Networks, Servers, and Containers

Welcome to the Networks, Servers, and Containers course. This course is for M.Sc. Information Systems students, as well as anyone else, interested in the foundational but practical aspects of computer networks, server administration, and containerization. Through a series of lectures, videos, and exercises, you'll gain a practical and theoretical understanding of these core technologies and concepts.

Learning Goals

This course will equip you with the skills for in-depth analysis and practical implementation in the realms of networking, server management, and containerization. Focusing on technologies like **Docker** and server administration within **GNU/Linux** environments, the course introduces you to essential concepts for modern IT infrastructure.

You will learn to understand the architecture of computer networks, from the lowest link layer to the application layer, and how to manage servers, including file systems and remote access. The course also covers the principles of containerization using **Docker**, providing a robust framework for building and deploying applications.

Through practical projects and hands-on exercises, you'll learn to administer servers, manage multi-container applications, and craft robust network solutions, preparing you for a career in IT and data science by emphasizing analytical rigor and clarity in data presentation.

Course Structure

This course is structured to provide both theoretical knowledge and practical experience.

It consists **formally** of:

- 15 Lectures
- 6 Exercises

But the execution will be in a hybrid format:

- Some content is in person, in the classical frontal lecture format.
- Some content is in person, as exercises in class.
- Some content will be in the form of a video lecture.
    - Each video lecture has a corresponding Q/A session in class, which may also contain

additional material and/or exercises.

The lectures cover:

- Networks I
- Networks II
- Networks III
- [EXERCISE] Networks
- DNS
- WWW
- [EXERCISE] DNS + WWW
- GNU/Linux I
- GNU/Linux II
- GNU/Linux III
- GNU/Linux IV
- [EXERCISE] GNU/Linux-terminals-automation
- Introduction to Docker
- [EXERCISE] Introduction to Docker
- In practice: containers, data persistence, networks, environment
- Containerizing an app I
- Nginx and using it as a reverse proxy
- Deeper Dive Volumes and persistent data
- Deploying with Docker Compose I
- [EXERCISE] Deploying with Docker Compose II
- [EXERCISE] Exam preparation

Make sure to have a look at ILIAS to see what is being offered and when. **You need to watch the video(s) before attending the corresponding in-class event.**

Prerequisites

The course is as self-contained as possible.

While it does not have any formal prerequisites, basics of programming are essential. Some self-taught knowledge of the basic GNU/Linux command line will help you, but we will introduce the basics as well.

In this course, you will program and use the command line extensively.

You need a laptop for most of the sessions.

Course Materials

The course is 100% self-contained. No book purchase is needed. Attending lectures and labs, watching the videos, and studying from the slides covers all that is needed.

Course Evaluation

The evaluation for this course is based on a final written exam.

Contact Information

The course is held by:

- Prof. Dr. Daniel Graziotin, lecturer, exerciser, examiner, and responsible for the module.