

Lecture 13: Bash Shell and Command Line, Grep

LING 1340/2340: Data Science for Linguists

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Objectives

- ▶ Finally, shell (bash, zsh)
 - ◆ Running things in command line
 - ◆ Interacting with text files in command line
 - ◆ Regex-based text search using grep

- ▶ Follow up of Lecture 11: Data formats, text file encoding & conversion (pages 7 – 11)
 - ◆ <https://naraehan.github.io/Data-Science-for-Linguists-2025/lecture11.pdf>

Bash/Zsh shell

▶ What is a "shell"?

- ◆ [https://en.wikipedia.org/wiki/Shell_\(computing\)](https://en.wikipedia.org/wiki/Shell_(computing))
- ◆ Usually refers to the command-line interface (CLI) as opposed to graphical user interface (GUI).
- ◆ **Bash** is the most common flavor of shell in Unix-like OS.

To find out which shell you're running:
`echo $SHELL`

▶ Mac:

- ◆ Mac OS is a Unix-type OS.
- ◆ **Terminal** is a built-in terminal. **Zsh** is the default shell, very similar to bash.

▶ Windows:

- ◆ Not Unix-like OS, so does not come with native bash shell. But we installed "**git bash**": a bash environment for running command-line git.
- ◆ As a bonus, it came with pretty much all of **popular Unix command-line tools**!

Shell introduction, navigating

- ▶ Introducing the shell
 - ◆ <https://swcarpentry.github.io/shell-novice/01-intro.html>
- ▶ Navigating & working with files and directories
 - ◆ <https://swcarpentry.github.io/shell-novice/02-filedir.html>
 - ◆ <https://swcarpentry.github.io/shell-novice/03-create.html>
- ▶ We've been doing some of these already, as part of our git routine. You should know:
 - ◆ `.` `..` `~` `/`
 - ◆ `pwd`
 - ◆ `cd`
 - ◆ `ls`
 - ◆ Command-line history with **↑** and **↓**
 - ◆ Using **TAB** for file name completion
 - ◆ Using **Control+C** to quit

PATH, which, where

- ▶ By now, we have multiple versions of Python on our system.
- ▶ But which Python is your default? Where is it exactly? ← Depends on your **PATH** system variable.

```
MINGW64:/c/Users/narae/home
narae@X13-Yoga MINGW64 ~
$ which python
/c/ProgramData/anaconda3/python

narae@X13-Yoga MINGW64 ~
$ which -a python
/c/ProgramData/anaconda3/python
/c/Program Files/Python311/python
/c/Users/narae/AppData/Local/Microsoft/windowsApps/python

narae@X13-Yoga MINGW64 ~
$ echo $PATH
/c/Users/narae/home/bin:/mingw64/bin:/usr/local/bin:/usr/bin:/bin:/mingw64/bin:/usr/bin:/c/Users/narae/home/bin:/c/Program Files/ImageMagick-7.1.1-Q16-HDRI:/c/windows/system32:/c/windows:/c/windows/System32/wbem:/c/windows/System32/windowsPowerShell/v1.0:/c/windows/System32/OpenSSH:/c/Programs/Ruby32-x64/bin:/cmd:/c/ProgramData/anaconda3/Scripts:/c/ProgramData/anaconda3:/c/Program Files/Python311/Scripts:/c/Program Files/Python311:/c/Program Files/Pandoc:/c/Program Files/MiKTeX/miktex/bin/x64:/c/Program Files (x86)/Graphviz/bin:/c/Program Files (x86)/Foma/win32:/c/Program Files/dotnet:/c/Program Files (x86)/PDFtk/bin:/c/Users/narae/AppData/Local/Microsoft/windowsApps:/c/Users/narae/AppData/Roaming/Python/Python311/Scripts:/usr/bin/vendor_perl:/usr/bin/core_perl:~/util
```

`which` shows your default python

`which -a` to see all matches

`echo $PATH` lists all directories where my OS looks for executable commands. My Anaconda Python's location is listed first, so it is my default Python.

Running python script from command line

Ways to run python:

- ◆ In Ling1330, we ran .py scripts via IDLE.
- ◆ In this class, we are running Jupyter Notebooks.
- ← Surprise! Neither is *the primary way* to run Python.
- ← **Running .py scripts in command line** is.

