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

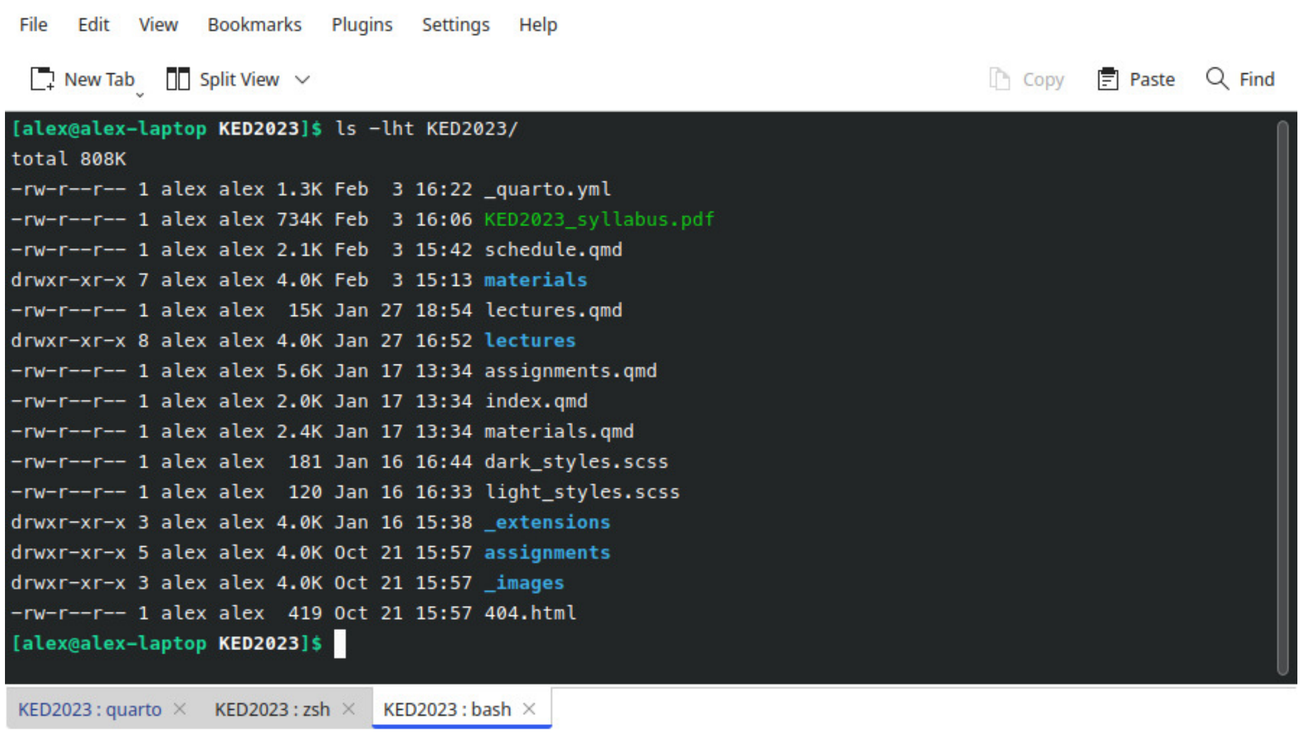
  `USER@HOSTNAME:~$`

- home directory

  `~` refers to `/home/USER`

- case-sensitive
- no feedback

  unless there is an issue



Unix Philosophy

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

Basic Commands in Shell

Say hello!

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

General Structure of Commands

Example parts of a command

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

Where your Files are stored

… and how to find them

- **hierarchical filesystem** 🌲

  folders/directories

  files with a suffix

```
.
├── README.md
└── lectures
    ├── images
    │   └── ai.jpg
    ├── html
    │   ├── KED2023_01.html
    │   └── KED2023_02.html
    └── md
        ├── KED2023_01.md
        └── KED2023_02.md
```

Relative vs. Absolute Pathes

- 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`

⚠️ 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 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
```

Useful Key Actions

- autocompletion: 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
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 subfold
cp *.txt files/.             # copy all txt-files in a single folder
```

