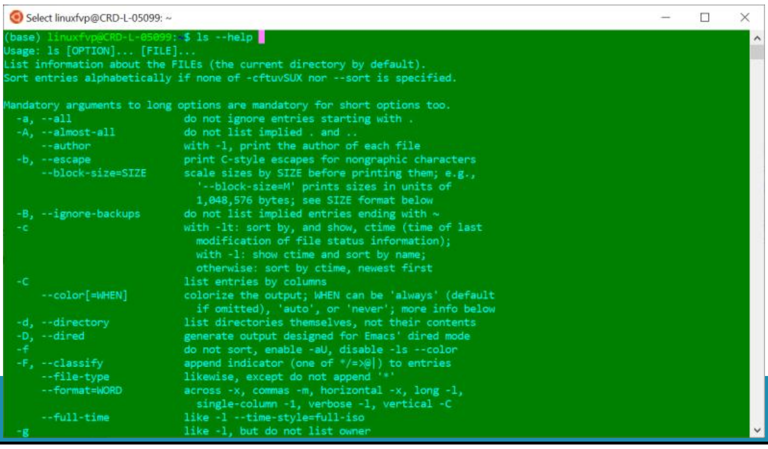
Commands, Options, and Arguments

- **option(s)** – (*flags*) optional arguments for the command that alter the behavior.
    - Start with a - or -- (example: `-h` or `--help` for help).
    - Each command may have different options or no options at all.
    - Some options require an argument immediately following.
    - Explore options for commands by reading the Manual Pages.
- **argument(s)** – depend on the command and the flags selected.
    - Certain flags require an argument.
    - Filename arguments must include a path unless located in the current directory.

https://cvw.cac.cornell.edu/Linux/shells

Getting help: command built-in

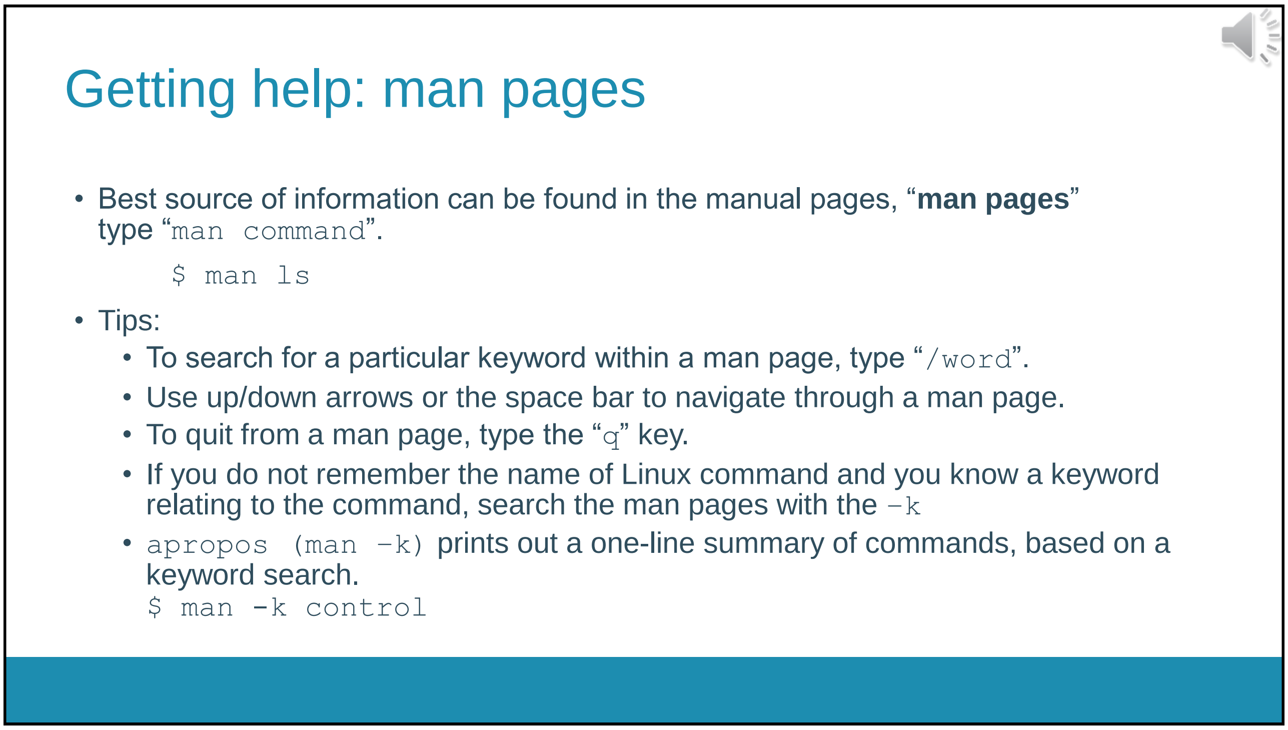
- Help on most Linux commands is typically built into the command itself
- These flags usually look like "`-h`" or "`--help`".
- `$ ls --help`