1. `python hello.py`

- ◆ Assuming python is in your \$PATH, and hello.py is in your current working directory

2. `hello.py`

- ◆ Assuming your current working directory is in your \$PATH. If not, you should execute `./hello.py`
- ◆ Assuming your script begins with a line (called 'shebang' line):
`#!/systempath/to/python`
 - ◆ In my case, it's `#!/c/ProgramData/Anaconda3/python`
 - ◆ If your path contains a SPACE... tough luck! (kidding, there are ways around it.)

Method 1

```
MINGW64:/c/Users/narae/Documents/Data_Science
narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ ls
hello.py

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ cat hello.py
print('hello, world!')

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ which python
/c/ProgramData/anaconda3/python

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ python hello.py
hello, world!

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ which -a python
/c/ProgramData/anaconda3/python
/c/Program Files/Python311/python
/c/Users/narae/AppData/Local/Microsoft/windowsApps/python

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data_Science
$ /c/Program Files/Python311/python hello.py
hello, world!

narae@X13-Yoga
$ |
```

To run with different python program,
I must specify the full path
(note \ to escape space)

Method 2

```
MINGW64:/c/Users/narae/Documents/Data_Science
narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data
$ cat hello.py
#!/c/ProgramData/Anaconda3/python
print('hello, world!')

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data
$ ./hello.py
hello, world!

narae@X13-Yoga MINGW64 /c/Users/narae/Documents/Data
$ |
```

Piping and I/O redirection

- ▶ **Piping** and **I/O redirection** make command-line ever so powerful.
- ▶ For people working mainly with text data (us!), piping enables us to manipulate data on the fly.
 - ◆ `hello.py > out.txt` redirect output to file
 - ◆ `hello.py | wc` pipe output to another application
 - ◆ `hello.py | wc > out.txt` daisy chain!

Also:

- ◆ `<` read in from a file input
- ◆ `>>` *append* to existing file rather than overwriting

Download two files

▶ Alice's Adventures in Wonderland

- ◆ <https://www.gutenberg.org/ebooks/11>
- ◆ Download the Plain Text UTF-8 version.
- ◆ Rename the file to "alice.txt"

▶ ENABLE word list from Peter Norvig's site:

- ◆ <https://norvig.com/ngrams/>
- ◆ Download "enable1.txt"

← Save them onto your Desktop.

← Then, within bash shell, move the files into your Data_Science directory.
(Wait if you are not sure how this is done.)

← In command line, find out as much you can about these files.

Files in your Data_Science directory

```
MINGW64:/c/Users/narae/Documents/Data_Science
narae@T450s MINGW64 ~/Documents
$ cd Data_Science/

narae@T450s MINGW64 ~/Documents/Data_Science
$ ls
Class-Practice-Repo/  HW2-Repo/  planets/
Corpus-Resources/    Inaugural-Address-Project/  real_linguistics_data/
HW1-Repo/            foo/

narae@T450s MINGW64 ~/Documents/Data_Science
$ mv ~/Desktop/alice.txt .

narae@T450s MINGW64 ~/Documents/Data_Science
$ mv ~/Desktop/enable1.txt .

narae@T450s MINGW64 ~/Documents/Data_Science
$ ls
Class-Practice-Repo/  Inaugural-Address-Project/  planets/
Corpus-Resources/    alice.txt                    real_linguistics_data/
HW1-Repo/            enable1.txt
HW2-Repo/            foo/

narae@T450s MINGW64 ~/Documents/Data_Science
$ |
```

Examining a text file

▶ `ls (-lahF)`

- ◆ Displays file info
- ◆ Also: `-G` (Mac OS)

