Welcome to the Bash Workshop!

- If you prefer to work on your own, already know programming or are confident in your abilities, please **sit in the back**.
- If you prefer guided exercises, are completely new to programming, or want to have your hands held, please **sit in the front**.

Bash Workshop

Aline Abler

What will we do today?

- Theory
  - What is bash?
  - The basics
- Exercises

Bash is a not a programming language.

- It is a shell
- It is an interface between you and your computer
- It allows you to access the operating system's services (i.e. run programs)
- It is not designed as a programming language, but can be used as such

Bash is not the only shell there is.

- sh, ksh, zsh, fish, dash...
- Most commands work in any shell, but some don't
- Usually this doesn't matter too much

Bash scripts are not programming

- Glue existing programs together to create new ones
- It's possible to write entire programs, but please don't

Look, a bash script

```
#!/bin/bash

echo 'Hello World'

echo Bash is awesome

# Now some fun stuff:
sudo zypper update
notify-send 'Update complete'
feh --bg-fill 'pictures/fancy_wallpaper.jpg'
youtube-dl -o 'Video.%(ext)s' 'https://www.youtube.com/watch?v=lAIGb1lfpBw'
```

What bash can do

- Automate anything you can do from a console
- Let several separate programs work together

All about commands

Everything is a command

Kinds of commands

- Functions
  are a sequence of bash commands that have been given a name
- Programs
  are external programs that are installed on your system
- Builtins
  are small utilities that are part of bash
- Keywords
  are like builtins, but with special parsing rules

Why is this so important?

- if and while are builtins
- [[is a keyword

Example

- wrong:

```
[[1<3]]
```

- correct:

```
[[ 1 < 3 ]]
```

Repeat after me

If there's brackets, you probably need spaces.

All about strings

Everything is a string

Strings and word splitting

- A string is a sequence of characters that is treated as a unit
- Commands are strings, too
- Strings are split at every space, tab, or newline unless they're in quotes

Meaning of strings

```
echo Hello World
```

- `echo`, `Hello` and `World` are single strings
- The first string becomes the command, all following become arguments

```
echo 'Hello World'
```

- Here, `Hello World` is just one string

Repeat after me

Every word is a single argument unless you use quotes.

All about return values

Every command returns a value

Return values

- What you run

```
echo 'Hello World'
```

- What you see

```
Hello World
```

- What bash sees

```
0
```

Why?

- Every command returns a number, its return value
- 0 means success
  Everything else means there was an error
- Some commands also print to stdout - that's what you see.

Why is that important?

- &&, ||, if and while all act based on the return value of something
- They disregard that command's actual output

Example

```
if xrandr | grep 'HDMI-0 connected'  # if HDMI monitor is connected
then
    feh --bg-fill ~/bigwallpaper.jpg # set the larger wallpaper
fi
```

Bash doesn't only run commands

- Tilde expansion

  `~/files` becomes `/home/alinea/files`
- Variable expansion

  `$BROWSER` becomes `Firefox`
- Arithmetic expansion

  `$(( 1 + 4 ))` becomes `5`
- Command substitution

  `$( pwd )` becomes `/home/alinea/scripts`
- Pathname expansion (or globbing)

  `files/qui*` becomes `files/quicknotes files/quiz`

Bash doesn't only run commands

- Expansion happens before any command is run
- Double quotes (") don't prevent expansion, but single quotes (') do.
- Expansion happens before word splitting

The issue with word splitting

```
var='Unimportant File.odt'
rm $var  # Variable expansion
```

becomes

```
rm Unimportant File.odt
```

The issue with word splitting

- The correct way

```
rm "$var"
```

Repeat after me:

If there's a dollar, you probably need quotes!

Why is bash awesome?

- Bash can easily invoke any programs and connect them
- Bash is like glue

How to write a bash script

- I want a script that searches youtube and downloads the first video it finds

Splitting it up

- Search youtube
- Download video

Google for a program that already does what you need

- `youtube-dl` can download a video from youtube

```
youtube-dl -o 'Video.%(ext)s' 'https://www.youtube.com/watch?v=lAIGb1lfpBw'
```

Splitting it up even further

- Search youtube
  - Download youtube results website
  - Search website text
  - Find first youtube video link
- Download video

Hands on!

Self-driven exercises

- Self study using a guide
- Try some of our exercises
- Choose the exercises you find interesting! No need to go in order.

Guided exercises

- Solve easy exercises in plenum
- Tailored to complete beginners
- Please sit in the front

Course material

- These slides, exercise sheet and bash guide: http://thealternative.ch/index.php?view=knowhow
- Theme by Christian Horea, CC BY