



**Distributed Computer Systems Lab**

<http://disco.informatik.uni-kl.de>



# Quantitative Aspects of Distributed Systems (QuantAs)

## 0. Organization

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# Who are we?

- Prof. Jens Schmitt  
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- Michael Beck  
[beck@cs.uni-kl.de](mailto:beck@cs.uni-kl.de), room 36-440
- DISCO Lab: <http://disco.cs.uni-kl.de>
- Research Areas:
  - **performance of distributed systems**
  - security in distributed systems
  - wireless sensor networks
  - network calculus
  - ...



# The Lecture

- Web: <http://disco.informatik.uni-kl.de/content/QuantAs>
- Course Mode:
  - 2+1 (4 ECTS)
  - Lecture takes place every Tuesday, 11:45-13:15 in room 46-210
  - Exercises: every other week (roughly)
  - Oral exam
- Prerequisites:
  - Communication Systems (desirable)
  - Not to be at war with maths

# What it's gonna be about...

## There is more than protocols and headers ...

- *Networks* are inherently shared systems and thus often *performance bottlenecks*
- *Performance management* takes an important role and happens on *multiple time-scales*
- The underlying techniques to design, optimize, tune, and control the performance in networks are *mathematical* in nature (finally you can apply it 😊)
  - Optimization
  - Graph Theory
  - Probability
  - Algebra, ...

## → Performance Management of Communication Networks on Different Time Scales

# Course Overview

1. Introduction & Motivation
2. Long-Term Performance Management
  - Network Design
  - Traffic Modelling
3. Medium-Term Performance Management
  - Traffic Engineering / Routing
  - Content Distribution / Caching
4. Short-Term Performance Management
  - Packet-Level Dynamics
  - Packet Scheduling
5. Conclusion and Outlook

# Course Material

- Slides will be made available via Web as we go
- Literature:
  - No single book, but ...
  - Many articles
    - We give references throughout the course