▶ `file (-i)`

- ◆ Displays character encoding, line ending

▶ `wc`

- ◆ Displays line count, word count, and character count

▶ `head -n`

- ◆ Displays initial n lines

▶ `tail -n`

- ◆ Displays last n lines

```
MINGW64:/c/Users/narae/Documents/Data_Science
narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ ls -l enable1.txt
-rw-r--r-- 1 narae 197121 1916146 Mar 19 12:39 enable1.txt

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ ls -lh enable1.txt
-rw-r--r-- 1 narae 197121 1.9M Mar 19 12:39 enable1.txt

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ wc enable1.txt
172819 172820 1916146 enable1.txt

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ wc alice.txt
3736 29465 173595 alice.txt

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ head enable1.txt
aa
aah
aahed
aahing
aahs
aal
aalii
aaliis
aals
aardvark

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ tail -5 enable1.txt
zymotic
zymurgies
zymurgy
zyzzyva
zyzzyvas

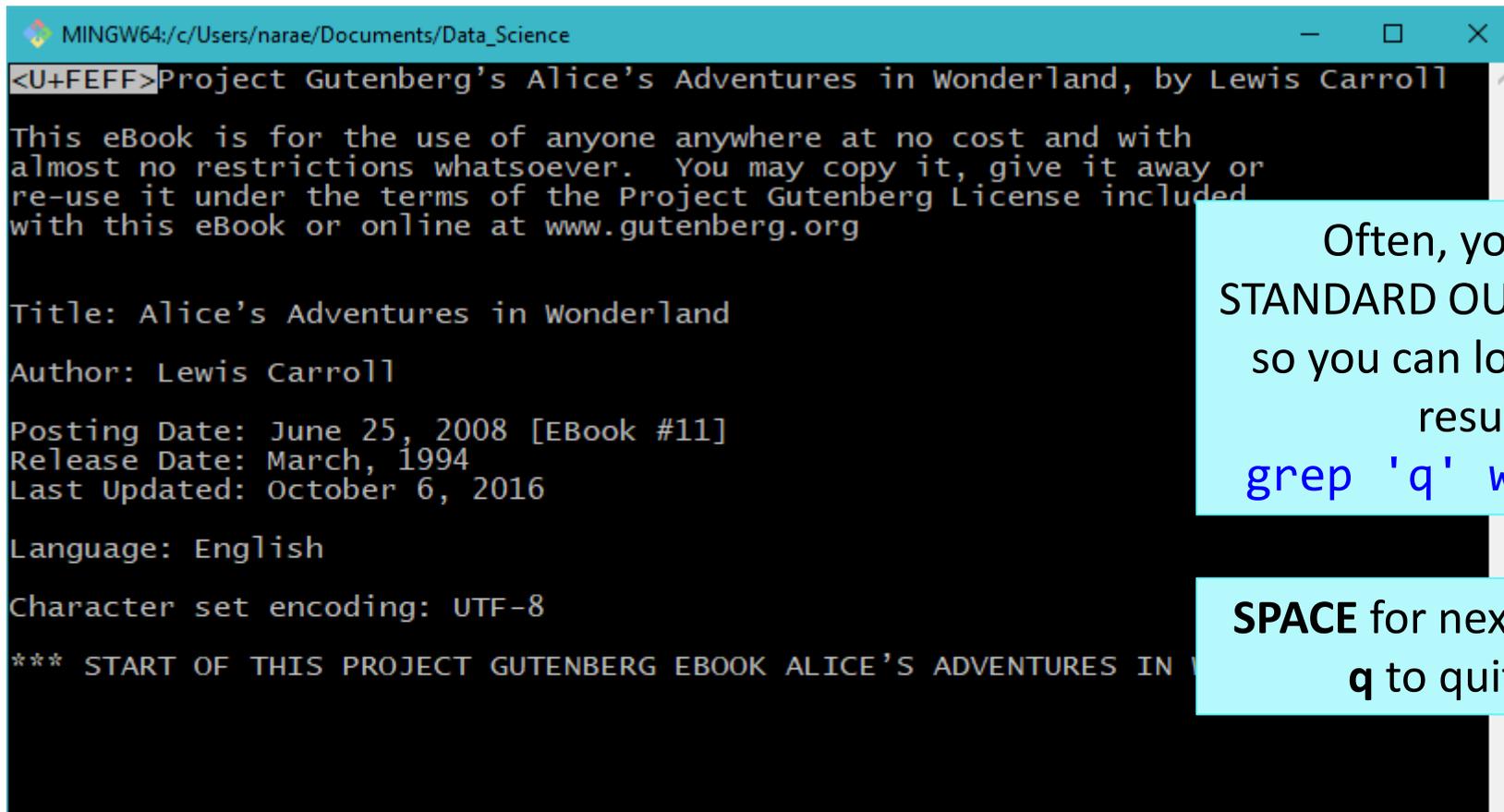
narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ head -5 alice.txt
Project Gutenberg's Alice's Adventures in Wonderland, by Lewis Carro

This eBook is for the use of anyone anywhere at no cost and with
almost no restrictions whatsoever. You may copy it, give it away or
re-use it under the terms of the Project Gutenberg License included

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$
```

