

# Cloud Computing Technologies

DAT515 - Fall 2025

Course Information

Prof. Hein Meling



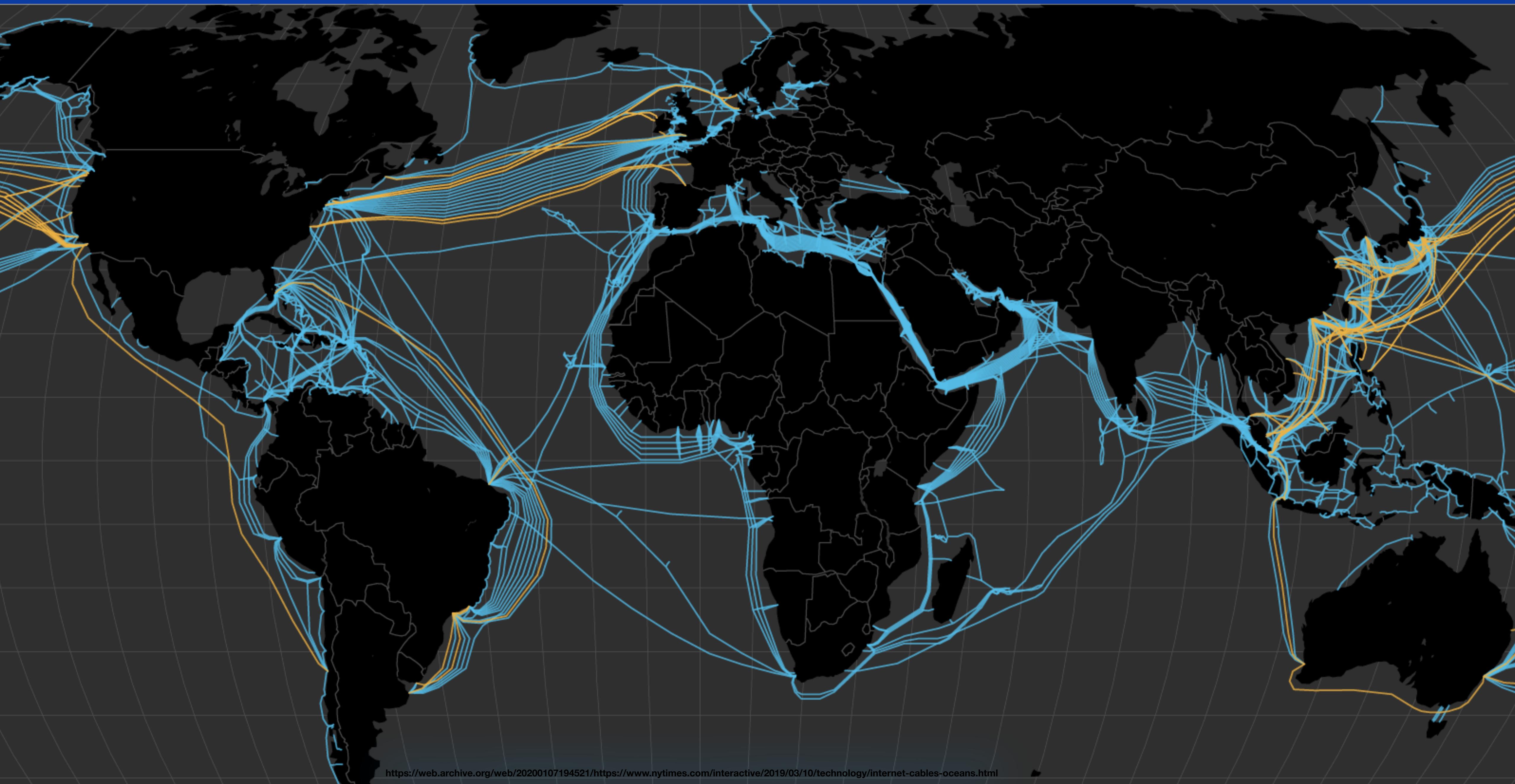
WHERE  
THE HECK  
IS MY DATA?

IT IS  
UP THERE IN  
IN THE CLOUD.



‘People think their data is  
in the cloud.’

It's not!



