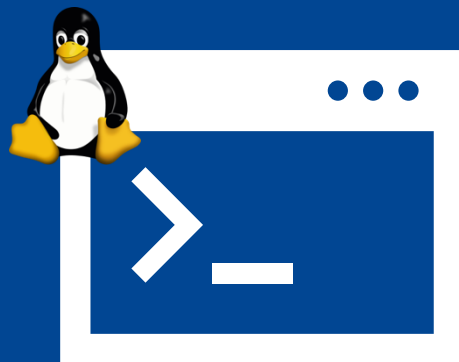


Teknostart Dag 4

Exploring the Linux Command Line Interface (CLI)

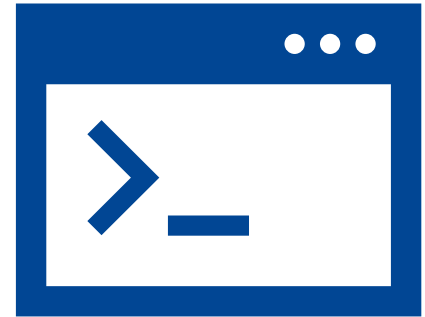


Short Repetition of Day 3

- Redundante strukturer krever ekstra utstyr som øker kostnader (CAPEX = investering og drift)
- Hvordan bygge redundante strukturer?
- Hvordan beregne påliteligheten av en web-tjeneste mellom klient og server?
- Forskjellen mellom tilfeldige feil og målrettede angrep
- Viktig å beskytte informasjonen om system-struktur
- Mer om dette i TTM4185, TTM4110 ("PYSE"), [og TTM4158]

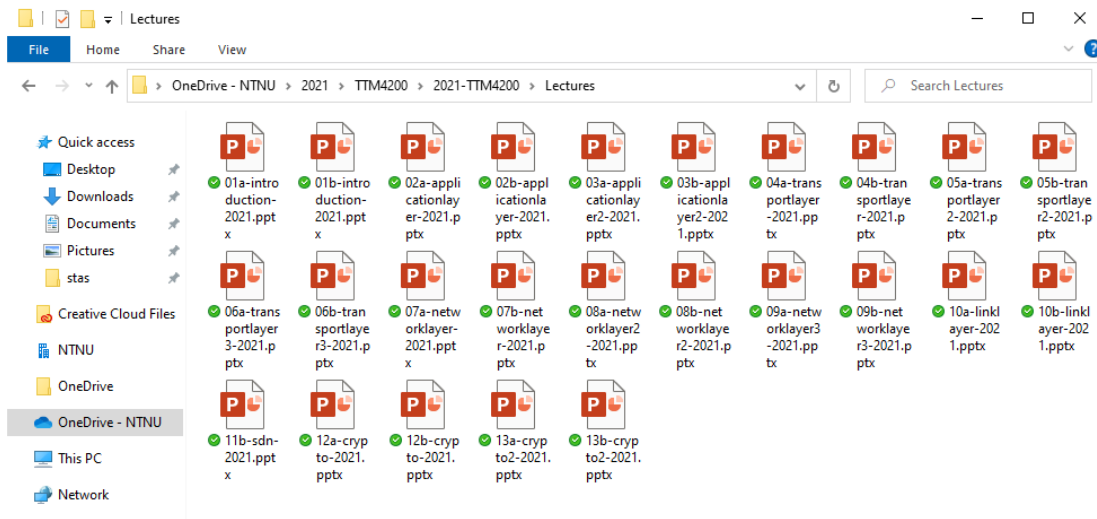
Goals

- Get to know the Linux Command Line Interface (CLI)
 - Understand its importance
 - Learn basic commands for
 - Navigation
 - File access and manipulation
 - Text search
 - Become ready for the labs in TTM4175