more or less

- ▶ **more** (and **less**) through a text file content, one screen-full at a time. Press **SPACE** for next page, **q** to quit.
 - ◆ Windows users: only **less** is available on git bash.



```
MINGW64:/c/Users/narae/Documents/Data_Science
<U+FEFF>Project Gutenberg's Alice's Adventures in Wonderland, by Lewis Carroll
This eBook is for the use of anyone anywhere at no cost and with
almost no restrictions whatsoever. You may copy it, give it away or
re-use it under the terms of the Project Gutenberg License included
with this eBook or online at www.gutenberg.org

Title: Alice's Adventures in Wonderland
Author: Lewis Carroll
Posting Date: June 25, 2008 [EBook #11]
Release Date: March, 1994
Last Updated: October 6, 2016

Language: English

Character set encoding: UTF-8

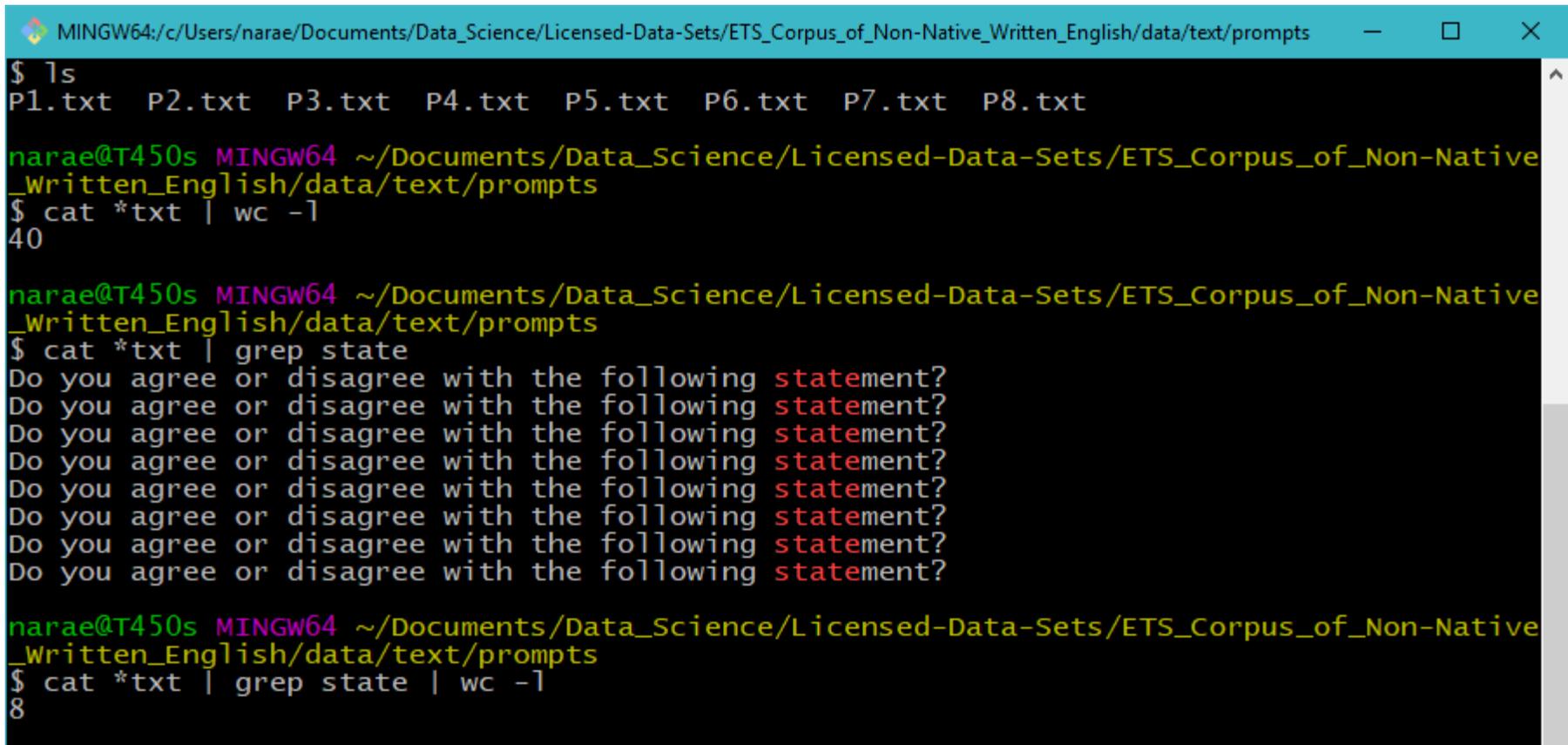
*** START OF THIS PROJECT GUTENBERG EBOOK ALICE'S ADVENTURES IN W
```

