08 - Superlative Streams

CS 2043: Unix Tools and Scripting, Spring 2016 [1]

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Cornell University

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  - *Only* `fork` the `lecture-demos` repo.

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  - *Do NOT fork the `<usr>-assignments` repositories*!!!!!!
  - Getting lectures easily: `clone` the `lecture-slides` repo, `pull` as needed.
  - *Only* `fork` the `lecture-demos` repo.
    - This allows you to put your demo work online, get more practice with `git`.

Cutting and Pasting

Chopping up Input

Cut

`cut <options> [file]`

- *Must* specify a list of bytes, characters, or fields.
  - The `file` is optional this time, uses **STDIN** if unspecified.
- Use `-b` to extract using range of *bytes*.
- Use `-c` to extract using a range of *characters*.
- Use `-f` to extract a range of *fields* separated by a delimiter.

N	Nth byte, character or field, counted from 1
N-	from Nth byte, character or field, to end of line
N-M	from Nth to Mth (included) byte, character or field
-M	from first to Mth (included) byte, character or field

- Use `-d` to specify a delimiter (**TAB** by default).
- Use `-s` to suppress line if `delimiter` not found.

Cut Examples

employees.csv

```
Alice,female,607-123-4567,11 Sunny Place,Ithaca,NY,14850
Bob,male,607-765-4321,1892 Rim Trail,Ithaca,NY,14850
Andy,n/a,607-706-6007,1 To Rule Them All,Ithaca,NY,14850
Bad employee data without proper delimiter
```

Examples

- Get names, ignore improper lines:
  ```
  >>> cut -d , -f 1 -s employees.csv
  ```
- Get names and phone numbers, ignore improper lines:
  ```
  >>> cut -d , -f 1,3 -s employees.csv
  ```
- Get address (4th col and after), ignore improper lines:
  ```
  >>> cut -d , -f 4- -s employees.csv
  ```
- Get 11th character of every line:
  ```
  >>> cut -c 11 employees.csv
  ```

Paste

`paste [options] [file1] [file2] ...`

- No `options` or `files` necessary...
  ...but relatively useless program without them.
- Use `-d` to specify the delimiter (`TAB` by default).
- Use `-s` to concatenates serially instead of side-by-side.
- No options and one `file` specified: just like `cat`.
  - Use with `-s` to join all lines of file!

Paste Examples I

names.txt

```
Alice
Bob
Andy
```

phones.txt

```
607-123-4567
607-765-4321
607-706-6007
```

```
>>> paste -d , names.txt phones.txt > result.csv
```

result.csv

```
Alice,607-123-4567
Bob,607-765-4321
Andy,607-706-6007
```

Paste Examples II

names.txt

```
Alice
Bob
Andy
```

phones.txt

```
607-123-4567
607-765-4321
607-706-6007
```

```
>>> paste -d , -s names.txt phones.txt > result.csv
```

result.csv

```
Alice,Bob,Andy
607-123-4567,607-765-4321,607-706-6007
```
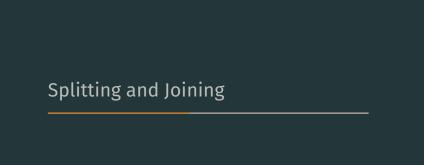
Paste Examples III

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Andy,n/a,607-706-6007,1 To Rule Them All,Ithaca,NY,14850
Bad employee data without proper delimiter
```

```
>>> paste -d "" -s employees.csv | \
      cut -d , -f 1- --output-delimiter="" | \
      tr -d "[:space:]"
```

output (all on one line…)

```
Alicefemale607-123-456711SunnyPlaceIthacaNY14850Bobmale6
07-765-43211892RimTrailIthacaNY14850Andyn/a607-706-60071
ToRuleThemAllIthacaNY14850Bademployeedatawithoutproperde
limiter
```

Splitting and Joining

Split

`split [options] [input] [prefix]`

- Use `-l` to specify how many lines in each file.
  - Default is 1000.

- Use `-b` to specify how many bytes in each file.

- The `prefix` is prepended to each file produced.

- Use `-d` to produce numeric suffixes instead of lexographic.
  - Not available on OSX.

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· Remember that annoying *dungeon* folder?

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- Remember that annoying *dungeon* folder?
  - `split -l 5` is what we did.

Joining Files

Join lines containing the same keys between two different files.

Join

