

The ABC of Computational Text Analysis

#4 INTRODUCTION TO THE COMMAND-LINE

Alex Flückiger

Faculty of Humanities and Social Sciences
University of Lucerne

March 24, 2023

Recap last Lecture

- Successful installation? 
- Scripting 
automate, document, reproduce
- Any questions?

Outline

- learn principles of the shell 
- perform shell commands 
- get practice by solving exercises 

How to get started

Open a Shell

macOS

- open `Terminal`
- shell type: `zsh`

Windows

- open `Ubuntu 20.04 LTS`
- shell type: `Bash`
- ~~open Windows Command Prompt~~

Bourne-again Shell

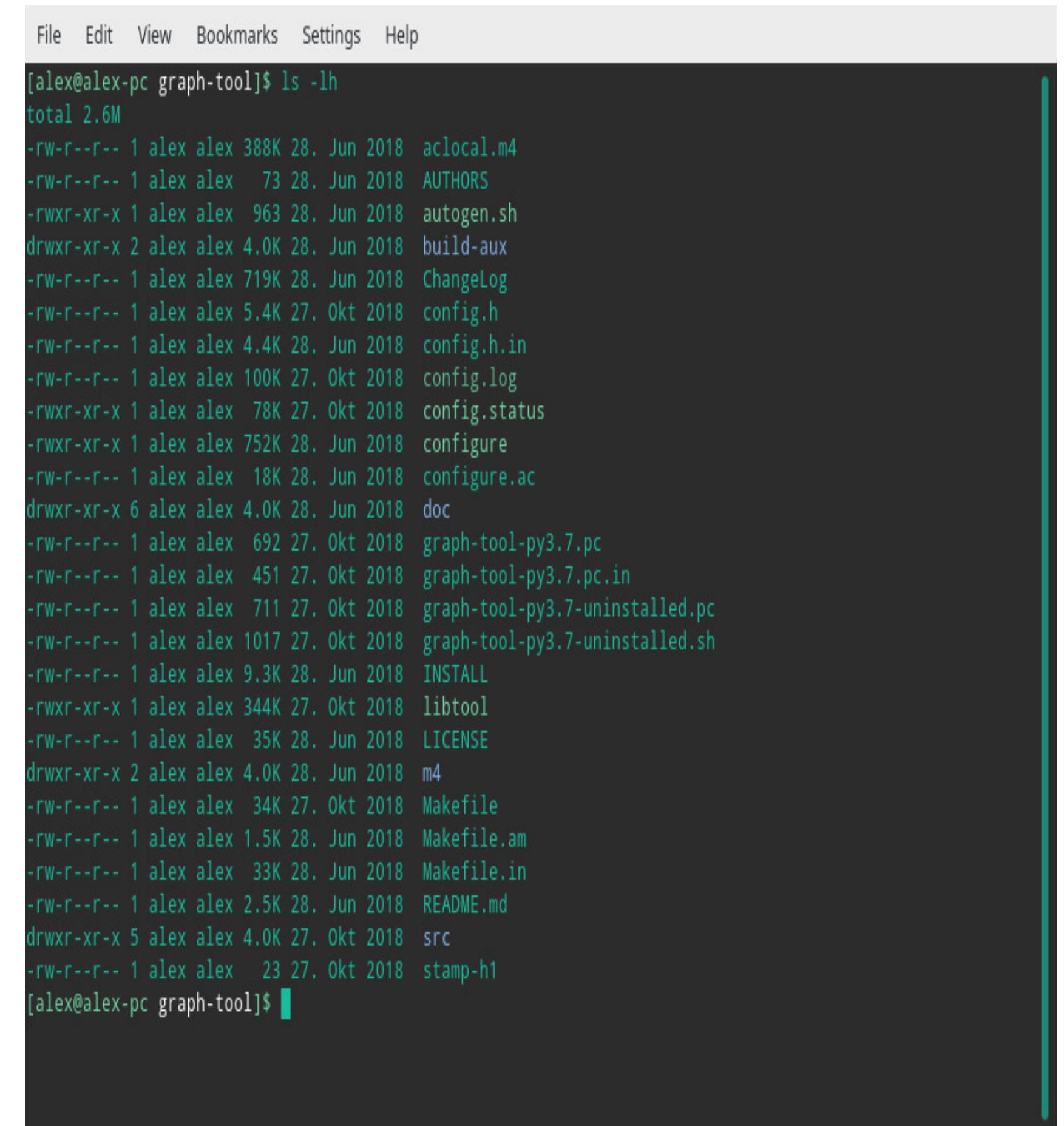
Bash

- offers many built-in tools
- shell prompt

USER@HOSTNAME :~\$

- home directory
 - ~ refers to /home/USER
- case-sensitive
- no feedback

unless there is an issue



The screenshot shows a terminal window with a light gray header bar containing the menu items: File, Edit, View, Bookmarks, Settings, and Help. Below the header is a dark gray terminal area. At the top of the terminal area, the command [alex@alex-pc graph-tool]\$ is visible, followed by the output of the ls -lh command. The output lists numerous files and directories with their permissions, sizes, and modification dates. Some files have descriptive names like aclocal.m4, AUTHORS, autogen.sh, build-aux, ChangeLog, config.h, config.h.in, config.log, config.status, configure, configure.ac, doc, graph-tool-py3.7.pc, graph-tool-py3.7.pc.in, graph-tool-py3.7-uninstalled.pc, graph-tool-py3.7-uninstalled.sh, INSTALL, libtool, LICENSE, m4, Makefile, Makefile.am, Makefile.in, README.md, and stamp-h1. The terminal ends with the prompt [alex@alex-pc graph-tool]\$.

```
[alex@alex-pc graph-tool]$ ls -lh
total 2.6M
-rw-r--r-- 1 alex alex 388K 28. Jun 2018 aclocal.m4
-rw-r--r-- 1 alex alex 73 28. Jun 2018 AUTHORS
-rwxr-xr-x 1 alex alex 963 28. Jun 2018 autogen.sh
drwxr-xr-x 2 alex alex 4.0K 28. Jun 2018 build-aux
-rw-r--r-- 1 alex alex 719K 28. Jun 2018 ChangeLog
-rw-r--r-- 1 alex alex 5.4K 27. Okt 2018 config.h
-rw-r--r-- 1 alex alex 4.4K 28. Jun 2018 config.h.in
-rw-r--r-- 1 alex alex 100K 27. Okt 2018 config.log
-rwxr-xr-x 1 alex alex 78K 27. Okt 2018 config.status
-rwxr-xr-x 1 alex alex 752K 28. Jun 2018 configure
-rw-r--r-- 1 alex alex 18K 28. Jun 2018 configure.ac
drwxr-xr-x 6 alex alex 4.0K 28. Jun 2018 doc
-rw-r--r-- 1 alex alex 692 27. Okt 2018 graph-tool-py3.7.pc
-rw-r--r-- 1 alex alex 451 27. Okt 2018 graph-tool-py3.7.pc.in
-rw-r--r-- 1 alex alex 711 27. Okt 2018 graph-tool-py3.7-uninstalled.pc
