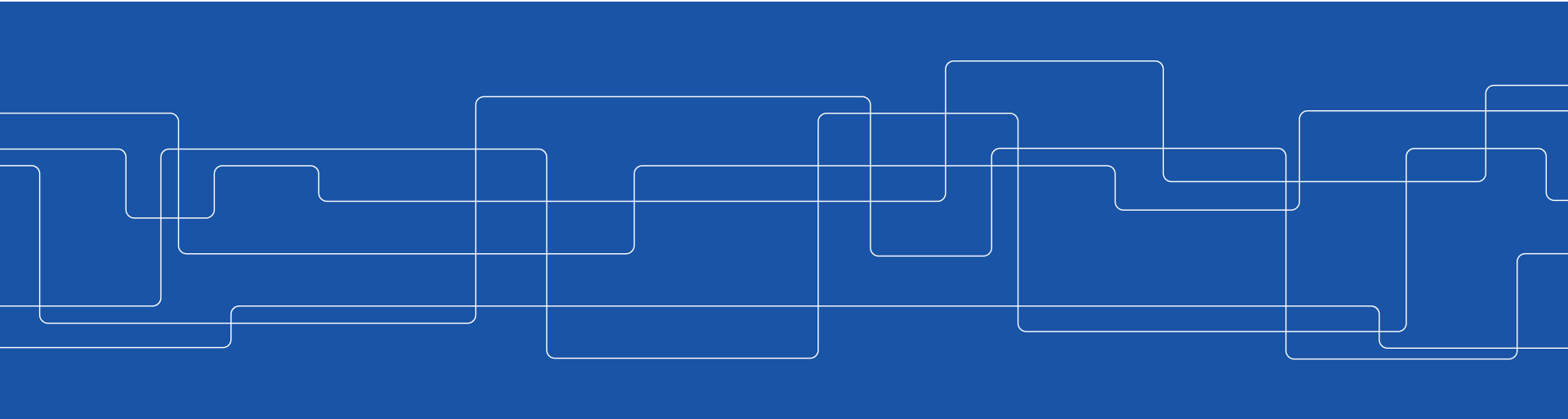
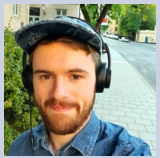
KTH ROYAL INSTITUTE
OF TECHNOLOGY

ID2201 Distributed Systems Course Overview

Vladimir Vlassov



Course Staff

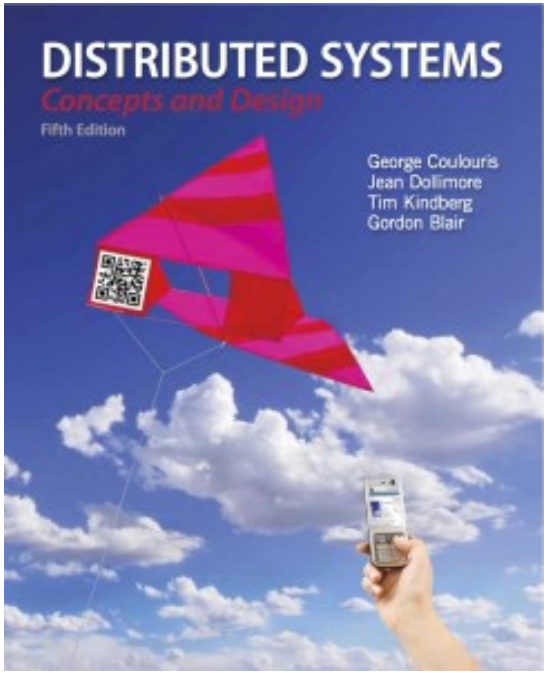
Lecturers, Examiners		Teaching Assistants	
Vladimir Vlassov Professor, PhD vladv@kth.se		Júlia Tribó Cabré Master student juliatc@kth.se	Eugene Park Master student epark@kth.se
Ahmad Al-Shishtawy Assist. Professor, PhD ahmadas@kth.se		Paul Hübner Master student phubner@kth.se	Ping Yu Master student pingyu@kth.se
Klas Segeljakt PhD student klasseg@kth.se			

Course goal

- explain important characteristics of distributed systems
- describe architectural and fundamental models of distributed systems
- explain and compare strategies for inter-process communication
- explain and compare middleware models
- explain and compare name services
- explain the concept of logical time
- use the logical time to implement distributed algorithms

