Computational Science and Scientific Computing Workshop

Elliot S. Menkah, Ph.D
Daniella N. Apeadu

National Institute for Mathematical Sciences, Ghana.
Kwame Nkrumah University of Science and Technology, Ghana.

October 7, 2025

Linux Command Line basic tools & File Operations

CLI tools and File operations

Linux Command Line - File Operations

echo: display lines of text or string

grep: match string pattern in text

paste: join content of files(horizontally)

cut: cut out sections of a line of text

file: file information

find: find files matching

xargs: parse as argument

tar: de(archive) and (un)compress files

Linux - Shell Tools: echo

echo

ECHO is a command-line tool used for displaying lines of text or string which are passed as arguments on the command line.

Mostly Used to output status text to the screen or a file

Linux - Echo Practice

Structure

```
echo [options] string
```

Eg. : Dump 'Hello Bash' to screen

Example

```
$ echo 'Hello World'
```

Outcome

```
'Hello World'
```

Linux - Echo Practice

Options

1. Options
   - **e :** Allows you to change format of text
   - **n :** Removes preceding newline
2. Escape

   \a : For audible alert
   \b : backspaces character just before the slash
   \c : truncates everything after the slash.
   \n : Adds a new-line character
   \t : adds a tab character to the output

Linux - Echo Practice

```
un@mn:~$ echo -e "Hello World!"

```

```
un@mn:~$ echo -n "Hello World!"


```

```
un@mn:~$ echo -e "It is\b red"

```

```
un@mn:~$ echo -e "It is red\n"

```

```
Hello World!

```

```
Hello World!un@mn:~$


```

```
It i  red

```

```
It is  red

```

Linux - Shell Tools: Echo Practice, Redirect to file

> : Output Redirect to new file

>> : Output Redirect and append to file

Redirect the output of an echo command
echo [options] 'string' > nameOfFile
Eg.

```
~ $ echo "Logfile for Today 27/10/2022" > log.txt

```

```
~ $ ls

```

log.txt should be found with other files that may be present in pwd.

```
~ $ log.txt

```

Linux - Shell Tools: Echo Practice, Redirect to file

To add some more data to **log.txt**
echo [options] ’string’ >> **log.txt**

```
echo -e "#By Captain Jack Sparrow\n" >> log.txt

```

To verify the content of file **log.txt**
cat *’file-name’*

```
~ $ cat log.txt

```

File should contain:

```
#Logfile for Today 27/10/2022
#By Captain Jack Sparrow

```

Linux - Shell Tools: grep

grep

GREP is a command-line utility for searching plain-text data sets for lines matching a regular expression.

- Line matching and extraction
- Supports Regular Expressions
- Support inverse matching (-v)
- Supports piping

Linux - Grep Practice

Structure

```
grep [options] pattern-being-sort [files]
```

Eg. : Find lines containing text 'Williams' in the file addresses.txt

Example

```
$ grep Williams addresses.txt
```

Outcome

```
Steve Williams
Elizabeth Williams
John Williams
John Williamson
```

Linux - Grep Practice

Structure

grep [options] pattern-being-sort [files]

Options

- **w :** match exact words
- **n :** provide lines of occurrence
- **i :** case-insensitive pattern
- **r :** recursive search and match
- **c :** count
- **A :** Lines After context
- **B :** Lines Before context
- **C :** Lines Before & After context

Linux - Shell Tools: CUT

cut

CUT is a command-line utility for cutting out sections of string of text.

Cuts out certain section of line from files

cut out byte positions, characters or fields.

Structure

cut [options]... [FILES] ...

- **b :** Extract by bytes
- **c :** Extract by Character
- **f :** Extract by fields

Linux - Shell Tools: CUT Example -b

williamsfam.txt

```
Steve Williams
Elizabeth Williams
John Williams
John Williamson
```

Example

```
$ cut -b 1,2,3 williamsfam.txt
```

Outcome

```
Ste
Eli
Joh
Joh
```

Linux - Shell Tools: CUT Example -c

williamsfam.txt

```
Steve Williams
Elizabeth Williams
John Williams
John Williamson
```

Example

```
$ cut -c 2,4 williamsfam.txt
```

Outcome

```
tv
lz
on
on
```

NB: -b and -c can give the same results when dealing with characters.

Linux - Shell Tools: CUT Example -f

```
cut [options]... [FILES] ...
```

-f option

-f option uses a tab space as the default delimiter.
The delimiter is denoted by -d and can be changed

Example

```
$ cut -d ” ” -f 1 williamsfam.txt
```

Outcome

```
Steve
Elizabeth
John
John
```

Linux - Shell Tools: paste

paste

PASTE is a command-line utility joining files horizontally (parallel merging) by outputting lines consisting of lines from each file specified.

Merges files using tab as delimiter

Structure

paste [options]... [FILES] ...

- **-d :** Delimiter
- **-s :** sequential merging

Linux - Shell Tools: PASTE Example

Checking content of firstnames.txt

```
~ $ cat firstnames.txt
```

```
Jack
Alice
Fred
Kwame
```

Checking content of lastnames.txt

```
~ $ cat lastnames.txt
```

```
Ford
Reynolds
Russo
Mensah
```

Example

$ paste firstnames.txt lastnames.txt > fullnames.txt

Outcome into file fullnames.txt

Jack Ford
Alice Reynolds
Fred Russo
Kwame Mensah

Linux Command Line - Practical tools

Finding files

```
$ find . -type f — xargs grep elliot
```

Linux Command Line - File Operations ...

End of File Operations, thank you ...