```
join [options] file1 file2
```

- Join two files at a time, no more, no less.
- Default: files are assumed to be delimited by *whitespace*.
- Use -t <char> to specify an alternative *single-character* delimiter.
- Use -1 field_number to join by the nth field of file1.
- Use -2 field_number to join by the nth field of file2.
  - Field numbers start at 1, like cut and paste.
- Use -a f_num to display unpaired lines of file f_num.

Join Examples I

ages.txt

```
Alice 44
Bob 30
Candy 12
```

salaries.txt

```
Bob 300,000
Candy 120,000
```

```
>>> join ages.txt salaries.txt > results.txt
```

results.txt

```
Bob 30 300,000
Candy 12 120,000
```

Join Examples II

ages.txt

```
Alice 44
Bob 30
Candy 12
```

salaries.txt

```
Bob 300,000
Candy 120,000
```

```
>>> join -a1 ages.txt salaries.txt > results.txt
```

results.txt

```
Alice 44
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The Stream Editor (**sed**)

Stream Editor

sed [options] [script] [file]

- Stream editor for filtering and transforming text.
- We will focus on sed's 's/<regex>/<text>' [file].
  - Replace anything that matches <regex> with <text>.

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  - `sed` can match regular expressions!

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- sed goes line by line searching for the regular expression.

- We will only cover the *basics*, as sed is an entire programming language.
  - As in there are entire books on it...
- What is the difference between sed and tr?
  - sed can match regular expressions!
  - sed also does a *lot* more.

A Basic Example

```
>>> sed 's/not guilty/guilty/g' filename
```

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```

- Replaces *not guilty* with *guilty* everywhere in the file.

```
>>> sed 's/not guilty/guilty/g' filename
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- CAUTION: You should be in the habit of using *single-quotes* for strings with **sed**.

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- What happens if we do not have the **g**?

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- CAUTION: You should be in the habit of using *single-quotes* for strings with `sed`.
    - don't have to escape every double-quote (`"`).
- What happens if we do not have the **g**?
    - Without the **g**, it will only do one substitution per line.
        - There are definitely cases where you would want that!

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- `sed '/regex/d'` - deletes all lines that contain `regex`.
- Example:

```
>>> sed '/[Dd]avid/d' file1 > file2
```

  - Deletes all lines in `file1` that contain either *David* or *david*, and saves the result into `file2`.

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Regular Expressions

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>>> sed 's/[[:alpha:]]\{1,3\}[[:digit:]]*@cornell\.edu/REMOVED/g' file
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  - Print a file with all **netID@cornell.edu** emails removed!

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  - Print a file with all **netID@cornell.edu** emails removed!
- Use **-r** (**-E** on BSD/OSX) to use *extended* regular expressions.

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```
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- Searches for an expression at the beginning of the line of the form **e1**, **e2** where **e1** and **e2** are "words" starting with capital letters.

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- Placing an expression inside () tells the editor to *save* whatever string matches the expression.
- Since () are special characters, we escape them e.g. with \(\).
- We access the saved strings as \1 and \2.
- This script for example could convert a database file from
  Lastname, Firstname - to - Firstname Lastname

- You can specify which lines to check by numbers or with regular expressions:

More **sed**

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```
# checks lines 1 to 20
>>> sed '1,20s/john/John/g' file
# checks lines beginning with "The"
>>> sed '/^The/s/john/John/g' file
```

More **sed**

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- Many more resources here:
  http://www.grymoire.com/Unix/Sed.html

Sed Practice

Can be found here: https://github.com/cs2043-sp16/lecture-demos/tree/master/lec08

[1] B. Abrahao, H. Abu-Libdeh, N. Savva, D. Slater, and others over the years.
Previous cornell cs 2043 course slides.