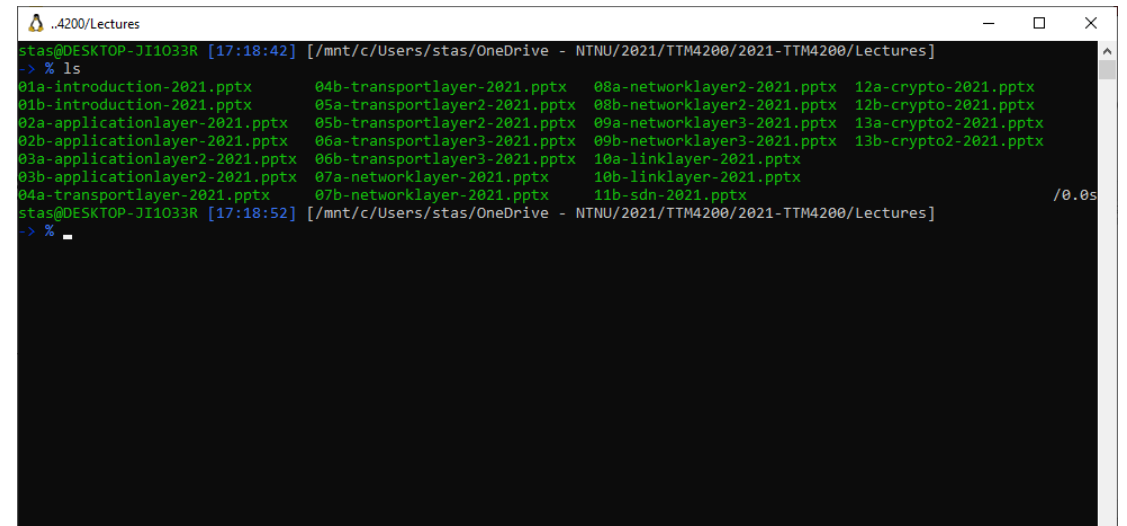


What is the Command Line?

- Text-based interface to navigate and control computers
 - Inspect, create, move, edit files
 - Execute programs



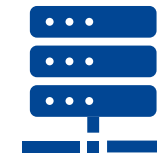
Graphical User Interface (GUI)



Command Line Interface

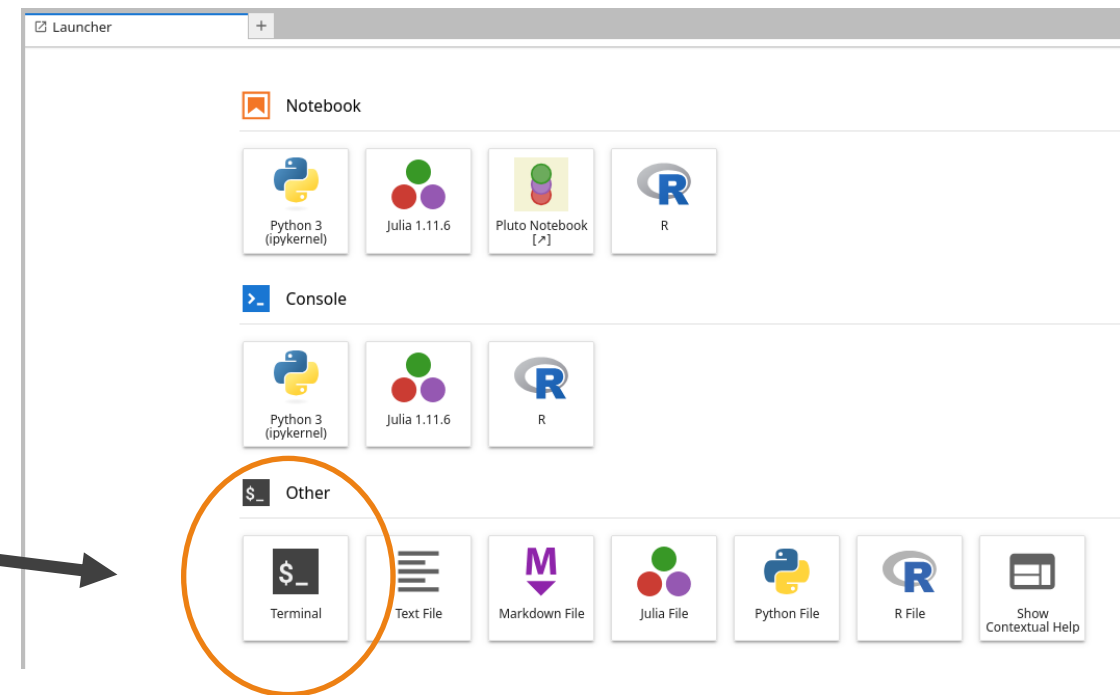
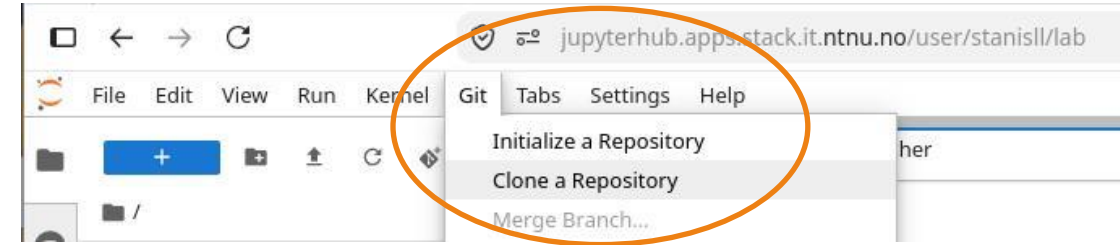
Why use the Command Line?