Select linuxfvp@CRD-L-05099: ~

```
(base) linuxfvp@CRD-L-05099:~$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all                  do not ignore entries starting with .
  -A, --almost-all           do not list implied . and ..
      --author               with -l, print the author of each file
  -b, --escape               print C-style escapes for nongraphic characters
      --block-size=SIZE      scale sizes by SIZE before printing them; e.g.,
                               '--block-size=M' prints sizes in units of
                               1,048,576 bytes; see SIZE format below
  -B, --ignore-backups       do not list implied entries ending with ~
  -c                         with -lt: sort by, and show, ctime (time of last
                               modification of file status information);
                               with -l: show ctime and sort by name;
                               otherwise: sort by ctime, newest first
  -C                         list entries by columns
      --color[=WHEN]         colorize the output; WHEN can be 'always' (default
                               if omitted), 'auto', or 'never'; more info below
  -d, --directory            list directories themselves, not their contents
  -D, --dired                generate output designed for Emacs' dired mode
  -f                         do not sort, enable -aU, disable -ls --color
  -F, --classify             append indicator (one of */=>@|) to entries
      --file-type            likewise, except do not append '*'
      --format=WORD          across -x, commas -m, horizontal -x, long -l,
                               single-column -1, verbose -l, vertical -C
      --full-time            like -l --time-style=full-iso
  -g                         like -l, but do not list owner
```



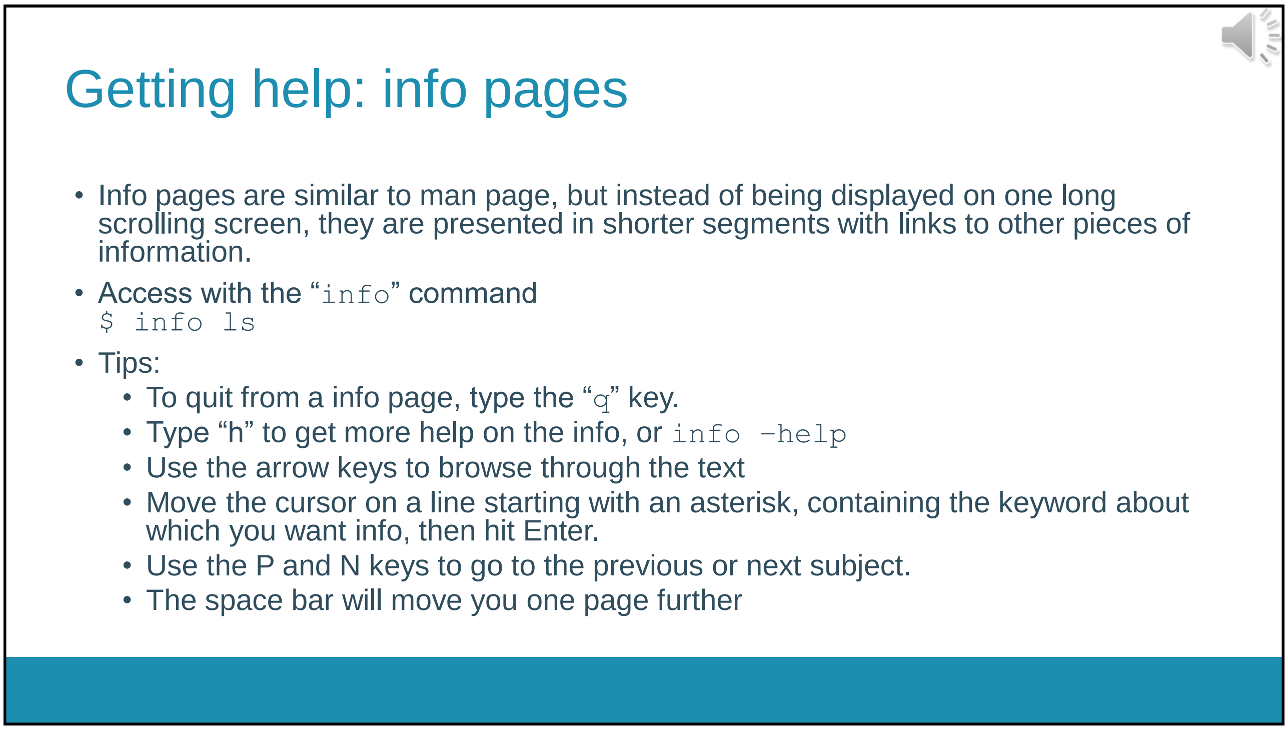
Getting help: man pages

- Best source of information can be found in the manual pages, "**man pages**" type "`man command`".

  ```
  $ man ls
  ```

- Tips:
  - To search for a particular keyword within a man page, type "`/word`".
  - Use up/down arrows or the space bar to navigate through a man page.
  - To quit from a man page, type the "`q`" key.
  - If you do not remember the name of Linux command and you know a keyword relating to the command, search the man pages with the `–k`
  - `apropos (man –k)` prints out a one-line summary of commands, based on a keyword search.

