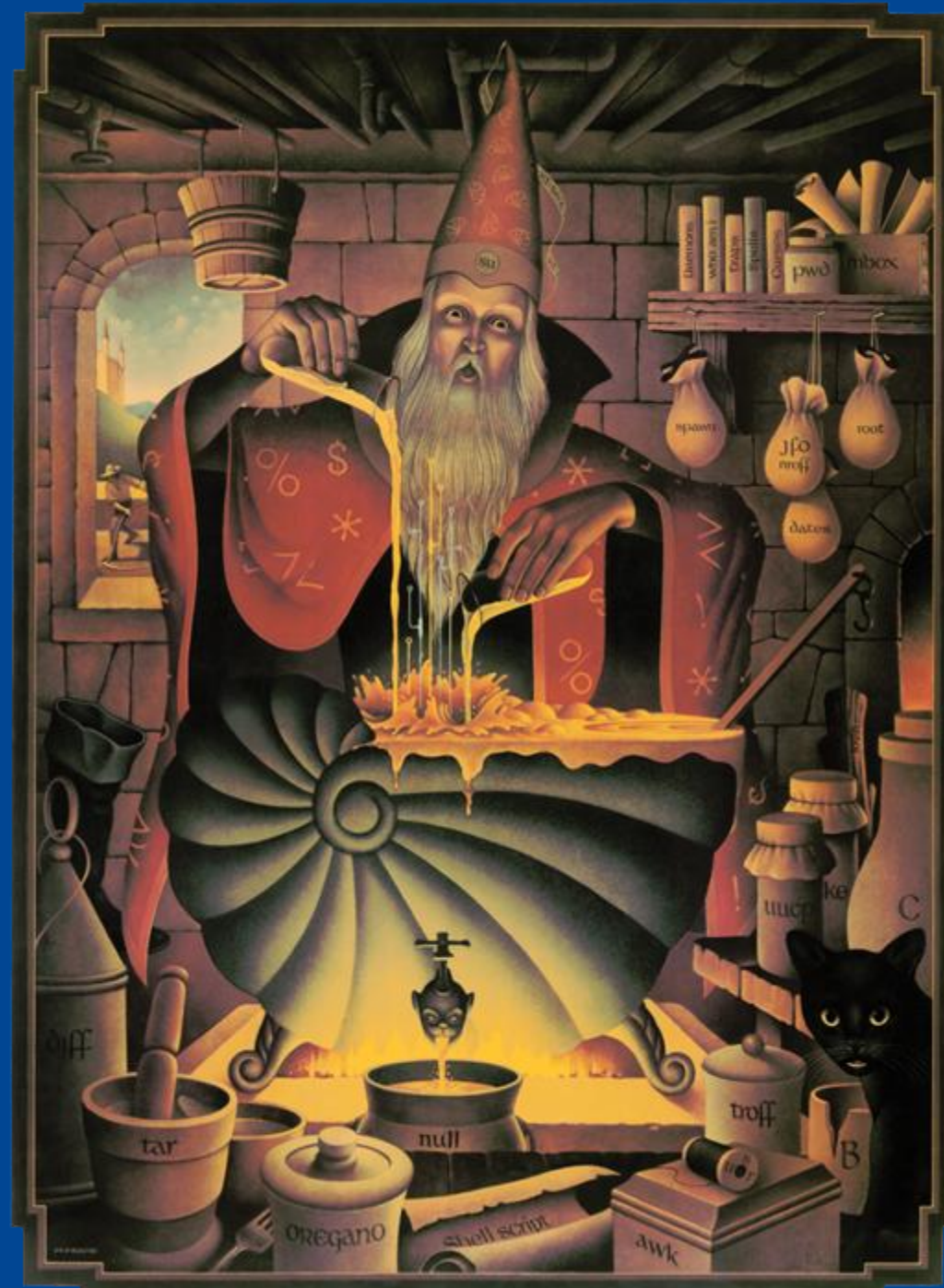


TTM4175 – Week 34

Intro Linux Command Line Interface (CLI)



Agenda

- General info [Katrien, Stas]
- Explainer about labs and reports [Stas]
- Explainer about RATs [Stas]
- RATs – individual & team-based
- Break
- Lecture until 12
- Labs in Sahara