Often, you **pipe** your
STANDARD OUTPUT into more,
so you can look through the
result, e.g.,
`grep 'q' words | less`

SPACE for next page
q to quit

cat

- ▶ **cat** *concatenates* text file content and prints on the standard output.
 - ◆ Often used as the first step of piping.
 - ◆ Also useful in concatenating multiple file contents.



```
MINGW64:/c/Users/narae/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts
$ ls
P1.txt P2.txt P3.txt P4.txt P5.txt P6.txt P7.txt P8.txt

narae@T450s MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts
$ cat *txt | wc -l
40

narae@T450s MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts
$ cat *txt | grep state
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?
Do you agree or disagree with the following statement?

narae@T450s MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts
$ cat *txt | grep state | wc -l
8
```

grep!!!

▶ grep

- ◆ Searches each line in text for **regular expression** match
- ◆ Excellent intro:
<https://softpanorama.org/Tools/grep.shtml>

▶ grep -P

- ◆ Already on git-Bash & Linux
 - ◆ **Mac users:** use `egrep` or `grep -E`
- ◆ Accepts **perl-style** regular expressions
- ◆ Perl-style = Python-style! Can use `\s`, `\d` etc.

```
MINGW64:/c/Users/narae/Documents/Data_Science
narae@T450s MINGW64 ~/Documents/Data_Science
$ grep '^o.*o$' enable1.txt
obbligato
obligato
ocotillo
octavo
oho
oleo
olio
oloroso
onto
oratorio
ordo
oregano
ortho
orzo
ostinato
otto
outdo
outecho
outgo
ouzo
overdo
ovoio
oxo

narae@T450s MINGW64 ~/Documents/Data_Science
$ grep '^a.*z$' enable1.txt
abuzz
adz

narae@T450s MINGW64 ~/Documents/Data_Science
$ grep -P '[aeiou]{5,}' enable1.txt
cooeeing
miaoued
miaouing
queueing

narae@T450s MINGW64 ~/Documents/Data_Science
$ |
```

Words with 5+ consecutive "vowel"s

grep is better in color

- ▶ You might want to colorize your grep output: `grep --color`
- ▶ I have `grep` aliased to use color & perl-style regex in my `.bash_profile` configuration file:

Mac users: your config file is `.zprofile`

Mac users: you will want to alias `egrep` or `grep -E`

```
MINGW64:/c/Users/narae/Documents/Data_Science

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ grep '[aeiou]{5,}' enable1.txt
cooeeing
miaoued
miaouing
queueing

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ cat ~/.bash_profile
alias more='less'
alias grep='grep -P --color'
```

grep and piping, together

MINGW64:/c/Users/narae/Documents/Data_Science

```
unwarrantable  
unwatchable  
unwearable  
unwinnable  
unworkable
```

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ grep '^un.*able$' enable1.txt | wc -l  
213
```

Pipe into wc -l to count

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ grep '^un.*able$' enable1.txt > able.txt
```

Write out to a file

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ tail -5 able.txt  
unwarrantable  
unwatchable  
unwearable  
unwinnable  
unworkable
```

Take a look at the
last 5 lines of file

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ grep '^in.*able$' enable1.txt >> able.txt
```

Append new search
result to file

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ tail -5 able.txt  
invariable  
investable  
inviabile  
inviolable  
invulnerable
```

Take a look at the
last 5 lines of file

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ wc -l able.txt  
316 able.txt
```