- Unified set of tools & commands to navigate
 - Servers
 - Personal computers
 - Mobile and embedded devices
- Interaction with devices that don't have a GUI (servers)
- Easier to automate than GUI interactions

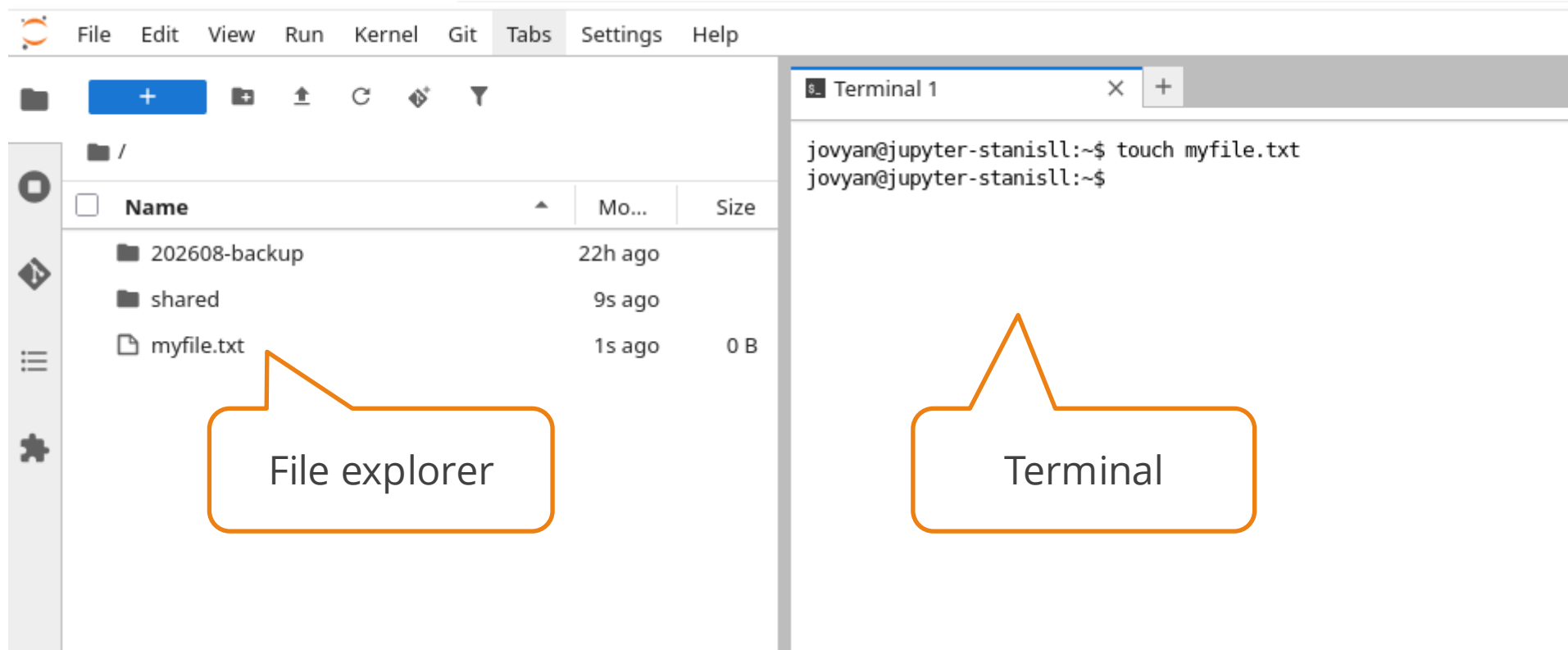


Preparation

- Log in to JupyterNB @ NTNU
 - <https://jupyterhub.apps.stack.it.ntnu.no/>
- Clone the git repository with the starter package