Course Team: Lecturers



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Course Schedule

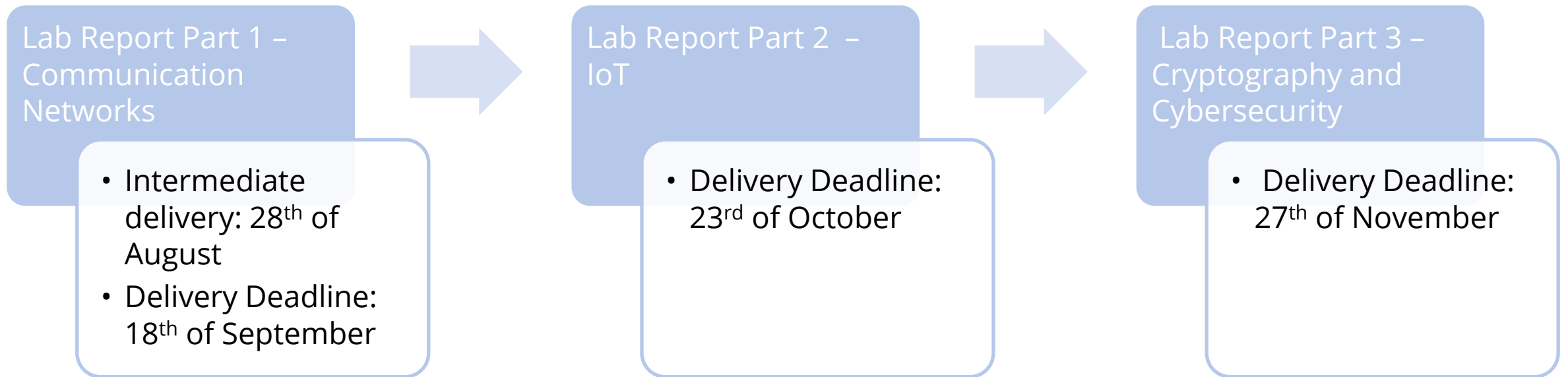
Lectures: 10:15-12 (KJL4)

Lunch break: 12:00-13:00

Lab: 13:00-16:00 (Sahara)

Week	Date	Time	Place	Topic	Teacher
34	21.aug	10:15-16:00	KJL4, Sahara	Lab 1: Linux CLI	Stas
35	28.aug	10:15-16:00	KJL4, Sahara	Lab 2: IPs, LAN // Frist rapport 0	Stas
36	04.sep	10:15-16:00	KJL4, Sahara	Lab 3: Ports, Web Servers	Stas
37	11.sep	10:15-16:00	KJL4, Sahara	Lab 4: Routing, DNS	Stas
38	18.sep	10:15-16:00	KJL4, Sahara	Lab 5: Human Aspects // Frist rapport 1	Katrien
39	25.sep	10:15-16:00	KJL4, Sahara	Lab 6: Sustainability	Iwona
40	02.okt	10:15-16:00	KJL4, Sahara	Lab 7: Introduction to OOP	Urooj
41	09.okt	10:15-16:00	KJL4, Sahara	Lab 8: Introduction to IoT and the Microbit	Urooj
42	16.okt	10:15-16:00	KJL4, Sahara	Lab 9: Tilstandsmaskiner	Urooj
43	23.okt	10:15-16:00	KJL4, Sahara	Lab 10: HTTP and JSON // Frist rapport 2	Urooj
44	30.okt	10:15-16:00	KJL4, Sahara	Lab 11: Cybersikkerhet 1: Intro and Ethical Hacking	Danilo
45	06.nov	10:15-16:00	KJL4, Sahara	Lab 12: Cybersikkerhet 2	Danilo
46	13.nov	10:15-16:00	KJL4, Sahara	Lab 13: Kryptografi 1	Tjerand
47	20.nov	10:15-16:00	KJL4, Sahara	Lab 14: Kryptografi 2, no lecture	
48	27.nov	10:15-16:00	Sahara	Frist rapport 3	

TTM4175 Lab Reports



➔ More on reports + link to template @
<https://ttm4175.iik.ntnu.no/latest/reports/#template>

Weekly Reflections

- Short **individual** reflection about every lab (week)
- To be included in the reports

Avsluttende refleksjon

Etter hver uke skal du gå gjennom en kort individuell refleksjon rund det du har lært i uken. Du skal tenke på én ting du har lært best, og én ting som var vanskelig. Dette hjelper ikke bare deg selv, men gir oss også verdifull innsikt. Fyll ut skjema for denne uken her:

NTNU on GenAI - Student Perspective

- Use of ICT tools with generative artificial intelligence at NTNU: [link](#)
- Protect privacy & data (especially in non-NTNU tools)
 - Only share open information, not personal/confidential data
 - Assume prompts can be stored and hard to retrieve or delete
- Be transparent and avoid academic misconduct
 - Use AI as support, the final work must be your own
 - Disclose and reference the AI tools you used; not citing may be misconduct.
 - Don't cite chatbots as factual sources, use original sources instead.
- Quality control: verify everything
 - AI can hallucinate, be biased, and even fabricate sources.
 - Cross-check claims with reliable references before submitting.

