ULI101

Week 05

Week Overview

- Simple filter commands:
  head, tail, cut, sort, tr, wc
- grep utility
- stdin, stdout, stderr
- Redirection and piping
- /dev/null file

head and tail commands

- These commands display the beginning or the end of a file respectively
- By default, 10 lines are displayed
  - The entire file will be displayed if it is less than 10 lines in length
- Example usage:

```
head [-line_count] file
  for example: head –3 users.log
```

cut

- Selects fields or columns from files or standard input
- Range can be specified in multiple ways:
  - 1–10 – first 10
  - 3–8 – 3rd to 8th
  - –10 – up to 10th
  - 2– – from 2nd until the end of line
  - 1–3,4,10– – combination of above
- Important options:
  - -c – cut **c**haracters
    Example: cut -c 1-2 – will cut first 2 characters
  - -f – cut **f**ields
    Example: cut –f 2,5 – will cut 2nd and 5th field

cut fields

- Default field delimiter is the tab
- Other field delimiter can be specified using the –d option
  For example:
  cut –d, –f1–2 – will cut first 2 fields delimited with a comma
- Field delimiter must be a single character, only one delimiter is supported
- If special characters are used for delimiters they must be quoted
  For example:
  cut –d" " –f1 – space is the field delimiter

sort command

- Sorts single files or standard input
- Merges and sorts multiple files
- Is able to sort by fields
- Popular options:
  - -f – ignore case in comparisons
  - -n – numeric sort
  - -u – display unique entries
  - -r – reverse sort

wc

- Counts the number of lines, words and/or characters in a file
- Usage:

  wc *option [filename]*
- Options:
  - -l – count lines
  - -w – count words (delimited by whitespace)
  - -m – count characters
  - If no option is specified all 3 counts are displayed

grep utility

- Searches for literal text and text patterns
  - Pattern-based searches will be covered in detail next week
- Example usage: grep student *
- Works with files and/or standard input
- Acts like a filter – outputs only lines which are successfully matched to a given regular expression
  - A successful match can be entire line or any part of it
  - The entire line that has the match inside will be displayed

Useful grep options

- -i – ignores case
- -n – numbers lines in the output
- -v – reverse match
- -c – displays the count of matched lines

Standard Input and Standard Output

- Standard input (stdin) is a general term which describes how or where a command receives information from
- When no information is coming from standard input a command usually has defaults or expects an argument (parameter)
  - Typically such parameter would be a file name
- Standard output (stdout) describes the place where or how the commands sends its output
- For most commands the standard input and output are your terminal's keyboard and screen
- Standard input can be redirected from a file or piped from another command
- Standard output can be redirected to a file or piped to another command

Standard Input Redirection

command < filename

- Example:
  tr ‘a-z’ ‘A-Z’ < ls.txt
- Used for commands which do not accept a file as argument

Standard Output Redirection

command > filename

- Redirects a command's standard output to a file
- Stdout redirection is represented by the **>** symbol

  Example:

  ls > ls.txt - will save output from the ls command into a file called ls.txt
- If the file exists already its content will be replaced
- To append to a file, the **>>** symbol can be used

Standard Error

- In addition to standard input and standard output UNIX commands have standard error
- Standard error is the place where error messages are sent to
- By default error messages are sent to the terminal
- Standard error can be redirected by using the 2> or 2>> redirection operators
- Sometimes you might want to redirect the standard error to the same place as standard output
  - Use the 2>&1 redirection for that

Inter-process communication

- Commands can send their standard output directly to standard input of other commands
- A few simple commands can form a more powerful one
- No temporary files are necessary
- This is achieved by using pipes and tees

Pipes

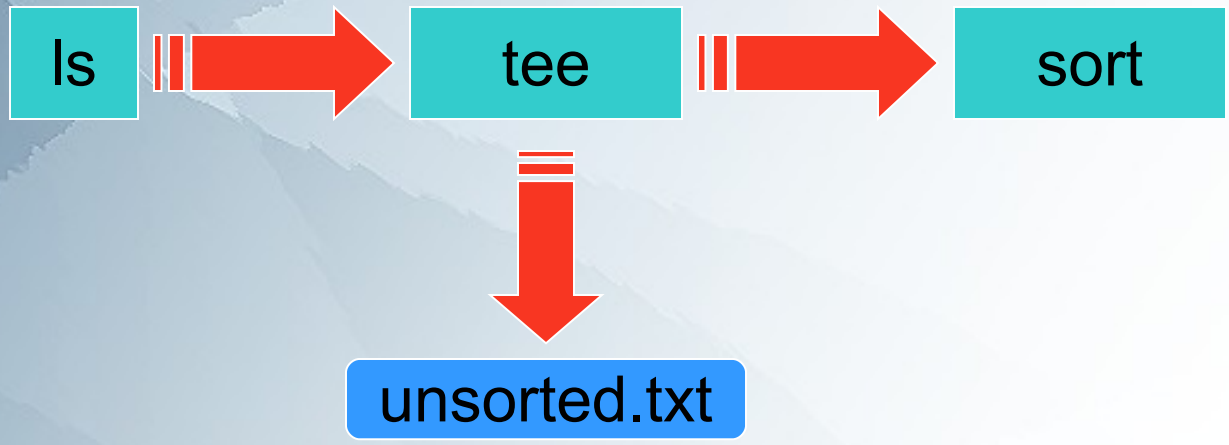
- Pipes are represented by |
- Many commands can be “piped” together, but filter commands use them especially often
  - Each filter processes the initial input based on it's design
  - Filters must be chained in specific order
- Example piping use:
  ls | less

Tee

- UNIX pipe with the tee utility can be used to split the flow of information

  Example:

  ls | tee unsorted.txt | sort



/dev/null file

- The /dev/null file (sometimes called the bit bucket or black hole) is a special system file that discards all data written into in
  - Useful to discard unwanted command output, for example:
    find / -name “homer” 2> /dev/null
- Also, /dev/null can provide null data (EOF only) to processes reading from it
  - Useful to purge (empty) files etc, for example:
    cat /dev/null > ~/.bash_history

“Here” documents

- The << symbol indicates a “here” document

Example:

```
sort << EOF
word
name
car
EOF
```

- Anything between EOF…EOF is sent to the standard input of a utility
- You can use some other string/symbol instead of “EOF”