Searching

list certain files only

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

find specific files

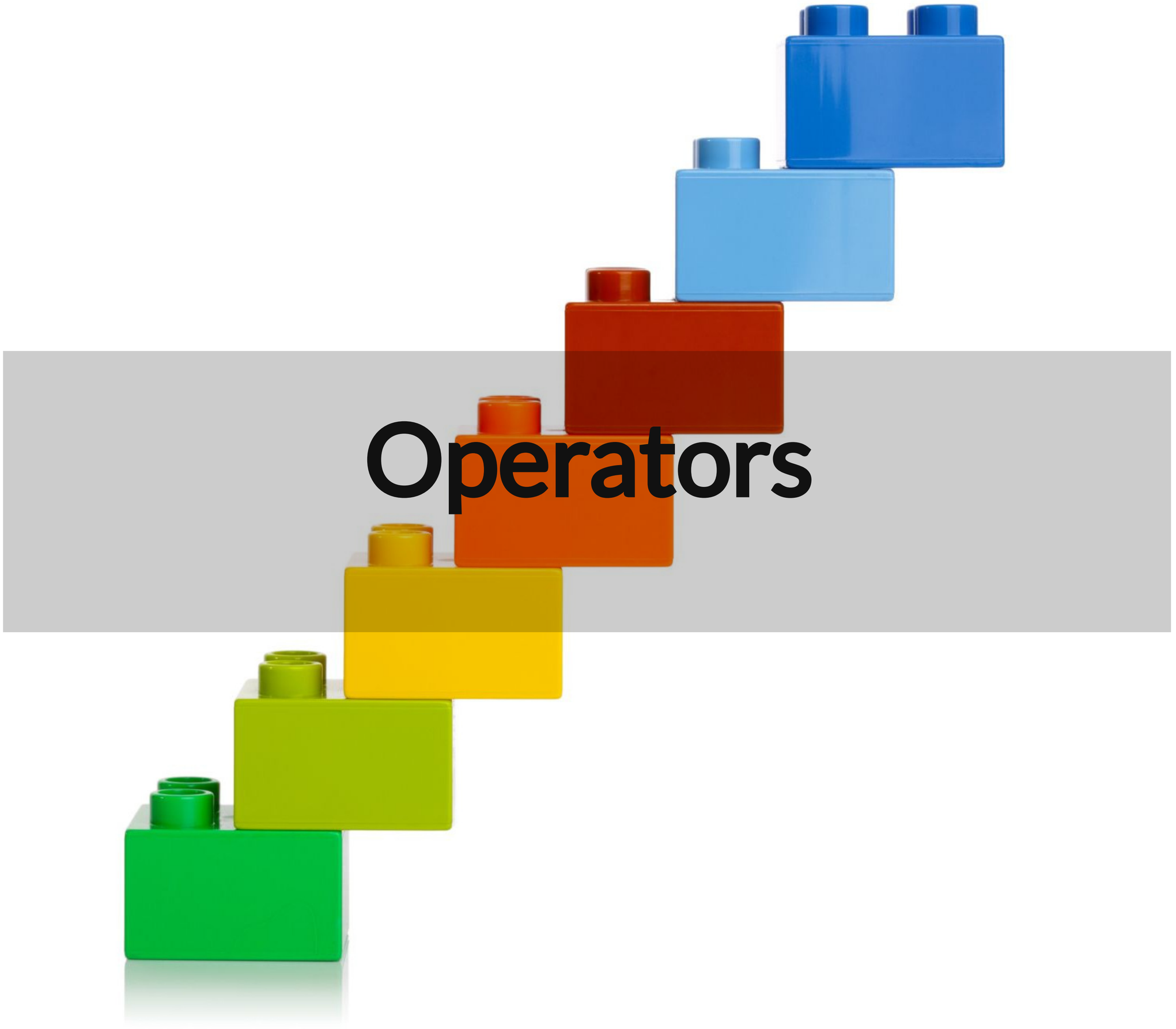
```
# search on content
grep -r "Europe" /path/to/dir    # find all files containing X in a d
```

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
```

Follow 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: `TODO.sh`

```
#!/bin/sh

TODO
```

- 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:

```
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 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