-rw-r--r-- 1 alex alex 1017 27. Okt 2018 graph-tool-py3.7-uninstalled.sh
-rw-r--r-- 1 alex alex 9.3K 28. Jun 2018 INSTALL
-rwxr-xr-x 1 alex alex 344K 27. Okt 2018 libtool
-rw-r--r-- 1 alex alex 35K 28. Jun 2018 LICENSE
drwxr-xr-x 2 alex alex 4.0K 28. Jun 2018 m4
-rw-r--r-- 1 alex alex 34K 27. Okt 2018 Makefile
-rw-r--r-- 1 alex alex 1.5K 28. Jun 2018 Makefile.am
-rw-r--r-- 1 alex alex 33K 28. Jun 2018 Makefile.in
-rw-r--r-- 1 alex alex 2.5K 28. Jun 2018 README.md
drwxr-xr-x 5 alex alex 4.0K 27. Okt 2018 src
-rw-r--r-- 1 alex alex 23 27. Okt 2018 stamp-h1
[alex@alex-pc graph-tool]$
```

Unix Philosophy

Build small programs that *do one thing*
and *do it well.* 😎

Basic commands in Shell

example components of a command

```
1 command -a --long_argument FILE      # non-working example command
```

run command + help

```
1 echo "hello world"      # print some text
2 man echo                # get help for any command (e.g., echo)
```



Where your files are
stored

... and how to find them

- hierarchical filesystem 🌲
 - folders/directories
 - files with a suffix
- absolute path starting from top-level directory
 - e.g. `/home/alex/KED2023/slides/KED2023_01.html`
- relative path looking from current directory
 - e.g. `KED2023/slides/KED2023_01.html`

```
1 .  
2 └── README.md  
3 └── lectures  
4     ├── images  
5     │   └── ai.jpg  
6     └── html  
7         ├── KED2023_01.html  
8         └── KED2023_02.html  
9 └── md  
10    ├── KED2023_01.md  
11    └── KED2023_02.md
```



Only relative paths work across systems

Important Places in your Filesystem

- shortcut names of directories
 - current dir
 - parent dir
 - ~ home dir (e.g. `/home/alex`)
- find your files on Windows
 - `/mnt/c/Users/YOUR_USERNAME/`
 - shortcut with `documents`

Navigating in a File System

```
1 pwd                                # show absolute path of current directory  
2  
3 ls                                  # list content of current directory  
4 ls -lh                             # list with more information  
5 ls dirname                         # list content of directory dirname  
6  
7 cd ..                              # change directory to go folder up  
8 cd dir/subdir                      # go to folder dir/subdir (two folders down)
```

when you are lost, open in file manager (GUI)

```
1 open .                            # open path in finder (macOS)  
2 explorer.exe .                   # open Windows Explorer in WSL Ubuntu (Windows)
```