Problematic Uses of GenAI

What can go wrong when you ask an AI model for the final solution of a problem?

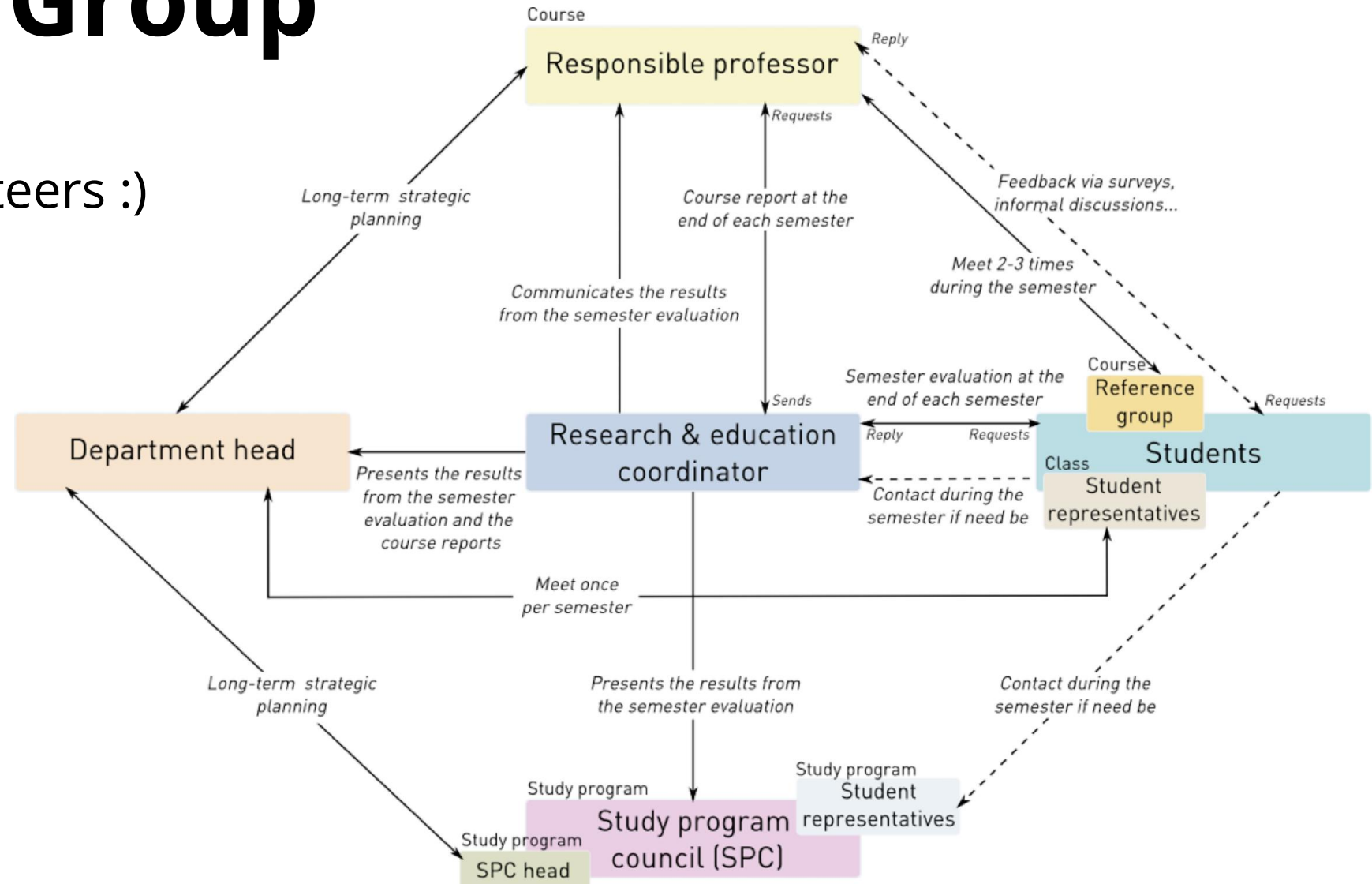
- Networks are messy, context-dependent systems
 - Real behavior depends on OS stack, timing, loss, buffers, topology, and configuration
 - Small changes can flip the “right” answer
- “Final answers” are often wrong or incomplete
 - An AI reply may sound plausible but miss hidden assumptions
 - Without your exact trace/output + environment, correctness is uncertain
- Copy-paste prevents verification habits
 - If you don’t test with Wireshark/logs and isolate layers, errors propagate into submissions
 - You lose the core skill: forming hypotheses and validating with evidence
- You trade short-term speed for long-term pain
 - You can’t adapt when the lab differs slightly or breaks in a new way
 - You also risk not being able to explain/defend the result (and integrity issues if rules are strict)

