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 🐎
- solving exercises 🏗️

Starting 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 apps
- shell prompt

  `USER@HOSTNAME:~$`
- home directory

  `~` *refers to* `/home/USER`
- case-sensitive
- no feedback

Unix Philosophy

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

Getting started in a Shell

generic components

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

run command + help

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

Structure of a File System

- hierarchical file system

  tree-like

- absolute path

  `/home/alex/KED2021/slides/KED2021_01.html`

- relative path from current directory

  `KED2021/slides/KED2021_01.html`

  works across systems

- common directories

  `.` *current dir*

  `..` *parent dir*

  `~` *home dir*

- find your files on Windows

  `/mnt/c/Users/YOUR_USERNAME/`

  shortcut with `documents`

```
.
├── data
├── materials
│   └── installation.pdf
├── README.md
└── slides
    ├── images
    │   ├── ai.jpg
    │   └── zotero.png
    ├── KED2021_01.html
    ├── KED2021_01.md
    ├── KED2021_02.html
    └── KED2021_02.md
```

Navigating in a File System

list content

```
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)
```

open in file manager (GUI)

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

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)
xdg-open text.txt       # Ubuntu
```

Useful Key Actions

- autocompletion: `TAB`
- get last command: ⬆️
- scrolling: `SPACE`
- interrupt `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
```

copy files

```
cp test.txt /other/.                # copy file, 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
```

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)
```

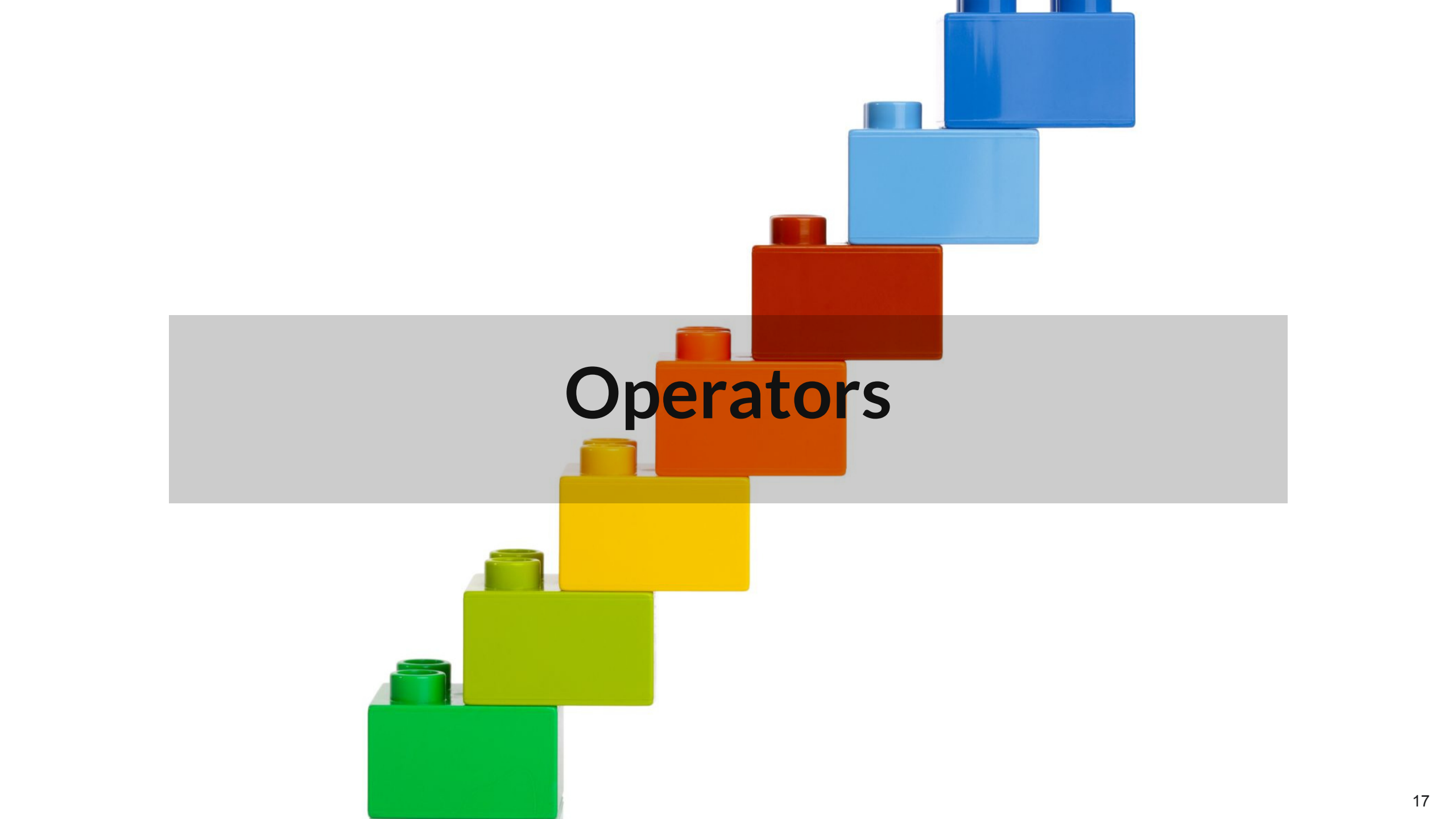
find specific files

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

# search on content
grep -r 'x'                      # find files in any subfolder containing x
```

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

shell operators to ...

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

```
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
```

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. ⚡

Conventions 🙏

- no spaces/umlauts in names

  alphanumeric, underscore, hyphen, dot

- files have a suffix, folders not

  `text_1.txt` *vs.* `texts`

- descriptive file organization

  `SOURCE/YEAR/speech_party_X.txt`

- separate data from scripts
- never change the raw data

Organizing Code

- Git to track file changes
- GitHub hosting platform

Get course repository

```
# get an initial copy of the course material
git clone https://github.com/afluecki ger/KED2021.git

# update your local copy continuously
cd KED2021
git pull
```


Questions?

Assignment #1 ✍️

- get/submit via OLAT
  starting tonight
  deadline: 25 March 2021, 23:59
- discuss issues on OLAT forum
- ask friends for support, not solutions

In-class: Exercises I

1. If you have not cloned the course repository from Github yet, do this now.
2. Create a new directory called `tmp` in the course directory `KED2021`.
3. Check out the `touch` command. The `man` command is your friend.
4. Use `touch` to create a new file called `advice_for_programmers.txt` in `tmp`.
5. Write the following content into that file, one line at a time using operators:

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

6. Make sure that the content was written into that file with `more`.

In-class: Exercises II

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

- The Programming Historian
- DigitalOcean