# About us

## Course Instructor: Prof. Hein Meling

- [hein.meling@uis.no](mailto:hein.meling@uis.no)
- Office: KE D427 (no office hours)
  - Talk to me between lectures
  - Come by the office – I may be busy ...
  - Send email to book an appointment
- Research interests: Distributed Systems
  - Fault tolerance, availability, security, reliable storage, blockchain systems, etc...



## Teaching Assistants

- Jayachander Surbiryala
  - Office KE D424
  - jayachander.surbiryala@uis.no
- Ainaz Rafiei
- Haakon Webb
- Foroozan





## {Resilient | Reliable} Systems Lab



Who are you?

- What's your study program?
  - Computer Science
  - Data Science
  - Others?
- Who is working as a developer?
  - What do you do?
- Experience using cloud platforms:
  - AWS, Azure, Google Compute, Others?
- Experience using cloud technologies:
  - Docker
  - APIs for online services
    - GitHub API, Discord API,...
  - Kubernetes?

# Learning Outcomes?

## Knowledge

- Understand elements of Cloud infrastructures.
- Characterize and compare typical service models like IaaS, PaaS, and SaaS.
- Compute abstractions, including virtual machines, containers, and serverless computing.
- Storage abstractions with varying consistency requirements.
- Resource management, including storage and container management.
- Understand and compare the most common commercial Cloud offerings.
- Ethical, environmental, and legal implications of Cloud technologies, e.g., United Nation's Sustainable Development Goals, GDPR, and MLAT/CLOUD Act.

## Skills

*Be able to*

- design a Cloud-based solution based on a given specification.
- deploy a Cloud-based solution optimized to available resources.
- analyze the security risks of a specific Cloud-based deployment.
- implement applications utilizing cloud APIs on the application layer,  
e.g., GitHub, Discord, and the storage/compute layer.
- implement secret management for Cloud applications using,  
e.g., Passkey, credentials, passwords, or tokens.

# Logistics

## Recommended prerequisites

- Git and GitHub proficiency expected
- Operating Systems
- Databases
- Computer Networking
- Web Programming
- Advanced Programming

## GitHub

[dat515-2025.github.io/info/](https://dat515-2025.github.io/info/)

[github.com/dat515-2025/assignments](https://github.com/dat515-2025/assignments)

- Course information
- Reading material (links)
- Lecture plan
- Lab plan
- Project information

## QuickFeed

- Submit assignments to GitHub
- Some assignments have tests
- View results of assignments
- Lab approval

<https://uis.itest.run/>

*Sign up using your  
GitHub account*

*Enroll in DAT515*

*Consider creating a separate  
GitHub account for course work*

## Discord

- Announcements
- Online help
- Online lab approval
- Discord Helpbot
  - Get help during labs: /gethelp
  - Queue management for in-lab approval: /approve

<https://discord.gg/tb5FfjEasB>

*Register with Helpbot using your GitHub username: /register*

# Weekly Schedule

Mon 25/8  ↔	Tue 26/8  ↔	Wed 27/8  ↔	Thu 28/8  ↔	Fri 29/8  ↔
08:00				
09:00				
		<b>Forelesning</b> 08:15-10:00 Room: <a href="#">KE E-456</a> Staff:		
10:00				
11:00				
12:00				
13:00				
			<b>Laboratorium</b> 12:15-14:00 Room: <a href="#">KE E-456</a> Staff:	
14:00				
15:00			<b>Laboratorium</b> 14:15-16:00 Room: <a href="#">KE E-456</a> Staff:	
16:00				

Week	Date	Day	Lecture Topic	Notes
34	Aug 18	Monday	Introduction to Cloud Computing	Lecturer: Hein
34	Aug 20	Wednesday	Introduction to Go Programming	Lecturer: Hein
35	Aug 25	Monday	Cloud APIs and Microservices Concepts	Lecturer: Hein
35	Aug 27	Wednesday	DevOps: Best Practices	Lecturer: Hein
36	Sep 1	Monday	Virtualization and Containers	Lecturer: Hein
36	Sep 3	Wednesday	Docker	Lecturer: Hein
36	Sep 4	Thursday	Serverless Computing	Lecturer: Hein
37	Sep 8	Monday	Kubernetes: Container Orchestration	Lecturer: Jayachander, Hein Traveling
37	Sep 10	Wednesday	Talos Lab Intro	Lecturer: Jayachander, Hein Traveling
38	Sep 15	Monday	Guest Lectures: TBD	Hein Traveling
38	Sep 17	Wednesday	No Lecture	Hein Traveling
38	Sep 18	Thursday	Guest Lectures: Factivore	Hein Traveling

“I love deadlines. I like the whooshing sound they make as they fly by.”

