UNIVERSITY OF TARTU
Institute of Computer Science

LTAT.06.007 Distributed Systems

Course overview

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Course overview

- Basic (Lectures 1-5)
  - Computer networking
  - RPC and threads
  - System architectures
- Intermediate (Lectures 5-10)
  - Coordination of parallel processing, and mutual exclusion
  - Data consistency models and management
  - Scalability and performance
- Advanced (Lectures 10-15) – **Invited instructor**
  - Fault tolerance
  - Replica management
  - Recovery

Course overview

- Fundamental principles
  - Concepts and definitions (in lectures)
- Practical work
  - Exercises (in the seminar) – **Zhigang Yin and Mohan Liyanage**
- Discussion on emerging topics
  - Distributed ledger
  - Opportunistic networks

Course requirements

Important to know before taking this course!

- Do you need to have basic programming skills?

Answer: Yes

LTAT.03.001 Computer programming

LTAT.06.004 Network Technology I

- Is the course focus on a particular technology?

Answer: The course will rely on Java and Python to teach fundamental concepts.

Course requirements

Important to know before taking this course!

```java
import java.util.ArrayList;

public class ListComprehension {

    public static void main (String[] args) {

        ArrayList<Integer> list = new ArrayList<Integer>();
        //for (i in Range.between(0, 10)){
        for(int x = 0; x < 10; x++){
           int num = x + 10;
           list.add(num);
        }

        System.out.println(list.toString());
    }

}
```

This is a data structure (not a network)

```java
 */
public class Parser {
  private File file;
  public synchronized void setFile(File f) {
    file = f;
  }
  public synchronized File getFile() {
    return file;
  }
  public String getContent() throws IOException {
    InputStream i = new FileInputStream(file);
    String output = "";
    var data;
    while ((data = i.read()) > 0) {
      output += (char) data;
    }
```

...

This is an input parser

Course schedule

- Lecture meetings
  - Monday 10:15-12:00 in Delta, Narva mnt 18 - 1021
- Weekly exercise sessions
  - Seminar (Group 1): Narva mnt 18 – 2048; Wednesday 10:15-12:00
  - Seminar (Group 2): Narva mnt 18 – 2048; Friday 12:15-14:00
- Exam (tentative) – Two options (you can just take one)
  - Beginning of June (TBD)
  - Moodle version
  - There will be time limit
  - Exams are completed individually

    No digital talks/chats/etc.
- Resit is just available for those that obtained a negative result (Not for grade improvement)

Course grading (Terminology)

- **Lectures** cover concepts and fundamental aspects of Distributed Systems
  - **Mini-projects** are assigned during lecture times, and are submitted in a specific deadline (a mini-project is completed by a group or individually)
- **Practical seminars** cover programming and written exercises about a topic, e.g., using JMeter.
  - **Exercises** are perform during the seminar. Exercises have to be completed and submitted (at home if seminar time is not enough)

    Exercises must be completed before the next seminar (upload through the course webpage)
  - **Quizzes** are also part of the practical seminar. Moodle will be used to conduct the quizzes. **You will have 2 attempts to complete a quiz.**

Course grading (Terminology)

- Students (assigned with pseudonymous) collect points during the course. *Ongoing results are updated weekly (see course website)*
  - Mini-projects
  - Exercises + Quizzes
- Bonus points will be available in each mini-projects. These points are **optional,** and will not influence your overall grade. However, you can improve your overall grade with bonus points.
  - **Bonus points are given when the result of that extra work is correct. No bonus points are given for attempts.**
- Be careful with plagiarism (presenting similar mini-projects/exercises, uncited work)

Course grading (Summary)

- Exam **40pts**
  - **You need to score half points to pass (MANDATORY)**
- Practical work **60pts**
  - 2 mini-projects **(30pts) – Bonus points (if any) are announced within the project description**

    Within each mini-project description are described grading instructions based on implementations of functions and standard answers
  - Quizzes **(15pts)** / exercises **(15pts)**

Total = Mini-projects (30) + Practical (Exercises + Quizzes) (30) + Exam (40)

Total = 100 + Bonus (if you have any)

Course grading

Points collected are then converted into a grade

Grade	Points
A	91-100
B	81-90
C	71-80
D	61-70
E	51-60
F	50 and below

Course book

Van Steen, Maarten , Tanenbaum, Andrew. Distributed Systems: Principles and Paradigms (Third edition). Published by Maarten van Steen, 2017. [Previous versions published by Pearson]
Free download from https://www.distributed-systems.net/

Other usefull course books:

- **Ghosh, Sukumar.** Distributed systems: an algorithmic approach (second edition). Chapman&Hall/CRC, 2015. Author's own course material, Spring 2015: http://homepage.divms.uiowa.edu/~ghosh/16615.html

- **Coulouris, George, Dollimore, Jean, Kindberg, Tim**: Distributed Systems: Concepts and Design [5th Edition], Addison-Wesley 2012

Discussions

The lecture sessions will be based on discussions. Everybody participates.

- Step 1: Pair discussion for two minutes,
- Step 2: Collect the points together

Tools for online communication:

- Slack (Message board)
- Moodle
- E-mail

Questions?

E-mail: huber.flores@ut.ee

Let’s get into it!