 - <https://git.ntnu.no/stanisll/teknostart-cli.git>
- Open a terminal



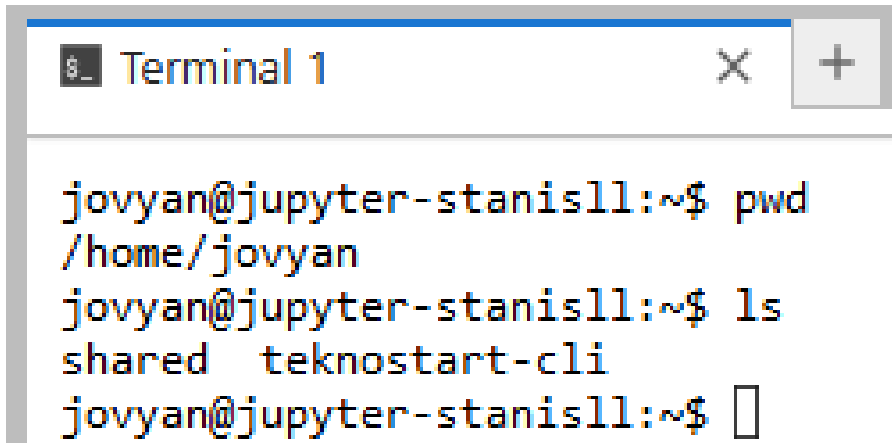
Environment Overview



- One environment – two modes of interaction

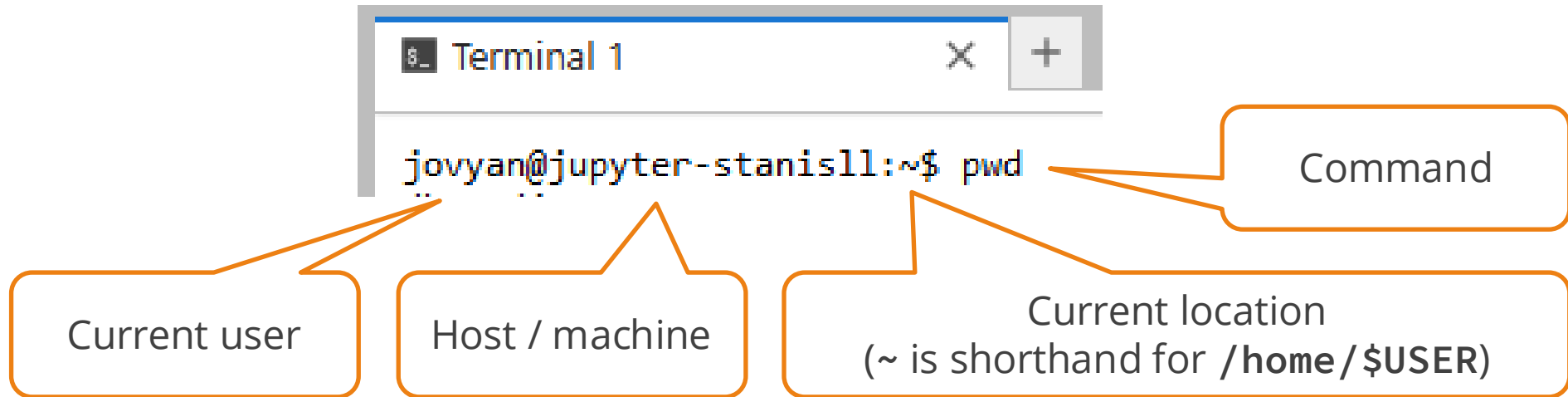
First Steps

- Basic commands for file system navigation
 - `pwd`: **p**rint **w**orking **d**irectory
 - `ls`: **l**ist contents of current directory