File is now longer

```
narae@T450s MINGW64 ~/Documents/Data_Science  
$ |
```

grep -i, -v

▶ grep -i

- ◆ ignores case

▶ grep -v

- ◆ prints lines that DO NOT match

```
narae@T450s MINGW64 ~/Documents/Data_Science
$ grep -i 'q' enable1.txt | grep -v 'u'
faqir
faqirs
qaid
qaidS
qanat
qanats
qat
qats
qindar
qindarka
qindars
qintar
qintars
qoph
qophs
qwerty
qwertys
sheqalim
sheqel
tranq
tranqs

narae@T450s MINGW64
$ |
```

```
MINGW64:/c/Users/narae/Documents/Data_Science

narae@T450s MINGW64 ~/Documents/Data_Science
$ cat enable1.txt | grep -Pv '[aeiouy]'
brr
brrr
crwth
crwthS
cwm
cwms
hm
hmm
mm
nth
pfft
phpht
pht
psst
sh
shh
tsk
tsks
tsktsk
tsktsks
```

grep -C n

▶ grep -C 2

- ◆ prints context: 2 lines before and after

← capital C!

```
narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ grep -iC 2 "curious" alice.txt
*      *      *      *      *      *      *

```

```
'what a curious feeling!' said Alice; 'I must be shutting up like a
telescope.'
```

```
--
```

```
her eyes; and once she remembered trying to box her own ears for having
cheated herself in a game of croquet she was playing against herself,
for this curious child was very fond of pretending to be two people.
'But it's no use now,' thought poor Alice, 'to pretend to be two people!
why, there's hardly enough of me left to make ONE respectable person!'
```

```
--
```

```
CHAPTER II. The Pool of Tears
```

```
'Curiouser and curiouser!' cried Alice (she was so much surprised, that
for the moment she quite forgot how to speak good English); 'now I'm
opening out like the largest telescope that ever was! Good-bye, feet!'
```

```
--
```

```
It was high time to go, for the pool was getting quite crowded with the
birds and animals that had fallen into it: there were a Duck and a Dodo,
a Lory and an Eaglet, and several other curious creatures. Alice led the
way, and the whole party swam to the shore.
```

```
--
```

```
always growing larger and smaller, and being ordered about by mice and
rabbits. I almost wish I hadn't gone down that rabbit-hole--and yet--and
yet--it's rather curious, you know, this sort of life! I do wonder what
CAN have happened to me! When I used to read fairy-tales, I fancied that
kind of thing never happened, and now here I am in the middle of one!
```

```
--
```

```
by another footman in livery, with a round face, and large eyes like a
frog; and both footmen, Alice noticed, had powdered hair that curled all
over their heads. She felt very curious to know what it was all about,
and crept a little way out of the wood to listen.
```

```
--
```

