Sistemas Distribuídos

Introduction to SD

Eurico Pedrosa

António Rui Borges

Universidade de Aveiro - DETI

2025-02-12

Introduction

Objectives

- Familiarize students with **principles** and **practical** design of **distributed systems** through key implementation concepts.
- Introduce **fundamental paradigms** of **process communication** and **synchronization in a distributed environment**.

Learning Outcomes

By the end of this course students will:

- Understand key issues in **distributed system** design.
- Develop skills in **design** and **implementation** of **simple distributed applications**.
- Familiarize students with **Java distributed programming**.

Prerequisites

- **Basic knowledge** of **operating systems** and **multiprogramming**.
- **Experience** in applying the **object-oriented paradigm** to design solutions.
- **Proficiency** in **sequential programming** and familiarity with **concurrent programming principles**.

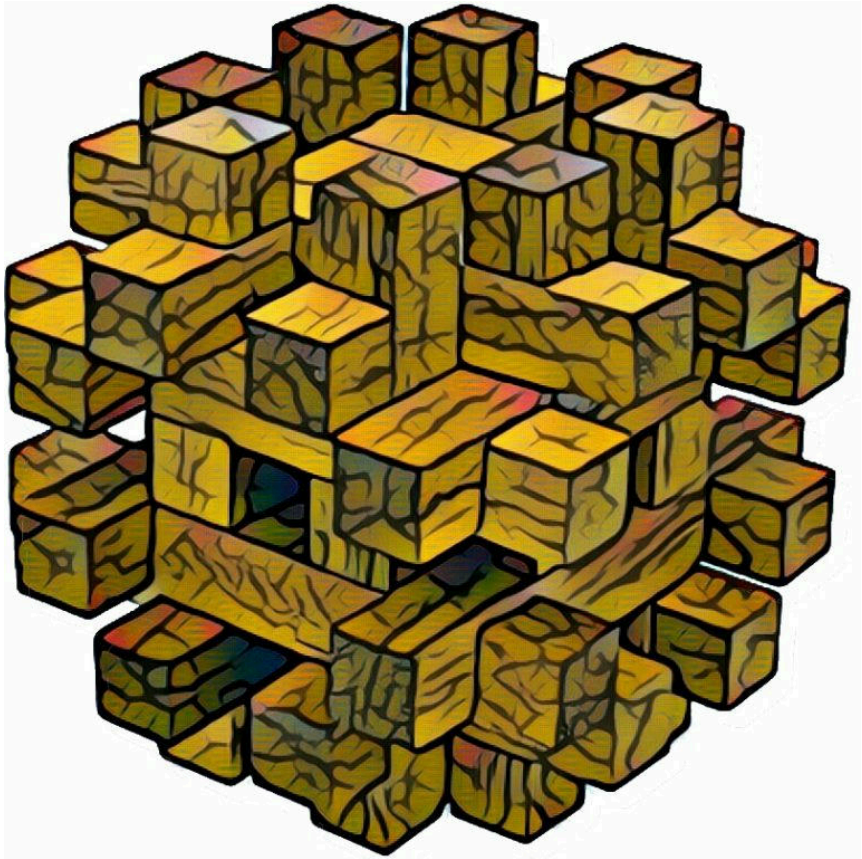
Syllabus

- Introduction to Java
- Distributed Systems
- System models
- Interprocess communication and synchronization
- Client-server models
- Group communication models
- Consistency and replication
- Security

Main Bibliography

- Distributed Systems – Principles and Paradigms, Tanenbaum A.S. e Steen M.v., Pearson Education International / Prentice Hall, 200
- Distributed Systems – Concepts and Design, Dollimore J., Kindberg T. e Coulouris G., Addison Wesley / Pearson Education Ltd, 2005
- Distributed Systems – An Algorithmic Approach, Ghosh S., Chapman & Hall CRC Computer and Information Science Series, 2007

Main Bibliography



- M. van Steen and A.S. Tanenbaum, Distributed Systems, 4th ed., distributed-systems.net, 2023.
- I recomend you get this book
  - http://www.distributed-systems.net/

Lectures & Lab Classes

Lectures

- Lectures cover key topics from the syllabus.
- Students are encouraged to actively participate in discussions, fostering critical reasoning and problem-solving skills.

Lab Classes

- Labs emphasize the principle **"learning by doing"** and focus on discussing implementation strategies for solving specific problems.

Lectures & Lab Classes

Work Assignments

- Assignment 1 - **Concurrency**
  - **Pure concurrent** implementation of the problem on a **single platform**.
- Assignment 2 - **Message Passing**
  - **Distributed implementation** using **message passing** across **multiple platforms**.
- Assignment 3 - **Remote Method Invocation**
  - **Distributed implementation** using **remote method invocation (RMI)** across **multiple platforms**.

Group Work

- Students collaborate in groups of three (3). Each group must:
  - Present their approach to problem-solving.
  - Defend their implementation during a dedicated query session.

Grading

$$\text{course grade} = \frac{5 \times \text{theorical mark} + 5 \times \text{lab mark}}{10}$$

- Rounding is always done half up to the nearest whole number, except when the lab mark exceeds the theoretical mark by more than three points; in this case, rounding is performed half down.
- **Theoretical grading:**
  - Written examination (época normal ou época de recurso).
- **Lab grading:**
  - Comprised of Work Assignments 1 through 3, with each carrying equal weight.

Grading

- **Pass:** Both theoretical and lab marks must be **8.5 or higher**, and the overall course grade must be **10 or higher**.
- **Fail:** Any of the following:
  - Theoretical mark is below the minimum required.
  - Lab mark is below the minimum required.
  - Final grade is below 10.
- **Fail by Absence (regular student)**
  - More than **two** lab classes are missed – $14 \times 20\% = 2.8$.
    - Regulamento de Estudos da Universidade de Aveiro (REUA) - Regulamento 833/2021, publicado em Diário da República, 2ª Série de 3 de setembro de 2021, Artigo 18.º, n.º6.

Final Remarks

- The lab mark is limited to 17 units
  - A higher grade may require an additional assigment.
- **Important Dates**
  - deadline for work assignment 1 ⟶ 23 de Março de 2025
  - deadline for work assignment 2 ⟶ 11 de Maio de 2025
  - deadline for work assignment 3 ⟶ 8 de Junho de 2025
- All documentation about the course is available on the eLearning platform (Moodle).
- For further questions, refer to the course operational document or contact me directly.