A terminal window titled "Terminal 1" with a close button (X) and a plus button (+). The terminal shows the following commands and output:

```
jovyan@jupyter-stanisll:~$ pwd
/home/jovyan
jovyan@jupyter-stanisll:~$ ls
shared  teknostart-cli
jovyan@jupyter-stanisll:~$
```

Anatomy of the Command Line



- Commands have a shape, too

`ls`

`ls -a teknostart-cli`

`cd teknostart-cli`

`cat START_HERE.txt`

General pattern

command option argument
command ~ verb
argument ~ thing(s) the verb acts on

Entering the Practice Folder

- **cd**: **change directory**
 - `cd teknostart-cli`
 - What changed after this command?
 - How can you test / confirm this?
- **cat**: **concatenate** and print file content
 - `cat START_HERE.txt`

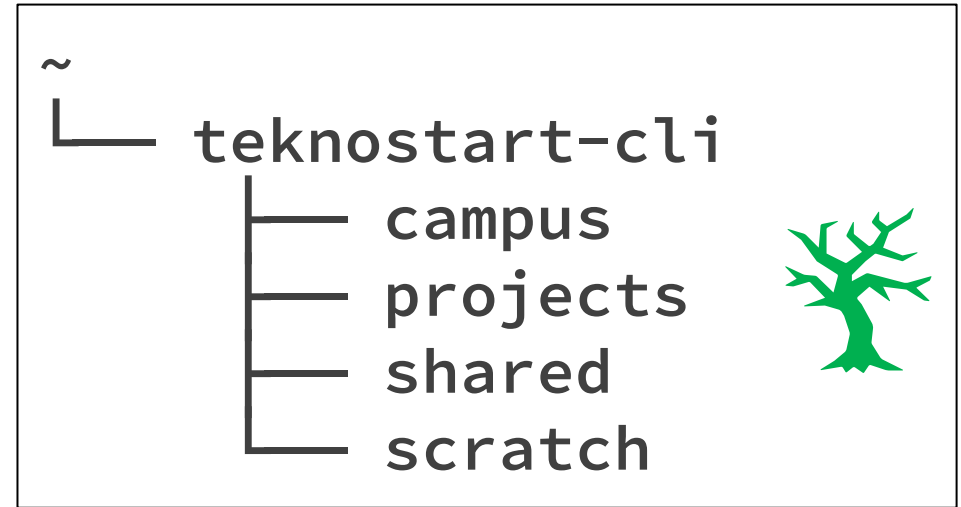
Errors Provide Feedback

- Try printing the contents of a non-existent file or navigating into a non-existent folder, you will get useful information about
 - The command that failed
 - The offending file / directory
 - The reason for the failure
- Don't panic on errors. Read the message and use it to debug 😊



The File System is a Tree

- At any time, you are somewhere in this tree
- That place is called the **current working directory**
- You already know the commands for changing and checking your location!
- Useful symbols & shorthands



~ -> your home directory,
 /home/\$USER

. -> "here" (current dir.)

.. -> parent directory
 (one up in the tree)

/ -> path separator

Relative vs. Absolute Paths

- Two ways of specifying locations
 - Relative paths start from your current location
 - `cd campus/courses/TTM4175`
 - Absolute paths start from the root of the file system
 - `cd /home/jovyan/teknostart-cli/campus/courses/TTM4175`
- Most of the paths we'll use today will be relative

Navigation Exercise

- Start in
 - `cd ~/teknostart-cli`
- Then,
 - Reach `campus/courses/TTM4175/notes`
 - Read `cli.txt`
 - Go back to `teknostart-cli`
 - Reach the `notes` folder again using a single `cd` command
- Use only `pwd`, `ls`, `cd`, `cat`