grep -n

▶ grep -n

- ◆ prints out line number

```
MINGW64:/c/Users/narae/Documents/Data_Science

narae@T450s MINGW64 ~/Documents/Data_Science
$ head -25 alice.txt
Project Gutenberg's Alice's Adventures in Wonderland, by Lewis Carroll.

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Title: Alice's Adventures in Wonderland
Author: Lewis Carroll

Posting Date: June 25, 2008 [EBook #11]
Release Date: March, 1994
Last Updated: October 6, 2016

Language: English

Character set encoding: UTF-8

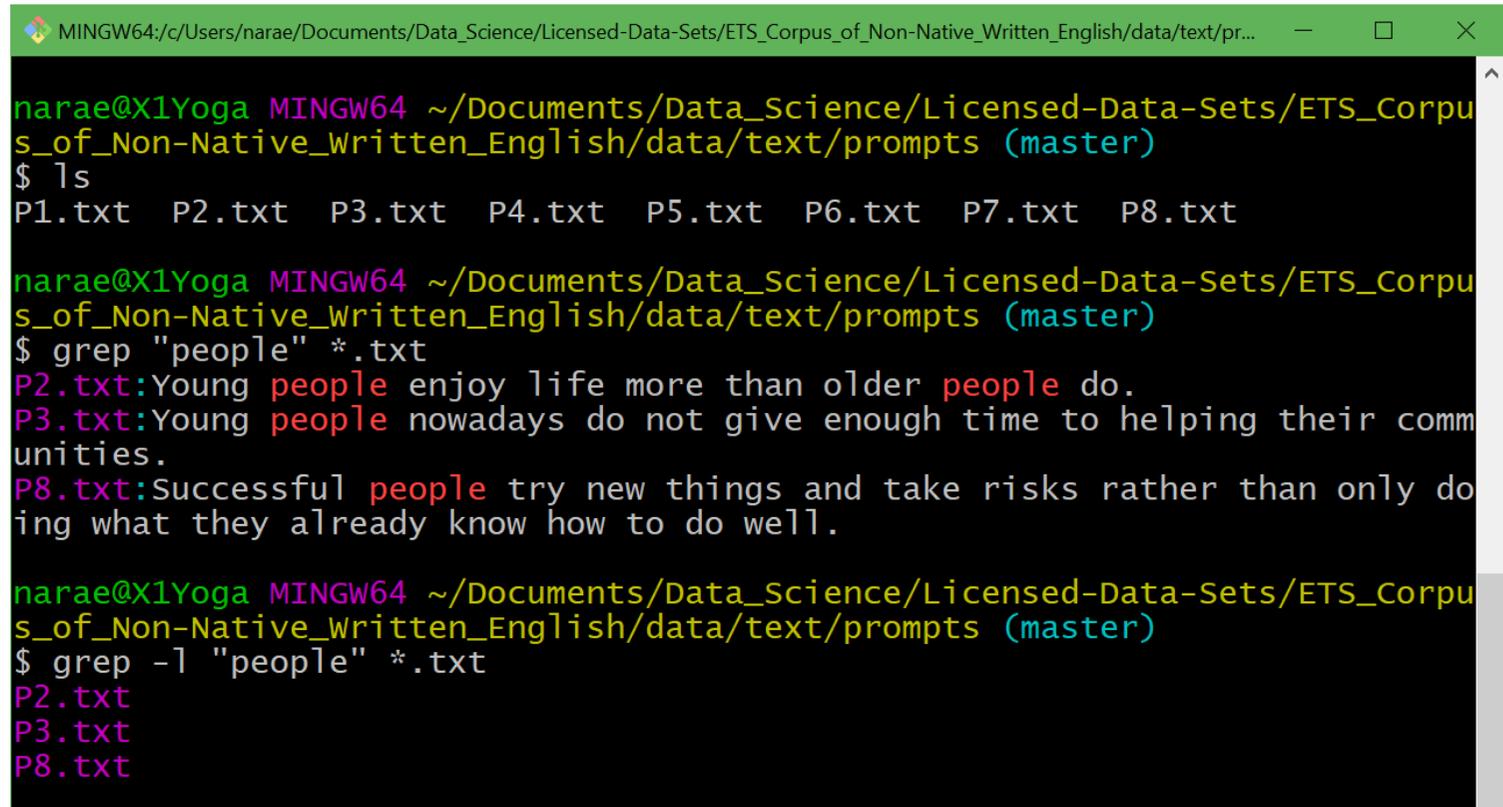
*** START OF THIS PROJECT GUTENBERG EBOOK ALICE'S ADVENTURES ***

narae@T450s MINGW64 ~/Documents/Data_Science
$ grep "\*\*\*" -n alice.txt
21:*** START OF THIS PROJECT GUTENBERG EBOOK ALICE'S ADVENTURES ***
3378:*** END OF THIS PROJECT GUTENBERG EBOOK ALICE'S ADVENTURES ***
3380:***** This file should be named 11-0.txt or 11-0.zip *****
3408:*** START: FULL LICENSE ***

narae@T450s MINGW64 ~/Documents/Data_Science
```

Searching multiple files

- ▶ `grep *.txt`
 - ◆ Searches through all files ending in `.txt`
- ▶ `grep -l`
 - ◆ prints file names *only if* a match is found



```
MINGW64:/c/Users/narae/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/pr...  
narae@X1Yoga MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts (master)  
$ ls  
P1.txt P2.txt P3.txt P4.txt P5.txt P6.txt P7.txt P8.txt  
  
narae@X1Yoga MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts (master)  
$ grep "people" *.txt  
P2.txt:Young people enjoy life more than older people do.  
P3.txt:Young people nowadays do not give enough time to helping their communities.  
P8.txt:Successful people try new things and take risks rather than only doing what they already know how to do well.  
  
narae@X1Yoga MINGW64 ~/Documents/Data_Science/Licensed-Data-Sets/ETS_Corpus_of_Non-Native_Written_English/data/text/prompts (master)  
$ grep -l "people" *.txt  
P2.txt  
P3.txt  
P8.txt
```

“informations”?

```
MINGW64:/d/Teaching/2022a.DS4Linguists/GitHub_repos/Licensed-Datasets/ETS_Corpus_of_Non-Native_Written_English/data/text/responses/original
```

e to be create a good product or a good service. So i divide in two grops. The relationship beetwin thee tw
o group is important to make dinamic the singlar group. The **informations** and the experience have to go in
two directions: from the administration and from the production, only with this continuous relationships is
possible give a good response to the society. The broad knowledge of many academic subject is the point of
start for the dinamism

98579.txt:2: First, we can get new knowledge when we challenge new things. If people just do what they a
lready know, they will be bored and lazy to do because their work is same every day. However, if they focus
on new things and try to do, they can get new **informations**; their view become wide, in addition, they can
make good and new relationship with other people and companys. It makes people success.

