

Course introduction

Computer Architecture

Grupo ARCOS
Departamento de Informática
Universidad Carlos III de Madrid

1 Overview

2 Resources

3 Assessment

1 Overview

- Objectives and competences
- Audience
- Program

Course

- **Goal:** to achieve that students know the basic concepts related to the **computer architecture** and the impact that these concepts have on the **performance of applications** and computer systems.

Competences and skills

- To achieve this **goal**, the student will gain insight in the following **skills**:
 - Ability to know, understand and evaluate **computer architecture**, as well as its **basic components**.
 - Knowledge and application of fundamental principles and basic techniques for **concurrent and parallel programming**.
 - Ability to analyze and evaluate computer architectures, including **parallel platforms**, as well as to be able to develop and optimize **software for those architectures**.

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Audience

■ Computer Architecture

- **Degree:** Bachelor in Computer Science and Engineering.
- **Type:** Compulsory. Common to Computer Science and Engineering.
- **Year:** 3.
- **Semester:** 1.
- **Credits:** 6 ECTS.

■ Previous knowledge:

- **Computer Structure.**
- **Operating Systems.**
- **Programming.**



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Contents

- 1 Fundamentals of computer design.
- 2 Performance evaluation in computer systems.
- 3 Instruction Level Parallelism.
- 4 Memory hierarchy.
- 5 Introduction to multiprocessors.
- 6 Parallel and concurrent programming models.

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References

■ Basic reference:

- **Computer Architecture: A quantitative approach, 6th Edition.** Hennessy, JL and Patterson, DA. Morgan Kaufmann, 2017.

■ Additional references:

- **Computer Organization and Design, 5th Edition.** Patterson, DA and Hennessy, JL. Morgan Kaufmann, 2013.
- **C++ Concurrency in Action. Practical Multithreading, 2nd Edition.** Williams, A. Manning. 2018
- **Patterns for Parallel Programming.** Mattson, TG, Sanders, BA and Massingill, BL. Addison-Wesley. 2004.
- **Computer Organization and Architecture. 9th Edition.** Stallings, W. Addison-Wesley. 2012

Other material

- Slides contents used in class will be published through *Aula Global*.
- **VERY IMPORTANT NOTICE:**
 - Slides and other materials published through *Aula Global* is just a **class outline**.
 - They are not the course materials
 - Only knowing the contents of those class outlines is insufficient for achieving the course goals.
 - You are very likely to fail if you do not do more.
 - It is highly recommended to use, study, and work with basic and additional references.
 - e.g.: solve yourself recommended exercises from books.



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Assessment System

- In summary:
 - **Final exam:** 50% of final score.
 - All contents included (theoretical, practical, and projects).
 - **Continuous evaluation:** 50% of final score.
 - **Tests:** 15% of final score.
 - **Projects:** 35% of final score.
 - Evaluation rounds:
 - Ordinary round: January.
 - Extraordinary round: June.

Continuous evaluation

- Good continuous evaluation scores are **key** for success.
- **Elements:**
 - **Midterm exam:** 15% of final score.
 - **Projects:** 35% of final score.
- You **have not followed** continuous evaluation:
 - if you get less than 2.0 in a project/lab, or,
 - if you get less than 4.5 in the average of all projects.

Ordinary round: Continuous evaluation

- If you follow the continuous evaluation process:
 - **Final exam:** 50%.
 - Minimum required: 4.0.
 - **Tests:** 15%.
 - Minimum required: There is no minimum.
 - **Projects/Labs:** 35%.
 - Minimum required per project/lab: 2.0.
 - Minimum average required for all projects: 4.5.
 - If you do not achieve a minimum average is not computed and **you have failed**.
- **Bonus:**
 - 1 point is added to your score if:
 - You got at least 7.0 points in continuous evaluation, and,
 - You got at least 6.0 points in the final exam.

Tests

- Tests through *Aula Global*.
 - Attending to class may be a requirement.
- Each test may include:
 - Multiple choice questions.
 - True/false question.
 - Free text questions.
 - Numeric problems.
 - ...
- Wrong answers may lead to negative marks.
- Dates for each test will be announced in class.
- Final mark computed as average of individual tests marks.

Completing the tests

- Tests performed in the classroom.
 - Bring your device.

- For every test:
 - Maximum completion time.
 - Never less than 10 minutes.
 - Additional rules:
 - Example: Negative value of wrong answers.

- Study before doing the test.

Labs/Projects

- Three lab sessions.
 - Performed during lab sessions.
 - Individual test at the end of session or after the session during a given period.
 - Each lab: 5% of total mark.
 - Minimum mark: 2 over 10.
- One parallel programming project.
 - Developed using OpenMP and C++ language.
 - Groups of 4 people.
 - Performance is evaluated both in sequential and parallel versions.
 - Marks include quality of code, tests, and performance evaluation.
 - Quality of project report.
 - Minimum mark: 2 over 10.

Ordinary round: NON-Continuous evaluation

- If you did not follow the continuous evaluation process:
 - Final exam is worth 60% of final score.
 - You need 8.33 in the final exam to pass the course.

- **ADVICE:**
 - Try hard to follow the continuous evaluation process.

Extraordinary round

- Extraordinary exam to be held in June.
- Rules:
 - 1 Student completed continuous evaluation:
 - Extraordinary exam gives 50% and continuous evaluation gives 50%.
 - Only applied if the score in exam is at least 4.0.
 - 2 Student did not complete continuous evaluation:
 - Final exam gives 100%.
- For students having completed continuous evaluation best of two options is taken.

Evaluation tests and exams

- **VERY IMPORTANT:**
 - Non showing-up to the final exam means you will be scored as **NON-PRESENTED**, regardless any other scores.

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