    ```
    $ man -k control
    ```



Getting help: info pages

- Info pages are similar to man page, but instead of being displayed on one long scrolling screen, they are presented in shorter segments with links to other pieces of information.
- Access with the "`info`" command

  ```
  $ info ls
  ```

- Tips:
  - To quit from a info page, type the "`q`" key.
  - Type "h" to get more help on the info, or `info –help`
  - Use the arrow keys to browse through the text
  - Move the cursor on a line starting with an asterisk, containing the keyword about which you want info, then hit Enter.
  - Use the P and N keys to go to the previous or next subject.
  - The space bar will move you one page further

Getting help

- bash has a built-in help facility available for each of the shell *builtins*.
- Get an overview of the builtins: `help -d`

```
$ help pwd
$ help ls
```

- `whatis` displays a very brief description of a command

```
$ whatis pwd
```

- `whereis` locates the binary, source and manual files for the specified command
- `type` displays information about the command type

More on the command line

1. Linux systems are case (and space) sensitive.
   - `MyFile` is not same as `myfile`
2. There is no "recycle bin" or "trash can" when working in the command line environment. There might be one for GUI.
   When files are deleted on the command line, they instantly disappear forever.
3. You should always practice new commands on a test case. This minimizes the chances of an accident that can take down an important system

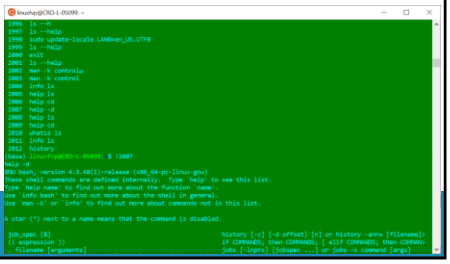
Useful features

Auto-Completion

- Have the shell automatically complete commands or file paths.
- Activated using the **<TAB>** key on most systems
- examples
  - `$ whe<TAB>`
  - `$ whereis`
  - `$ ls -l /etc/en<TAB>`
  - `$ ls -l /etc/environment`
- When more than one match is found, the shell will display all matching results (use **<TAB>** twice)
  - `$ ls -l /etc/host<TAB>`

Command history / Arrow Up

- Previously executed commands can be recalled by using the **Up Arrow** key on the keyboard.
- Most Linux distributions remember the last five hundred commands by default.
- Display commands that have recently been executed
  - The `history` command displays a user's command line history.
  - You can execute a previous command using `![NUM]` where NUM is the line number in history you want to recall.



```
 1996  ls --h
 1997  ls --help
 1998  sudo update-locale LANG=en_US.UTF8
 1999  ls --help
 2000  exit
 2001  ls --help
 2002  man -k controlµ
 2003  man -k control
 2004  info ls
 2005  help ls
 2006  help cd
 2007  help -d
 2008  help ls
 2009  help cd
 2010  whatis ls
 2011  info ls
 2012  history
(base) linuxfvp@CRD-L-05099:~$ !2007
help -d
GNU bash, version 4.3.48(1)-release (x86_64-pc-linux-gnu)
These shell commands are defined internally.  Type `help' to see this list.
Type `help name' to find out more about the function `name'.
Use `info bash' to find out more about the shell in general.
Use `man -k' or `info' to find out more about commands not in this list.

A star (*) next to a name means that the command is disabled.

 job_spec [&]                                 history [-c] [-d offset] [n] or history -anrw [filename]>
 (( expression ))                             if COMMANDS; then COMMANDS; [ elif COMMANDS; then COMMAN>
 . filename [arguments]                       jobs [-lnprs] [jobspec ...] or jobs -x command [args]
```

Command history related

Command	Options	Common usage	What does it?
CTRL-c			Stop current command
CTRL-r		reverse search in the command history	Recall the last command matching the characters you provide
!!			Repeat last command
!abc			Run last command starting with abc
!number			Retrieve command on line number in the history

history

- Check the maximum number of lines kept in history: `echo $HISTSIZE`
- Check the file containing the history: `echo $HISTFILE`
- when Bash exits, it dumps the history in memory to a disk file.
  - history file is overwritten every time we exit a Bash interactive login.
  - has implications when we have multiple Bash sessions/terminals active because the HISTFILE would contain only the contents of the last exiting shell.
  - https://www.baeldung.com/linux/preserve-history-multiple-windows

information about users

- `$ who`
  Lists all the users logged on the system.
- `$ whoami`
  Tells what user I am logged as.
- `$ groups`
  Tells which groups I belong to.

Copy text

- select-to-copy (with mouse) and right click to paste in a terminal