Proposed AI Usage Policy

- Core principle: AI = coach, not a shortcut
 - Allowed: explanations, self-quizzes, checking your reasoning, debugging plans, interpreting your traces/logs, improving writing clarity.
 - Not allowed: producing “final” work you can’t explain.
- Labs & reports: allowed with guardrails
 - Labs: ask for hints + verification steps, not full solutions; always validate with tests/Wireshark evidence.
 - Reports: add a brief disclosure if AI helped (tool + how: explain/plan/debug/edit); cite textbook/docs, not the chatbot.

Reference Group

- We need 4-5 volunteers :)
- 3 short meetings



Readiness Assurance Tests (RATs)

- Two types: individual / team-based ➔ iRAT / tRAT

RAT: **Test RAT**

Name: **Test User — tu1**

Team: **A**

Instructions:

- Select **one** answer alternative for each question.
- Select the answer alternative that matches **best**.
- **1 handwritten page** is allowed (no calculators).
- Only write within the answer box.

Answers: (A, B, C, or D)

A₁ B₂ C₃ D₄ A₅ B₆ C₇ D₈ A₉ B₁₀

Checksum: (Count how many of each letters you have used.)

3_A 3_B 2_C 2_D

Question 1: Individual RATs (iRATs) provide:

A no feedback until all questions have been answered.
B immediate feedback to the student submitting the answer.
C an opportunity for students who haven't prepared for the RAT.
D immediate feedback to the entire team.

Question 2: With digital/online RATs:

A for deploying online individual RATs (iRATs).
B for managing online scratch test-cards.
C for managing RATs in a simple way.
D for deploying online team RATs (tRATs).

Question 6: teampy is used:

A for deploying online individual RATs (iRATs).
B for managing online scratch test-cards.
C for managing RATs in a simple way.
D for deploying online team RATs (tRATs).

Question 7: teampy-s is used:

A for managing online scratch test-cards.
B for generating online team RATs (tRATs).
C for generating online individual RATs (iRATs).
D for managing RATs in a simple way.

✓ Make sure you have the sheet that has your name on it

✓ Solve individually, silently

✓ Can bring one-sided, *handwritten cheatsheet*

✓ Don't forget the checksum

RAT: **Test RAT**

Team: **hb1**

Solve this quiz together in your team. To get the solution as you work, do the following:

1. Exactly one member of your team should install the app **Nøtteknekker** on iPhone.
2. Open the app.
3. Use the following code in the app:
FQPEFX

Question 1: teampy is used:

A for deploying online individual RATs (iRATs).
B for managing online scratch test-cards.
C for managing RATs in a simple way.
D for deploying online team RATs (tRATs).

1: Forberedelse

Forberedelse

— at home —

2: RAT — “Readiness Assurance Test”

Individuell
Test

in class →

ca. 1 h.

Team
Test



Mini-
forelesning

max. 20 m

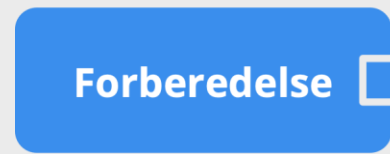
3: Anvendelse

Anvendelser
i Team

ca. 1–4 h

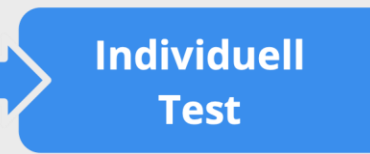


1: Forberedelse



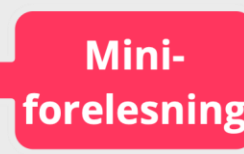
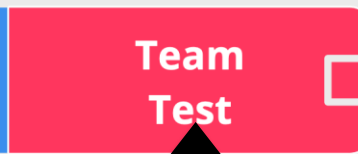
— at home —

2: RAT — “Readiness Assurance Test”



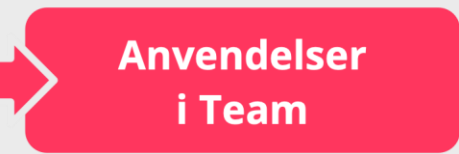
in class →

ca. 1 h.