Open Files

show within Shell

```
1 more text.txt          # print content (space to scroll)
2
3 head text.txt         # print first 10 lines of file
4 tail -5 text.txt      # print last 5 lines of file
```

show with default application (GUI)

```
1 open text.txt          # macOS
2 wslview text.txt       # WSL Ubuntu (Windows)
```

Useful Key Actions

- autocomplete: TAB
- get last command: 
- scrolling: SPACE
- cancel CTRL + C
- quit: q or CTRL + D

Creating, Moving and Copying

create files and directories

```
1 touch test.txt          # create a new file  
2  
3 mkdir data             # make a new directory  
4 mkdir -p data/1999     # make a new directory with a subfolder
```

copy and move files

```
1 cp test.txt other/.      # copy file into other folder, keep original  
2 mv test.txt other/new_name.txt # move or rename a file
```

Removing Files

Watch out, there is no recycle bin. No way back!

```
1 rm old.txt          # remove a file  
2 rm -r old_data     # remove a folder with all its files
```

In-class: Exercises I

1. Create a new directory called `tmp`.
2. Change into that directory using `cd` and print its absolute path using `pwd`.
3. Use `touch` to create a new file called `magic.txt` in `tmp`.
4. Rename the file from `magic.txt` to `easy_as_pie.txt`.
5. Check out the helper page of `mv` command.
6. Look around in the filesystem using `cd` and `ls`.

How is that useful? 🤔

We are getting there!

Wildcards

placeholders to match ...

- any single character: ?
- any sequence of characters: *

```
1 mv data/*.txt new_data/.      # move txt-files from to another subfo  
2 cp *.txt files/.            # copy all txt-files in a single fold
```

Searching

collect certain files only

```
1 ls *.txt      # list all files with the suffix .txt (in current directory)
```

find specific files

```
1 # search on filename
2 find /path/to/dir -name "*speech*"    # find files in specific directory
3 locate -i pattern_1 pattern_2          # global search of files/folders
4
5 # search on content
6 grep -r "Europe" /path/to/dir        # find all files containing X
```

Expansion

batch processing with expansion

```
1 touch text_{a..c}.txt
2 # is equivalent to
3 touch text_a.txt text_b.txt text_c.txt
4
5 mkdir {2000..2005}{a..c}
6 # is equivalent to
7 mkdir 2000a 2000b 2000c 2001a 2001b 2001c ...
```

Operators

Combining Commands

use shell operators to ...

- redirect output into file (overwrite): >
- append to existing file: >>
- stream to next command: | (pipe)

```
1 echo 'line 1' > test.txt      # write into file
2 more test.txt | tail -1       # pass output to next command
```

Learn more about operators

Merging Files

```
1 cat part_1.txt part_2.txt          # concatenate multiple files  
2 cat *.txt > all_text.txt         # merge all txt into a single one
```

Conventions



- no spaces/umlauts in names
 - alphanumeric, underscore, hyphen, dot
- files have a suffix, folders don't
 - `text_1.txt` vs. `texts`
- descriptive file names
 - `SOURCE/YEAR/speech_party_X.txt`
- don't modify the raw data

Writing a runnable Script

Example script: `find_all_pdf.sh`

```
1 #!/bin/sh
2
3 echo "This is a list of all PDFs on my computer:"
4 locate -i /home/*.*pdf
```

- file with suffix `.sh`
 - one command per row
 - # precedes comments
- start script with Shebang `#!/bin/sh`
- execute with `bash SCRIPTNAME.sh`

The beauty of scripting is automation. ⚡

Assignment #1



- get/submit via OLAT
 - starting tonight
 - deadline: 31 March 2023, 23:59
- discuss issues on OLAT forum
- ask friends for support, not solutions



Questions?

In-class: Exercises II

1. Create a new file with touch.
2. Write the following content into that file, one line at a time using the append operator:

```
1 How about making programming a little more accessible? Like:  
2 from human_knowledge import solution
```

3. Make sure that the content was written into that file using more.

In-class: Exercises III

1. Navigate up and down in your filesystem using `cd` and list the respective files per directory with `ls`. Where can you find your personal documents? Print the absolute path with `pwd`.
A hint to Windows users as they are working in a Ubuntu subsystem, have a look at: `/mnt/c/Users`
2. Read `man ls` and write an `ls` command that lists your documents ordered by recency (time)
by size
3. Use the `|` and `>` operators to write the 3 “last modified” files in your documents folder into a file called `last-modified.txt` on your desktop (desktop is also a directory). It is a single command performing multiple operations, one after another.

Additional Resources

useful primers on Bash

- Cheatsheet for this course
- The Programming Historian
- DigitalOcean