# *Distributed Systems*

## Course Overview

Werner Nutt



## Aims

- Introduce the principles and concepts involved in the design of distributed systems
- Familiarise students with protocols and interfaces used in the construction of distributed systems
- Enable students to realise themselves simple distributed systems

# Outline (tentative)

- Introduction to Distributed Systems
  - Definition, Examples, Challenges
- Networking Foundations
  - Network characteristics relevant for DS
  - Network principles, Internet protocols (IP, UDP, TCP)
- System Models
  - Architectures, Interaction, Failures, Security
- Concurrent Programming
  - Threads in Java
- Interprocess Communication
  - APIs for Internet protocols, data marshalling
  - Communication models



# Outline (tentative)

- Distributed Objects
  - Remote Method Invocation (RMI), RMI in Java
- Naming
  - Names, Addresses, Name Resolution
  - Internet DNS
- Time and Clocks
  - Clock synchronisation, logical clocks
- Coordination
  - Mutual exclusion, elections, multicasts
- Fault Tolerance
  - Two Phase Commit

# Textbooks

- Tanenbaum, van Steen.
  Distributed Systems. Principles and Paradigms.
  Prentice Hall

- Tanenbaum.
  Computer Networks.
  Prentice Hall
  Both books by Tanenbaum are written in a lively style and make for good reading

- Coulouris, Dollimore, Kindberg.
  Distributed Systems. Concepts and Design. 3rd and 4th ed.
  Addison Wesley
  Used for chapters on interprocess communication and distributed objects.



# Exam

- Written exam in January/February
  - conceptual questions
  - programming questions

- Final mark
  either: 100% exam mark
  or: 70% exam mark + 30% exercise mark
  whichever is higher

# Labs

- Lab tutors: Paul Knoll, Werner Nutt
- Labs:
  - Introduction to technologies
    - Networking, routing with Cisco routers (10/11, 17/11, 1/12)
    - Interprocess communication
    - Remote Method Invocation
    - Threading and synchronization
    - Name services
    - etc.
  - Programming support for exercises
- Coursework:
  - Elaboration of networking and routing exercises
  - Little programming exercises (in groups of 2)



# Coursework: Rules

- For the coursework you submit you will receive marks
- It is expected that the submissions represent your own work
  - This is not the case if parts of text or code are taken from sources on the web or from other students
  - Copying, e.g. from the web or from other students, will be considered as plagiarism
- Plagiarism will not be tolerated:
  - A single attempt will result in a mark of 0 awarded to all coursework, that is, the entire work for the coursework will be invalidated by one incident of plagiarism
  - In more severe cases, students can be excluded from the exam in January/February

# Schedule

| | Mon | Tue | Wed | Thu | Fri |
|---|---|---|---|---|---|
| 08:30<br>10:30 | | Lecture<br>*Nutt* | | | |
| 14:00<br>16:00 | | Office hour<br>*Nutt* | | | |
| 16:00<br>18:00 | | Lab<br>Group A<br>*Knoll/Nutt* | | | |
| 18:00<br>20:00 | | Lab<br>Group B<br>*Knoll/Nutt* | | | |



# Contact

- Office hours
  Di, 14:00 – 16:00
- Email
  nutt@inf.unibz.it
- Course web pages
  http://www.inf.unibz.it/~nutt/DSs0910.html
- Labs: Knoll/Nutt