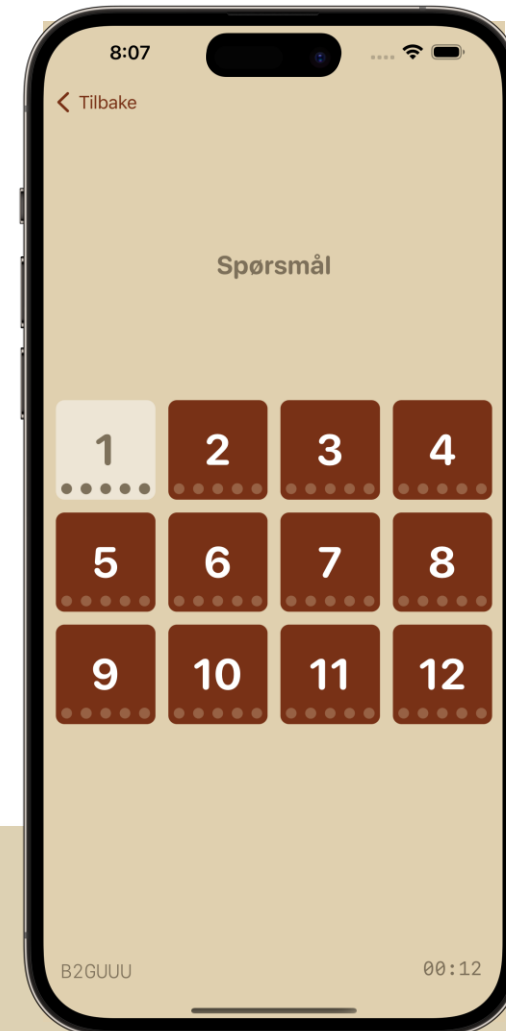
max. 20 m

3: Anvendelse



ca. 1–4 h

- **Nøtteknekker-App**
- Viser rett svaralternativ underveis
- Trenger kun én iPhone per team
- Enkelt å bruke og gratis
- Lagt med ♥ ved NTNU



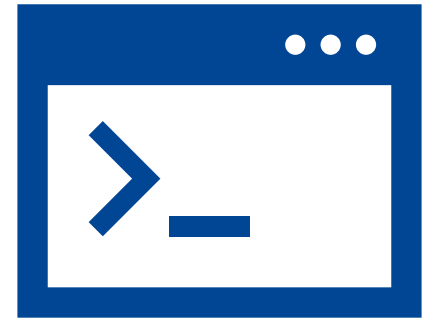
<https://s.ntnu.no/nuts>

RAT Evaluation

- Each individual RAT awards 0/1/2 points
 - 0 points: fewer than 3 correct answers
 - 1 point: fewer than 6 correct answers
 - 2 points: 6 or more correct answers
- 10 RATs in total
- RATs are “passed” with a total score of at least 15

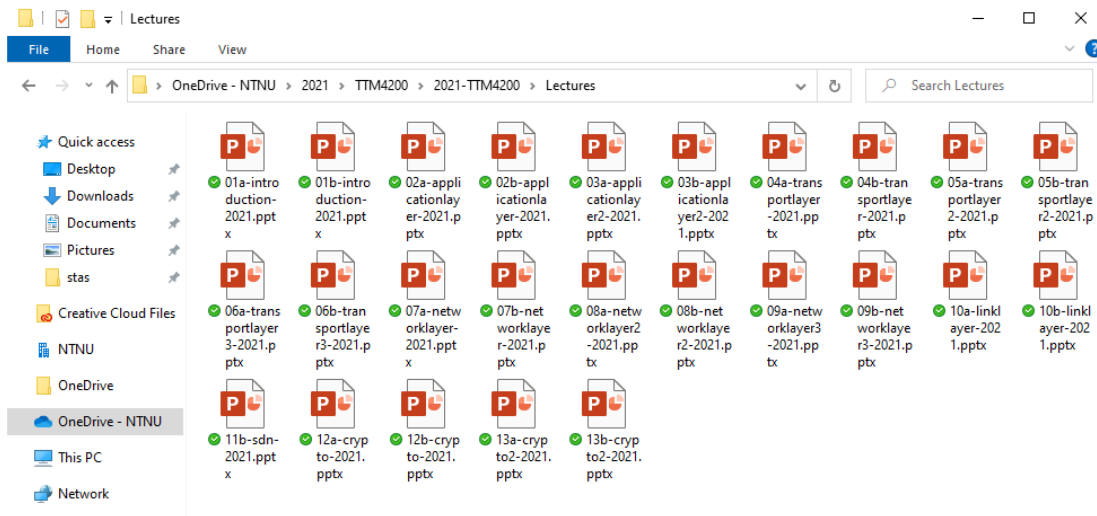
Goals

- Get to know the Linux Command Line Interface (CLI)
 - Understand its importance
 - Learn basic commands for
 - Navigation
 - Remote access
 - Networking-related tasks
 - Understand basic virtualization principles

