Sistemas Distribuídos

General Description

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Bolonha Model

- It promotes a student-centred teaching by
  - stimulating an autonomous learning
  - proposing the *problem solving* paradigm as the main methodological strategy for teaching
  - stressing the development of specific skills vs. a more or less automatic building up of general knowledge.
- It establishes very precise metrics on the work being carried out
  - the academic week is defined to be 40 hours of effective work, meaning a total of 30 ECTS credits
    - 1 ECTS = 4/3 h of weekly study
  - each course of the curriculum is assigned a very definite work load
    - SD: 6 ECTS $\Rightarrow$ 8 h of weekly study (attending classes + home work).

Main Objectives

- to acquaint the students to the principles and the underlying practice of the design of distributed systems through the presentation of the most important concepts about their implementation
- to introduce the most important paradigms of process communication and synchronization in a distributed fashion.

Learning Outcomes

- to gain a good understanding on the main issues related to the conception of distributed systems
- to develop skills for the design and the implementation of simple distributed applications
- to acquaint the students with the functionality of Java distributed programming environment.

Prerequisites

- basic knowledge about operating systems and multiprogrammed environments
- working knowledge of the application of the object oriented paradigm to the design of solutions
- working knowledge of sequential programming and some knowledge of the principles of concurrent programming.

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, 2006
- *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

Important note – One of these books should be really read!

Lectures

Lectures present specific topics of the syllabus. The adopted approach tries to entice the students to participate actively in the discussion and to help them to develop skills of critical reasoning and to learn general techniques of problem solving.

A recording of the each lecture will be made available.

During the allotted period of time, the students are invited to present their doubts by e-mail. A detailed answer will be given as soon as possible and both the questions (in an anonymous way) and the answers will be posted in the elearning site for general consultation.

Lab classes - 1

Labs follow the motto "*you learn by doing*" and are mostly devoted to discuss implementation issues about the solution of a general problem.

***Work assignment* 1 – Concurrency**

Pure concurrent implementation of the problem running in a single platform.

***Work assignment* 2 – Message passing**

Distributed implementation of the problem, based on message passing, running in multiple platforms.

***Work assignment* 3 – Remote method of invocation**

Distributed implementation of the problem, based on method invocation on remote objects, running in multiple platforms.

Students are organized in working groups composed of two elements. Each group must present and defend its approach to the solution and its implementation during a query session.

Lab classes - 2

Labs will start remotely due to the COVID 19 pandemic, but it is expected for them to resume in site at rooms 101 and 102 as soon as conditions will allow it.

During the remote period, operating conditions will depend on the instructor in charge of the lab. Prof. Óscar Pereira will announce how he wants to proceed for his own classes. As for myself, a short recording of the theme to be dealt with will be made available. The students are invited to work on their own, or in group, and present their doubts by e-mail. A detailed answer will be given as soon as possible and both the questions (in an anonymous way) and the answers will be posted in the elearning site for general consultation.

When in site, each lab class is split in two halves and the students are assigned for the duration of the semester to one of the rooms. After the assignment is made, no changes will be allowed.

A record of the students present at each room for each class will always be made and will be reported to the health authorities if requested.

An effort will always be made to ensure the proper operating conditions as prescribed by the health authorities.

Tutorials

Tutorials take place every week on Thursdays, at 14h.

For some of them, a recording of the solution to a specific problem will be made available. For all of them, the students are invited to present their doubts by email. A detailed answer will be given as soon as possible and both the questions (in an anonymous way) and the answers will be posted in the elearning site for general consultation.

They will have, when a recording is made available, an expositive character and aim to help the students to overcome deficiencies in background knowledge as well as to provide a space for the discussion of particular aspects of the course.

Grading - 1

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

- rounding is always carried out *half up* to unities, except when the lab mark is higher than the theoretical mark by more than three units; in this case, rounding is carried out *half down*
- *theoretical grading*
  - written examination (época normal ou época de recurso)
  - challenge placed during lectures (optional)
  - *minimum mark* equal to 8,5 units (always rounded to unities)
- *lab grading*
  - composed of *work assignment* 1 and *work assignment* 2, each having equal weight
  - *minimum mark* equal to 8,5 units (always rounded to unities)

Grading - 2

- *Pass*
  - both theoretical and lab marks higher or equal to 8,5 units ***and*** course grade higher or equal to 10 units
- *Fail*
  - theoretical mark lower than minimum mark ***or*** lab mark lower than minimum mark ***or*** final grade lower than 10 units
- *Fail by minimum mark*
  - lab mark lower than minimum mark
- *Fail by absence (regular student)*
  - missing more than seven lab classes

Final remarks

- the lab mark is limited to 16 units
  - a higher grade requires an additional assignment
- special dates
  - deadline for delivering work assignment 1: 25 de Abril de 2021
  - deadline for delivering work assignment 2: 23 de Maio de 2021
  - deadline for delivering work assignment 3: 27 de Junho de 2021
- all documentation about the course can be found in the *elearning* site (moodle)
- any further questions may be answered by the course operational document or by myself.

elearning site