Concurrency Theory

1: Introduction

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Course Participants

- Who are you?
- What is your study programme?
- What would you like to do in the future?
- Why did you register for this course?

Topic

- Concurrency Theory:
  The study of systems where multiple tasks run at the same time.

- Focus is on:

  - Models for the unambiguous definition of concurrent systems.

  - Definition of interesting properties (e.g., “no participant gets stuck”).

  - Reasoning techniques for proving interesting properties.

Course Structure

- Frontal Lectures.

- Exercises.

Course Material

- These slides.
- Online lectures notes.

Expected Learning Outcomes

- Represent concurrent systems in the abstract models covered in the course.
- Identify and formalise typical useful properties of concurrent systems.
- Prove properties of concurrent systems.
- Prove general properties of formal models for concurrency.

The General Objective

- Understand and reason about bleeding-edge techniques for concurrency.
- Many of these are already influencing the development of modern programming languages (Go, Jolie, Scala, …).
- Strong mutual influence with mathematical logic and category theory.

Evaluation and Assignment

- Written exam with exercises based on the content of the course.
- There is an obligatory assignment that you have to hand in during the course: solutions to a selection of exercises.
  - You must select exercises from the lecture notes for at least 6 points in total.
  - Each exercise is 1 point, unless marked with !.
  - Exercises marked with ! give 2 points.