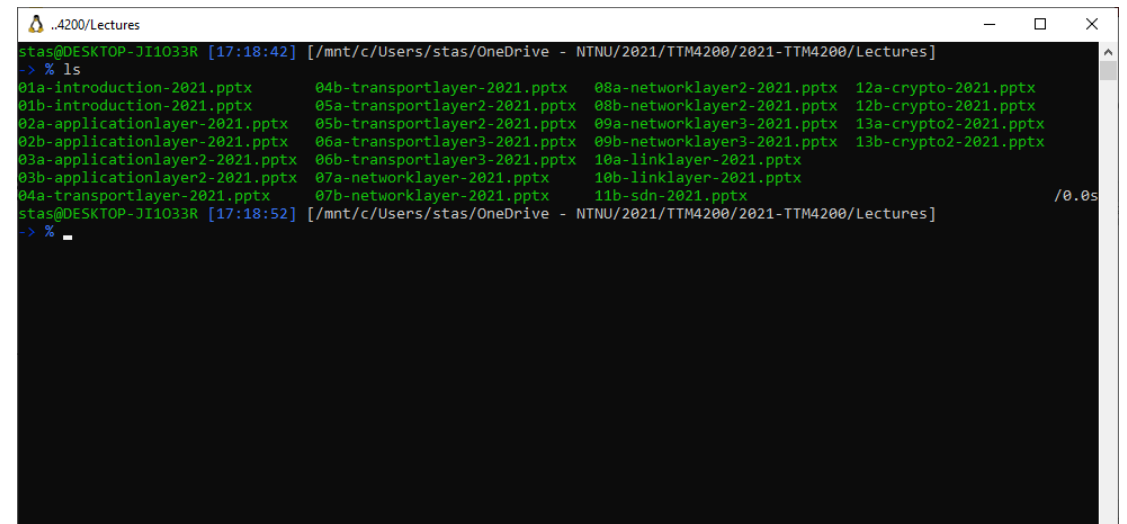


What is the Command Line?

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



Graphical User Interface (GUI)