Useful Shortcuts

- Tab (): complete file/folder/command names
- Up / down arrow: cycle through previous commands
- Ctrl-C: stop running command
- Ctrl-L: clear the screen
- Ctrl-R: search through previous commands

Creating Directories

- Return to the practice folder
 - `cd ~/teknostart-cli`
- Create your own workspace
 - `mkdir my-work`
 - `mkdir my-work/cli-intro`
 - `ls`
- `mkdir`: **make directory**

Copying, Renaming, Removing

- `cp shared/template.txt my-work/cli-intro/notes.txt`
- `mv my-work/cli-intro/notes.txt my-work/cli-intro/cli-notes.txt`
- `rm scratch/temporary.txt`

- `cp`: **copy**
- `mv`: **move** (=rename)
- `rm`: **remove** - **careful!** This will delete files without warning!

Seeing More

- Some files are hidden in the default `ls` view
 - `cd ~/teknostart-cli/projects/weather-station`
 - `ls`
 - `ls -a`
- Read the hidden contact file
 - `cat .contact.txt`
- Hidden files usually start with a dot: `.contact.txt`, `.config`, `.gitignore`, ...

Getting Help

- Quick help usually available via `--help` flag
 - `ls --help`
- Full **manual** via `man` command (not available in the environment we use today, but will be in the labs)
 - `man ls`



Basic Search

- `cd ~/teknostart-cli/projects/weather-station`
- `cat data/monday.txt`
- `cat data/tuesday.txt`
- `cat data/wednesday.txt`
- Cumbersome, let's search through all of them!
 - `grep "WARNING" data/*.txt`



└─ search term └─ “wildcard”, matches any character / sequence
└─ `grep`: global, regular expression, print

➔ Main takeaway for now: **grep** finds lines containing text.

Mini Mission A – Course Logistics

- Find the day, time, and room information for any CLI-related sessions in TTM4175
- Start in your home folder, ~
- Do not use the file browser
- Try to remember the relevant commands, but feel free to consult earlier slides

Mini Mission B – Getting the Map

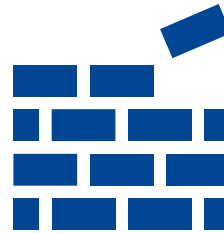
- Obtain a copy of the “campus map”, store it in the **my-work** folder you created earlier, and rename it to **campus-map.txt**
- Start in your home folder, ~
- Do not use the file browser
- Try to remember the relevant commands, but feel free to consult earlier slides
- Bonus: can you accomplish the task in a single line?

Main Takeaways



Stay oriented

Use `pwd` and `ls`



Think of commands as building blocks

We'll learn how to compose them into powerful tools next

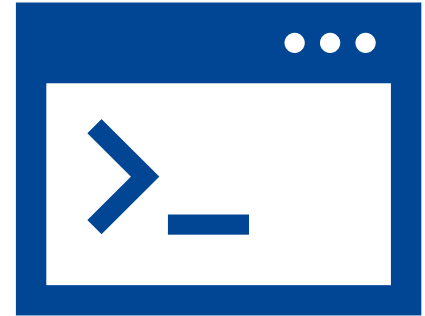


No need to memorize everything

Use tab completion, manuals, and error messages to guide you

Next Session & Preparation

- The Linux Command Line Interface (CLI)
 - Learn basic commands for
 - Navigation
 - Remote access
 - Networking-related tasks
 - Understand basic virtualization principles
 - Learning principles: <https://pages.git.ntnu.no/ie-iik/ttm4175-web/latest/learning/>
- Check <https://ttm4175.iik.ntnu.no/latest/unit-command-line-interface>
 - ➔ Preparation: videos, readings, establishing connectivity



Evaluation of this Week

- Tell us how this week was for you
- <https://s.ntnu.no/tekno>



Initial Survey for TTM4175



<https://s.ntnu.no/ttm4175-survey>

Utsjekk

Hva?

- Uformell kort avslutning etter dagens siste arbeidsøkt

Hvordan?

- Si kort noe om hvordan du har opplevd dagen
- Feks. hva synes du var interessant / gøy / kjedelig? Evt. hva skal du gjøre etterpå?
- 2-3 min. per person