— Douglas Adams, *The Salmon of Doubt*

Lab	Topic	Grading	Approval	Submission	Deadline
1	<a href="#">Unix Basics and Command Line Tools</a>	Pass/fail	Automatic	Individually	August 22
2	<a href="#">Introduction to Go Programming</a>	Pass/fail	Automatic	Individually	August 29
3	<a href="#">Network Programming with REST and gRPC</a>	Pass/fail	TA Approval	Individually	September 12
4	<a href="#">Getting Started with Docker: Deploying a Basic Web App</a>	Pass/fail	TA Approval	Individually	September 19
5	<a href="#">Talos Kubernetes Cluster Setup</a>	Pass/fail	TA Approval	Individually	September 26
6	<a href="#">Course Project</a>	A-F	Presentation	Group	November 14
7	<a href="#">Optional: Getting Started with AWS</a>	No grading	No Approval	Individually	December 31

# Course Project

<https://github.com/dat515-2025/assignments/tree/main/6project>

- Start planning the project this week (read the project description)
- Prepare design doc
  - Overview
  - Architecture
  - Technologies
  - Deployment

<https://github.com/dat515-2025/assignments/tree/main/6project>

- Will be created by QuickFeed
- When you create a group
- More details about groups and the commit policy soon
- Will be named like this:
  - <https://github.com/dat515-2025/group-name>

<https://github.com/dat515-2025/assignments/tree/main/6project>

- Project Overview
- Prerequisites
- Build Instructions
- Deployment Instructions
- Testing Instructions
- Usage Examples
- Architecture Overview
- Presentation Video
- Troubleshooting
- Self-Assessment Table.
- Hour Sheet
- Report Card

# Design Doc and Report Templates

<https://github.com/dat515-2025/assignments/tree/main/6project>

- design.md
- report.md
- Edit these files during the project execution

<https://github.com/dat515-2025/assignments/tree/main/6project>

- YouTube Presentation
- Q&A Session
- Instructions to be added later

# Course policies

## Group for Project

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Find group members first
  - Groups of two (max three)
  - Use the #group-maker channel on Discord
- Agree on a name
- Sign up for a group on QuickFeed

## Partner Problems

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Please **tell us** and **your partner** early
  - decide to drop out of the course
  - want to dissolve the group and work alone
- To avoid problems, we suggest to organize regular
  - joint work sessions



*Tell us!*

## Deadlines and Slip days

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- If you cannot make a deadline, you can use up to **7 slip days** throughout the semester, including weekends and holidays.
- It is the **date on your lab's submission**, as viewed **on GitHub**, that counts towards the slip days.
- Slip days **cannot be used to extend** the project and presentation deadlines.
  - Project and presentation deadlines are hard.

## Collaboration

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Talk to each other or the teaching staff about any of the assignments. Assistance is limited to general discussion of the problem. Each student/group must write out their own solutions.
- Consulting another student's/group's solution is prohibited. Submitted solutions must not be copied from any source.
- You **shall not** supply your work to other students in future instances of this course.



## Generative Models

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- May use generative models such as ChatGPT or GitHub Copilot to generate code.
- Must be able to **explain** the code as if you had **written it yourself**.
- The code must obviously **solve the assignment** and pass a sufficient number of tests on QuickFeed.



## Contributions

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Group members must **contribute equally** to code
- *Implies that group members should commit a similar amount of code on GitHub.*
- Each group member must **individually present** and explain their work to a TA for approval.
  - Group members expected to be able to explain the code written by other group members.