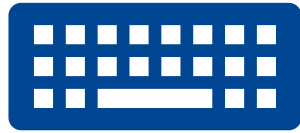
Command Line Interface

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



Recap of Preparation Material



Practical

Local environment
VMs, SSH, VNC



Readings

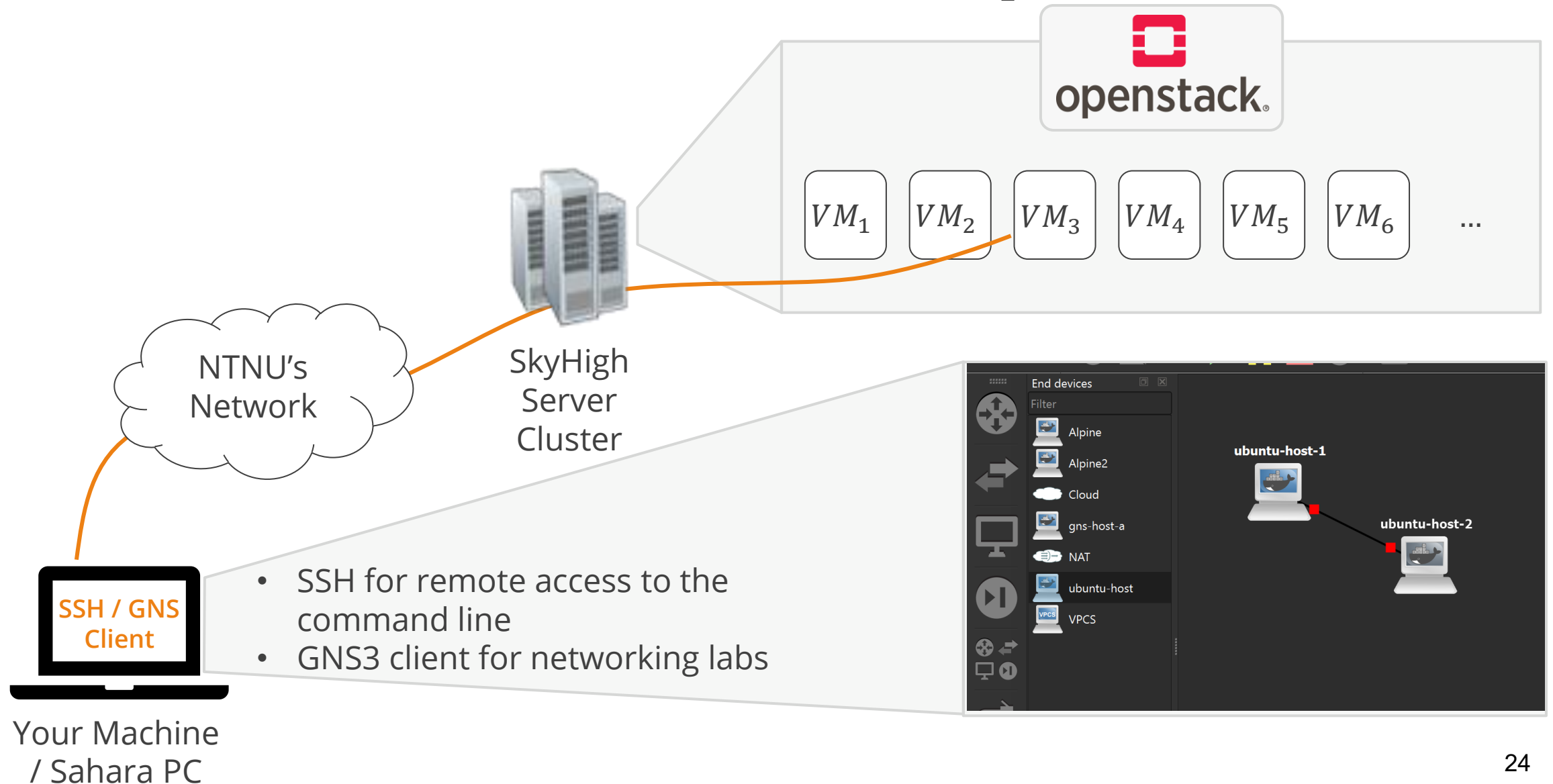
What is the CLI
Getting help



Videos

File system navigation
File system manipulation
grep, cat, man

Course Environment – OpenStack



Demo: Using SSH to Connect to Your VM

Enable Port Forwarding

- Before doing anything inside of the GNS3 application, you will need to setup port forwarding to ports which are used by GNS3. Open a new terminal on your local computer, or in the WSL for Windows users, and edit the `~/.ssh/config` to have the following text:

```
Host ntnu_server
  HostName team<your_team_number_and_letter>.ttm4175.iaas.iik.ntnu.no
  User <your_NTNU_username>
  LocalForward 3080 localhost:3080
  LocalForward 5000 localhost:5000
  LocalForward 5001 localhost:5001
```

Optional now, only needed for GNS3 from next week



```
stas@dsk-a269:~$ ssh ntnu_server
```



```
stas@dsk-a269:~/git/ttm4175-gns3-labs$ ssh gns3-ttm4175
The authenticity of host 'gns3-ttm4175' can't be established.
ED25519 key fingerprint is SHA256:
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'gns3-ttm4175' (ED25519) to the list of known hosts.
stanisll@10.212.168.88's password:
Welcome to Ubuntu 24.04.4 LTS (GNU/Linux 6.8.0-137-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Thu Aug 20 12:04:57 CEST 2026

System load:  0.24           Processes:           139
Usage of /:   9.7% of 37.70GB Users logged in:          0
Memory usage: 7%            IPv4 address for ens3:
Swap usage:   0%

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
   just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

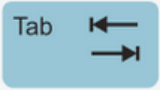
42 updates can be applied immediately.
18 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

*** System restart required ***
Last login: Wed Aug 19 11:25:22 2026 from
stanisll@admin1 ~ » ls
clmystery reset_clmystery.sh reset_ctf.sh teknostart_ctf
stanisll@admin1 ~ »
```

➔ <https://ttm4175.iik.ntnu.no/latest/unit-command-line-interface/preparation/#setting-up-gns3>