Literature

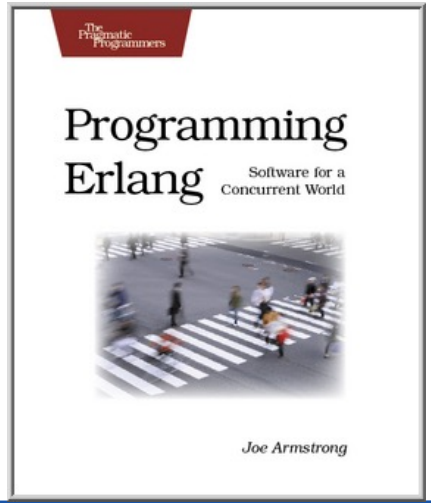
- "***Distributed Systems – Concepts and Design***",
- 5'th edition (4'th ok)
- Coulouris et al,
- Addison Wesley (www.cdk5.net)



Erlang

- "***Erlang Programming***",
- Francesco Cesarini and Simon Thompson
- O'Reilly

- "***Programming Erlang***"
- Joe Armstrong
- Pragmatic Programmer



Lectures

Fourteen lectures will mostly follow the course book.

Do read in advance!

Erlang is only given one lecture; you're expected to pick up a new language on your own.

Slides and videos will be available on the web in Canvas.

Lectures

1: Introduction - what is a distributed system, and why is it different [Chapters 1 and 2]

2: Erlang - concurrent and distributed programming in Erlang.

3: Networks and process communication - things you might (or should) know, but we'll go through them again [Chapters 3 and 4]

Lectures

4: Remote invocation - language constructs to program distributed systems [Chapter 5]

5: Indirect Communication - group communication, publish/subscribe, and message queue systems [Chapter 6]

6: File systems and Name services - the problems of a distributed file system, performance, consistency [Chapters 12 and 13]

Lectures

7: Time - a simple thing that turns out to be very complex [Chapter 14.1-4]

8: Global state - can we describe the state of a distributed system and what can we determine[Chapter 14.5]

9: Coordination and agreement - how do we agree, and how do we know that we agree? [Chapter 15]

Lectures

10: Transactions - how can we make a set of operations behave as an atomic operation? [Chapter 16]

11: Distributed transactions - now how do we solve it if we have multiple servers [Chapter 17]

12: Replication - building fault-tolerant systems [Chapter 18]

Lectures

13: Distributed Hash Tables - why do hashing? [Chapter 10]

14: Summary … and the price of olive oil

Homework and Reporting Sessions

You must perform ***five homework (HW1-HW5)*** to be presented, demonstrated, discussed, and examined at ***five corresponding reporting sessions.***

- *Help sessions (Räknestugor) – to get help*
- *Reporting sessions (Redovisning) – to report your HW*

HW0 on Erlang is not compulsory.

Following HWs (HW1-HW5) and reporting sessions:

- Book time slots (links will be provided in Canvas) to report your homework
- Submit your homework (code and written report) in a zip file to Canvas before/on the corresponding deadline
- Present and demonstrate your solution at a reporting session

Homework

- ***Erlang*** – no HW, only helping session, not compulsory

1. ***Rudy*** - a small web server
2. ***Routy*** - message routing
3. ***Loggy*** - logic time logger
4. ***Groupy*** - group communication
5. ***Chordy*** - a distributed hash table

Homework Grading and Bonus Policy

- You pass the homework if you complete and present it and a teaching assistant accepts your solution.
- **For each homework, you get 3 (three) bonus points added to the exam score if you submit your homework on the due date and pass it at a reporting session.**
  - **The bonus is not given if you miss the deadline or do not pass the homework.**
  - **Each homework includes an optional task for one extra bonus point**, such as implementing suggested improvements or performing experiments.
    You get an extra bonus for the optional task if you have done it, submitted it on time, and it is accepted.
  - The awarded points can be reduced for errors and poor, inefficient solutions.
- If you fail to present and demonstrate your homework, you have failed the homework and will have to redo it and present it again. In this case, you lose the bonus.

Examination

- ***LAB1 - Approved 5 (five) assignments graded Pass/Fail***
  - Complete tasks and submit them to Canvas on/before the due date
  - Present and demonstrate at a reporting session
- ***TEN1 - An approved written exam graded A-F***
  - A proctored computer-based closed-book exam in Canvas guarded by invigilators in computer rooms at KTH.
  - The exam consists of questions of different types, e.g., Multiple Choice, Multiple Answer, True/False, and Numeric, to be answered in Canvas.

Lectures, help and reporting sessions

- All course activities, including lectures, help, and report sessions, exam, will be carried out at the KTH Kista campus
    1. ID2201 lectures
    2. ID2201 help session and reporting sessions

- Help and reporting sessions will be hosted by course TAs
    - Júlia Tribó Cabré, juliatc@kth.se
    - Eugene Park, epark@kth.se
    - Paul Hübner, phubner@kth.se
    - Ping Yu, pingyu@kth.se