## Two Working Styles

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Pair programming
  - Alternate between coding vs watching
  - Make sure to switch user that writes and commits code to GitHub
- Code Review
  - Each group member creates a branch
  - Create Pull Request
  - Partner reviews your code before it is merged into the main branch

## When to Commit

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

- Commits should represent a **logical unit of work**.
  - A bug fix, a new feature, a refactoring, etc.
  - It is up to you to decide what constitutes a unit of work, but it should not be too large.
- *Unacceptable to commit an entire lab assignment in one commit.*

# Commit Messages

[dat515-2025.github.io/info/policy](https://dat515-2025.github.io/info/policy)

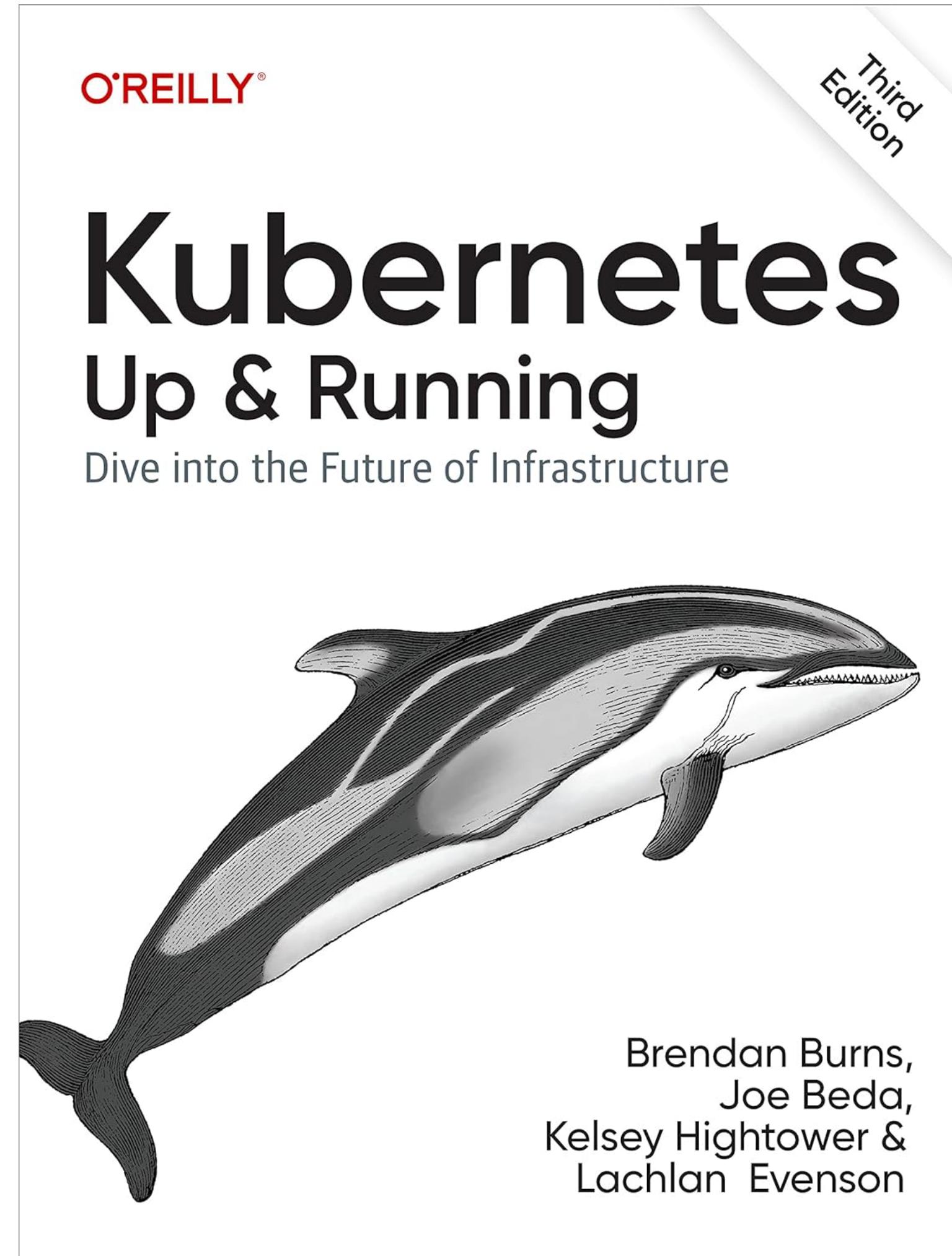
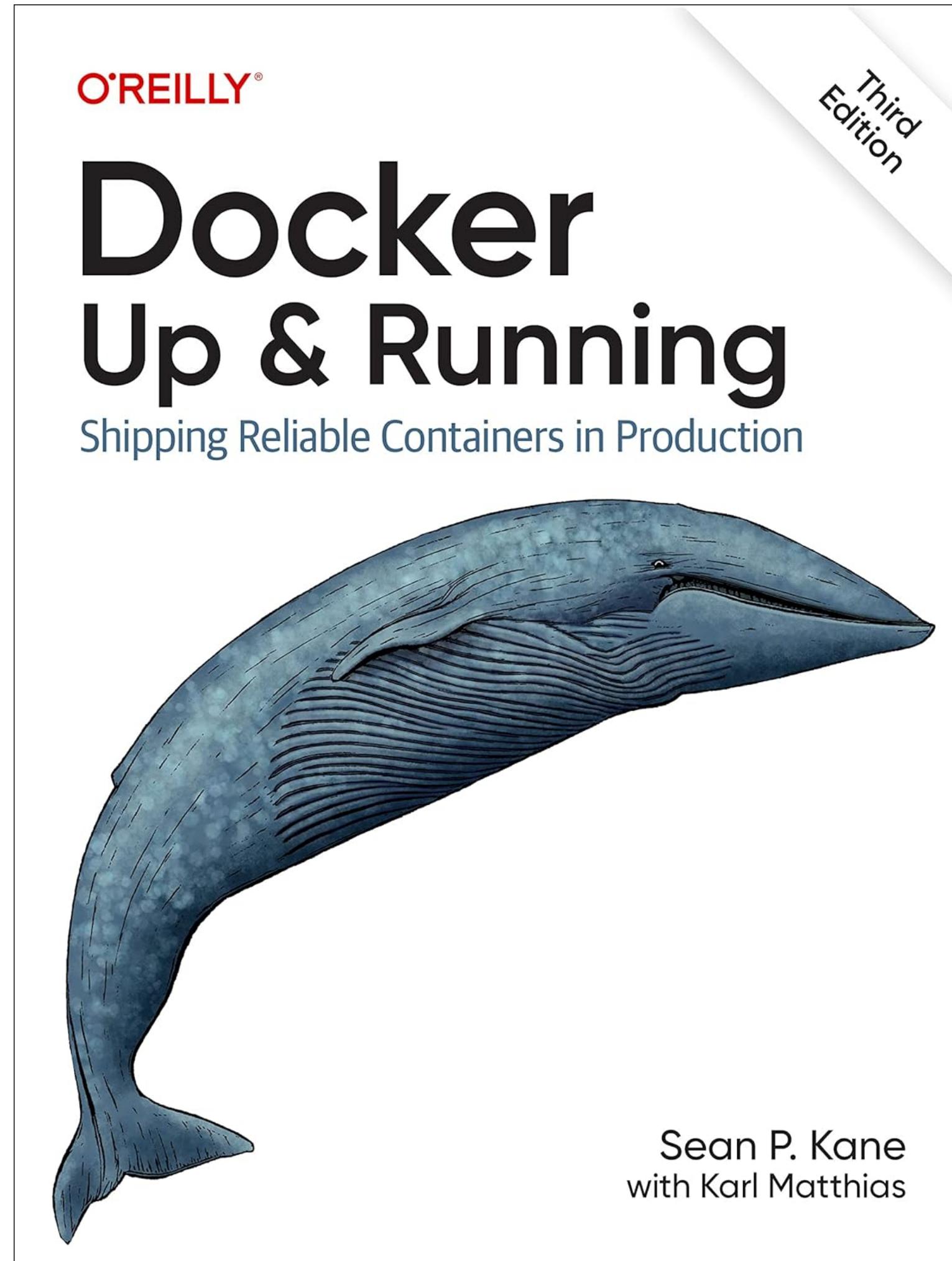
- Describe the changes you have made.
- Must follow the Conventional Commits format.

```
93fa221 Hein Meling Mon Jan 8 13:53:59 2024 +0100 fix(lab1): fixed doc format issue in errors task