Demo: Basics

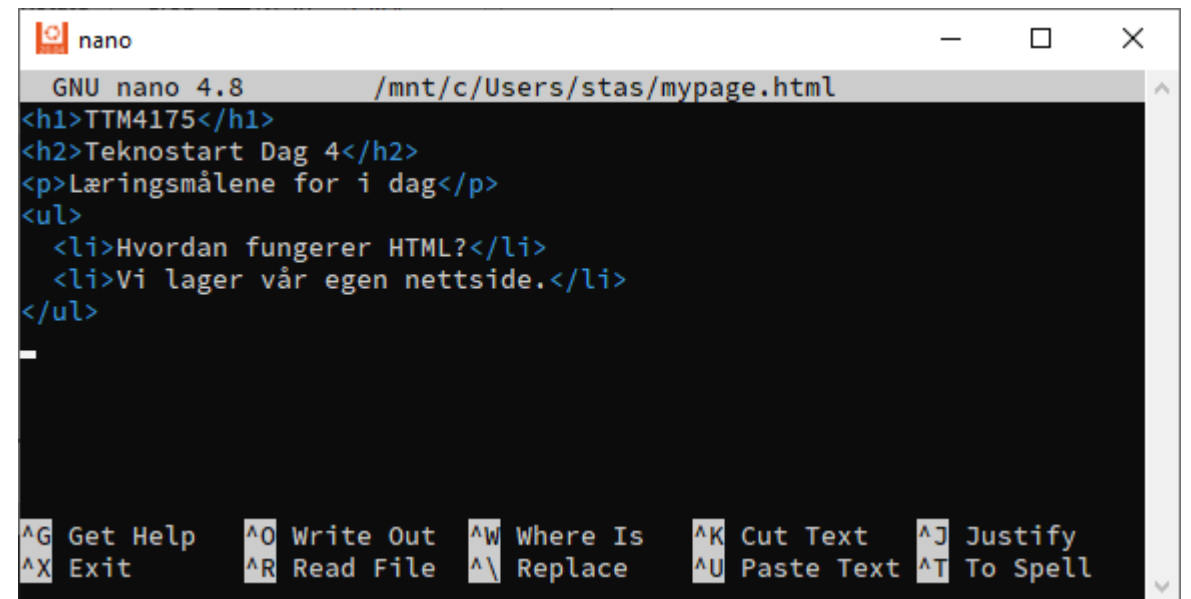
- `pwd`, `ls`, `cd`, `cat`, `less`
- `mkdir`, `rm`, `rmdir`, `mv`, `cp`
- *Tab completion*: start typing a command and hit  `Tab`  
- Arrow keys up / down to browse command history
- `Ctrl` + ..
 - `C`: abort currently active program – handy if something hangs
 - `R`: search command history
 - `L`: clear terminal window
 - `D`: exit current session

Demo: Streams, Redirection, Pipes

- (Over-)Writing to a file with > (caret)
 - `echo "hello, world" > hello.txt`
- Appending to a file with >>
 - `echo "hei, world" >> hello2.txt`
- *Piping* output from one command to the next with | (pipe)
 - `ls | head`
 - `cat *.txt | grep hei`

Demo: nano Editor

- Most basic CLI-based text editor
- Shipped with most Linux distributions
- Open a file for editing via `nano myfile.txt`
- `Ctrl + ..`
 - S: **s**ave
 - O: save as (**o**ffer to write)
 - X: **e**xit
 - W: search (**w**here is)
- Arrow keys to navigate



The screenshot shows the nano text editor window. The title bar indicates the file path is `/mnt/c/Users/stas/mypage.html`. The editor content is as follows:

```
GNU nano 4.8 /mnt/c/Users/stas/mypage.html
<h1>TTM4175</h1>
<h2>Teknostart Dag 4</h2>
<p>Læringsmålene for i dag</p>
<ul>
  <li>Hvordan fungerer HTML?</li>
  <li>Vi lager vår egen nettside.</li>
</ul>
```

The bottom status bar displays various keyboard shortcuts for navigation and editing:

<code>^G</code> Get Help	<code>^O</code> Write Out	<code>^W</code> Where Is	<code>^K</code> Cut Text	<code>^J</code> Justify
<code>^X</code> Exit	<code>^R</code> Read File	<code>^_</code> Replace	<code>^U</code> Paste Text	<code>^T</code> To Spell

Activities Today



Connect to Your VM

Suggested mode: one computer / connection per group



Solve the Tasks

Jeopardy-style Capture-the-Flag (CTF)
Command line crime mystery

Next Week: Networking Lab I

- Topics: binary, IP addresses, subnets, LAN configuration
- Goals
 - Understand and apply basic binary arithmetic
 - Understand IP addresses and their organization into subnets
 - Create and configure Local Area Networks (LANs)
 - Use basic Linux commands for managing
 - IP addresses (IPv4 and IPv6)
 - IP subnets and masks
- Preparation material & Canvas announcement on Friday