

The ABC of Computational Text Analysis

#4 INTRODUCTION TO THE COMMAND-LINE

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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`

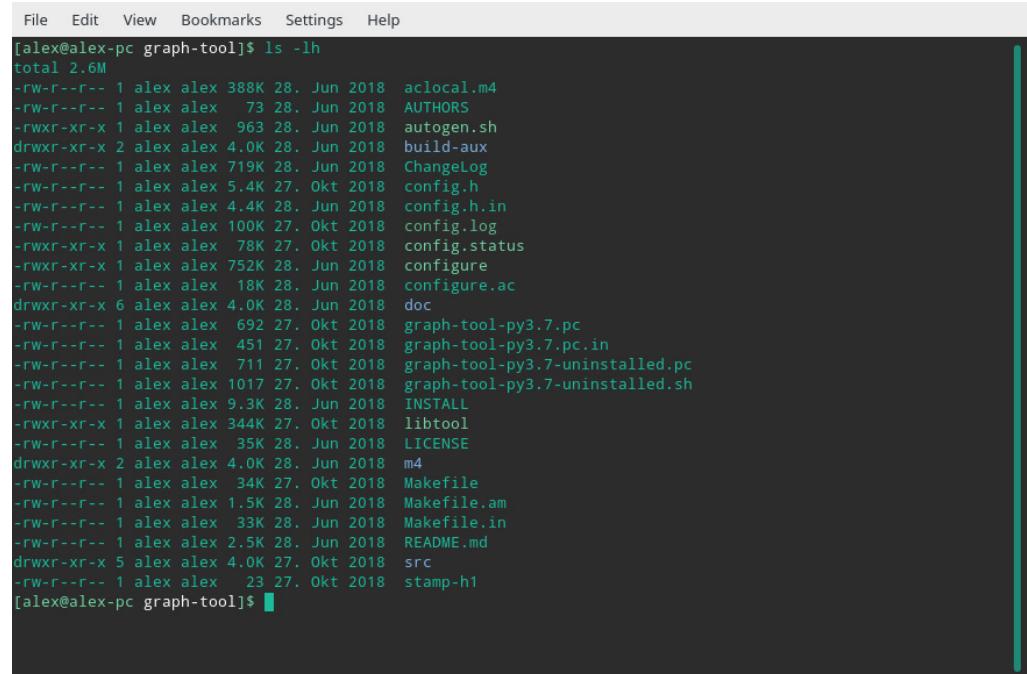
Bourne-again Shell

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



A screenshot of a terminal window titled 'File Edit View Bookmarks Settings Help'. The command entered is '[alex@alex-pc graph-tool]\$ ls -lh'. The output shows a list of files and directories in the current directory:

```
[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
-rw xr-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
-rw xr-xr-x 1 alex alex 78K 27. Okt 2018 config.status
-rw xr-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
-rw xr-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

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

run command + help

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



Where your files are
stored

... and how to find them

- hierarchical filesystem 

folders/directories

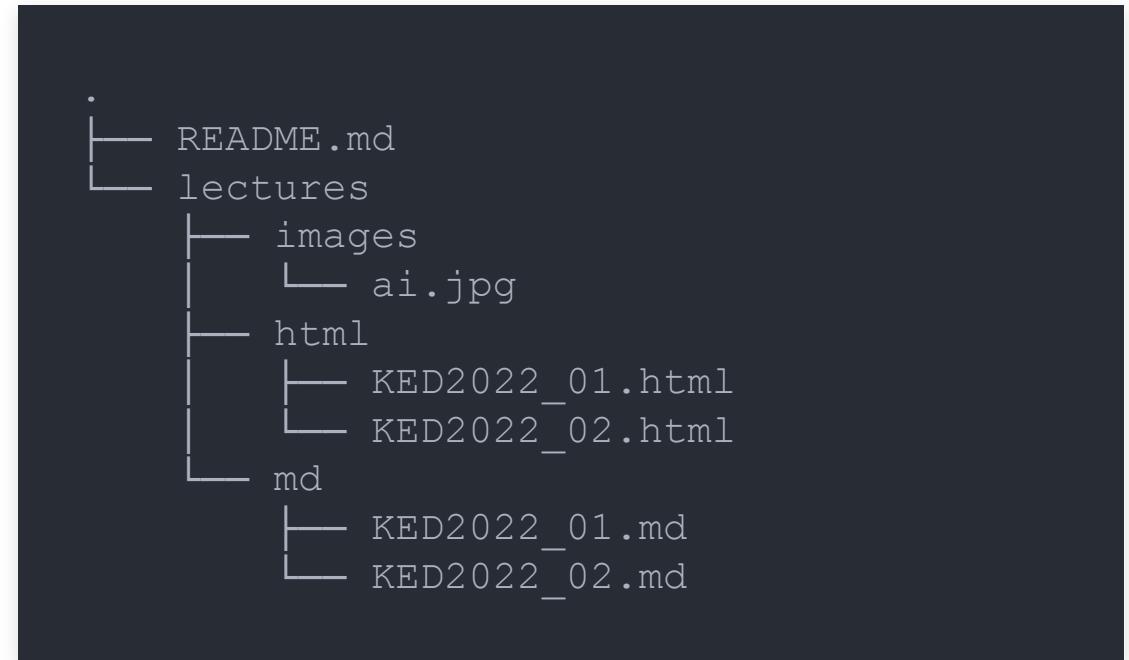
files with a suffix

- absolute path starting from top-level directory

e.g. `/home/alex/KED2022/slides/KED2022_01.html`

- relative path looking from current directory

e.g. `KED2022/slides/KED2022_01.html`



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

```
pwd          # show absolute path of current directory

ls           # list content of current directory
ls -lh       # list with more information
ls dirname   # list content of directory dirname

cd ..        # change directory to go folder up
cd dir/subdir # go to folder dir/subdir (two folders down)
```

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

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

Open Files

show within Shell

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

show with default application (GUI)

```
open text.txt          # macOS  
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

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

copy and move files

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

Removing Files

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

```
rm old.txt          # remove a file  
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: *

```
mv data/*.txt new_data/.      # move txt-files from to another subfolder  
cp *.txt files/.            # copy all txt-files in a single folder
```

Searching

collect certain files only

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

find specific files

```
# search on filename
find /path/to/dir -name "*speech*"    # find files in specific directory
locate -i pattern_1 pattern_2          # global search of files/folders

# search on content
grep -r "Europe" /path/to/dir        # find all files containing X in a directory
```

Expansion

batch processing with expansion

```
touch text_{a..c}.txt
# is equivalent to
touch text_a.txt text_b.txt text_c.txt

mkdir {2000..2005}{a..c}
# is equivalent to
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)

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

Learn more about operators

Merging Files

```
cat part_1.txt part_2.txt      # concatenate multiple files  
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`

```
#!/bin/sh

echo "This is a list of all PDFs on my computer:"
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 2022, 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:

```
How about making programming a little more accessible? Like:  
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