90509b3 Hein Meling Mon Jan 8 13:51:13 2024 +0100 feat(lab1): implemented fibonacci sequence task
43a353c Hein Meling Mon Jan 8 13:49:57 2024 +0100 feat(lab1): implemented multiwriter task
9d5d0bf Hein Meling Mon Jan 8 13:49:39 2024 +0100 feat(lab1): implemented errors task
2693212 Hein Meling Mon Jan 8 13:44:50 2024 +0100 feat(lab1): implemented the cipher task
f6d8a83 Hein Meling Mon Jan 8 13:43:12 2024 +0100 feat(lab1): implemented stringer task
1f9a64a Hein Meling Mon Jan 8 13:40:55 2024 +0100 mc-go(lab1): answered go questions
88da89b Hein Meling Mon Jan 8 13:38:25 2024 +0100 token(lab1): ran generate_token on go1
23e522c Hein Meling Mon Jan 8 13:20:26 2024 +0100 mc-missing(lab1): answered missing semester questions
24cf9ac Hein Meling Mon Jan 8 13:19:01 2024 +0100 mc-shell(lab1): answered shell questions
31c4fa8 Hein Meling Mon Jan 8 13:17:54 2024 +0100 mc-git(lab1): fixed git answers
ce0027e Hein Meling Mon Jan 8 11:19:53 2024 +0100 mc-git(lab1): answered git questions
8133f91 Hein Meling Mon Jan 8 09:52:23 2024 +0100 lab1: first commit
```