997714.txt:5:2.when you are looking for a job you can choose from a much larger variety of offers if you ha
ve an idea of more than one subject. Given the example you are a manager and you know many subjects very we
ll. Then you can draw conclusions, that could help you solving problems at work, with **informations** from a d
ifferent subject. Cross-subject thinking is an important qualification for higher management positions. Not
only because of your intelligence but aswell because you can do smalltalk, which becomes more and more imp
ortant in business relations.

998126.txt:11: to put in a nutshell, the student and te adult when they are not student spend time in und
erstand ideas and concepts and learn facts.On the whole, I am firmly convinced that all the time in your lif
e you learn and trie to understand concepts or **informations**.

998126.txt:12:Owing to world change evryday at evrytime. you have to focus on all **informations** if you want
to do not be drop out the society.

```
Jane Eyre@T480s MINGW64 /d/Teaching/2022a.DS4Linguists/GitHub_repos/Licensed-Datasets/ETS_Corpus_of_Non-Nat  
ive_Written_English/data/text/responses/original (main)  
$ grep -n 'informations' *.txt | wc -l  
252
```

Yep, a whole lot
of them...

Bring on Big Data! The Yelp Open Dataset

► <https://www.yelp.com/dataset>

← → ↻ 🏠 🔒 yelp.com/dataset/download 🔍 📄 ☆ 📷 m 🌟 🗄

yelp Dataset Dataset Docum

Download The Data

The links to download the data will be valid for **30 seconds**.

JSON	Photos
Download JSON	Download photos
4.04GB compressed 8.65GB uncompressed	6.93GB compressed 7.11GB uncompressed
1 .tgz file compressed 1 .pdf file and 5 .json files uncompressed	1 .tar file compressed 1 .json file, 1 text file, 1 .pdf and 1 folder containing 200,100 photos
For more information on the JSON dataset, visit the main dataset documentation page.	

Working with big data files

```
MINGW64:/d/Corpora/Yelp_dataset_2023/archive
narae@T480s MINGW64 /d/Corpora/Yelp_dataset_2023/archive
$ ls -lah
total 8.7G
drwxr-xr-x 1 narae 197121  0 Mar 21 15:33 ./
drwxr-xr-x 1 narae 197121  0 Mar 21 15:37 ../
-rw-r--r-- 1 narae 197121  79K Mar 21 15:32 Dataset_User_Agreement.pdf
-rw-r--r-- 1 narae 197121 114M Mar 21 15:32 yelp_academic_dataset_business.json
-rw-r--r-- 1 narae 197121 274M Mar 21 15:32 yelp_academic_dataset_checkin.json
-rw-r--r-- 1 narae 197121 5.0G Mar 21 15:33 yelp_academic_dataset_review.json
-rw-r--r-- 1 narae 197121 173M Mar 21 15:33 yelp_academic_dataset_tip.json
-rw-r--r-- 1 narae 197121 3.2G Mar 21 15:34 yelp_academic_dataset_user.json

narae@T480s MINGW64 /d/Corpora/Yelp_dataset_2023/archive
$ wc -l yelp_academic_dataset_review.json
6990280 yelp_academic_dataset_review.json

narae@T480s MINGW64 /d/Corpora/Yelp_dataset_2023/archive
$ wc -l yelp_academic_dataset_user.json
1987897 yelp_academic_dataset_user.json
```

Each file is in JSON format, and they are huge:

- ◆ review.json is 5GB with 7 million records (=lines)
- ◆ user.json is 3.2GB with 2 million records (=lines)

- ▶ These are too big to open in most text editors (Notepad++ couldn't.)
- ▶ How to explore them? In command line. [head/tail](#), [grep](#) and [regular expression](#)-based searching.

➔ To-do #14

Wrapping up

▶ To-do #14 out

- ◆ Start early! Big data means big time (and space) commitment.

▶ Next class

- ◆ More command line, grep, bash shell scripting
- ◆ Supercomputing at CRC