# Study Resources

[dat515-2025.github.io/info/reading-material](https://dat515-2025.github.io/info/reading-material)  
[dat515-2025.github.io/info/papers](https://dat515-2025.github.io/info/papers)

- Some overview and research papers
- Tutorials and Blogs
- Lab assignments
- Project Information
- Lecture slides



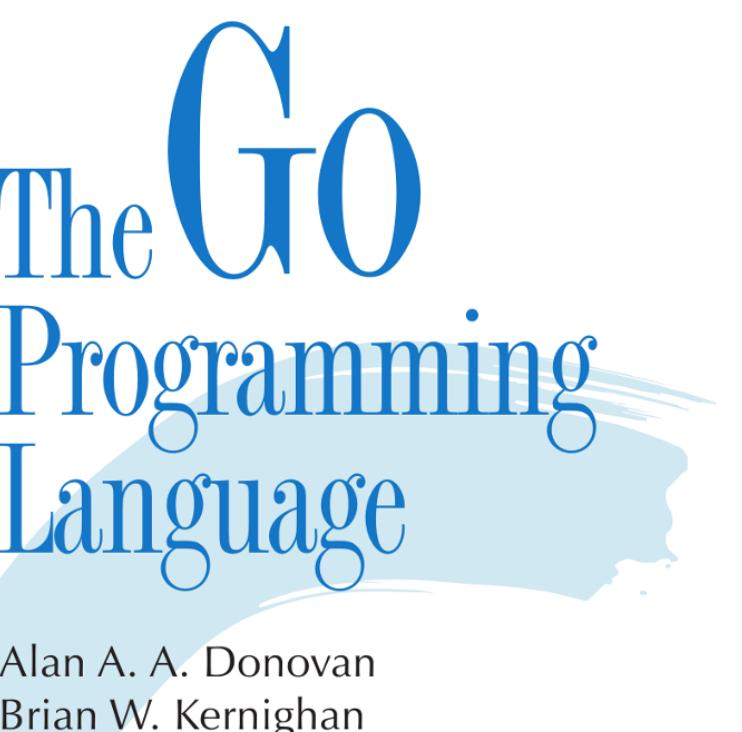
- Not mandatory reading, but they are nice if you like reading books.
- Online resources are sufficient to cover the course's topics.
- Links are included in slides and assignments.

# Important Online Resources

- <https://docs.docker.com/>
- <https://kubernetes.io/docs/home/>
- Optional: AWS Cloud Foundation Course
  - See the 7aws lab folder
  - Requires login; send a message on Discord #general channel to get access

## Links

- Official web page: [go.dev](https://go.dev)
- [A Tour of Go](#)
- [Effective Go](#)
- Other [Learning resources](#)
- [Standard library](#) and [Style guide](#)
- Video: [Go Tutorial](#) from freeCodeCamp.org (7 hours)
  - Beware: some information may be outdated!!



Alan A. A. Donovan  
Brian W. Kernighan



We want your feedback  
on the course

# Questions?