DEGREE CURRICULUM

COMPUTACIO DISTRIBUIDA

Academic year 2013-14

DISTRIBUTED COMPUTING 2013-14

Subject's general information

Subject name	COMPUTACIO DISTRIBUIDA
Code	102041
Semester	1r Q Avaluació Continuada
Typology	Obligatòria
ECTS credits	9
Theoretical credits	0
Practical credits	0
Department	Informàtica i Enginyeria Industrial
Teaching load distribution between lectures and independent student work	Total load: 225h - Lectures (40%) = 90h - Independent work (60%) = 135h
Important information on data processing	Consult this link for more information.
Language	English
Office and hour of attention	Contact the teacher by e-mail, or going to the Office 3.17, EPS Building.

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Lérida Monsó, Josep Lluís

Competences

GII - C1. Ability to have a thorough understanding of the fundamental principles and models of computation and learn to apply them to interpret, select, assess, model and creating new concepts, theories, applications and technological developments related to computer science.

GII - C2. Ability to understand the theoretical foundations of programming languages ??and techniques lexical processing, syntactic and semantic associates, and apply them to create, design and processing languages?.

GII - C3. Ability to evaluate the computational complexity of a problem known algorithmic strategies that may lead to resolution and to recommend, develop and implement one that guarantees the best performance according to the requirements.

GII - C4. Ability to learn the fundamentals , techniques and paradigms of intelligent systems and analyze, design and build systems, services and applications that use these techniques in any scope.

GII - C5. Ability to acquire, obtain, formalize and represent human knowledge in a computable way to solve problems using a computer system in any scope, particularly those related to aspects of computing , perception and action environments or environments intellectual Smart.

GII -C6. Ability to develop and evaluate systems and interactive presentation of complex information and its application to solving design problems Computer Interaction.

GII - C7. Ability to understand and develop learning techniques and computational design and implement applications and systems using them, including those devoted to extracting information and knowledge from large volumes of data.

Subject contents

1. Introduction

    1.1 Evolution of Computing.

    1.2 What is distributed Computing?

    1.3 Distributed System Architectures

    1.4 Applications of Distributed Systems

2. Distributed Computing Paradigms

    2.1 Background

    2.2 Message Passing

    2.3 Client-Server and Peer-to-Peer

    2.4 Remote Procedure Calls

    2.5.Message system: Point-to-point; Publish/Subscribe

    2.6.Distributed Objects: RMI, Object request broker, Object space

    2.7.Mobile agents

    2.8.Network services

2.9.Collaborative applications

2.10. Shared-Memory Programming

2.11. Cases of Study

3. Message-Passing Programming

3.1 Parallel programing

3.2 The Message-Passing model

3.3 The Message-Passing Interface

3.4 Circuit Satisfiability

3.5 Introducing Collective Communication

3.6 Case Study

4. Shared-Memory Programming

4.1. Introduction

4.2. The Shared-Memory Model

4.3. Parallel for Loops

4.4. Declaring Private Variables

4.5. Critical Sections

4.6. Reductions

4.7. Data Parallelism

4.8. Function Parallelism

4.9. Case Study

5. Combining MPI and OpenMP

5.1 Introduction

5.2 Profiling a MPI Program

5.3 Parallelizing selected Functions

5.4 Benchmarking

Methodology

The classroom sessions will be divided in three different main types: Lectures, exercices and practical sessions. The first three weeks of this course are most theorical, for introducing the students in the main course topic. The rest of sessions will combine exercises and practises, with some lectures for presenting and discussing the basic concepts of each topic.

Some classroom exercises will be counted along with classroom practices. In addition, during the course will be a group project culminating in a final oral presentation.

Classroom participation is considered essential and will be taken into account in the evaluation of the various activities. The use of English in the classroom and contributions will be considered a relevant factor in the assessment.

Evaluation

The course is approved with a final mark greater or equal to 5, and having passed the laboratory practices (least a mark of 4).

The final mark will be obtained from the weighted sum of the two Assessment Test, Practices, the class participation and the group work.

There will be two exams, each with a weight of 20% to the final mark. These tests are mandatory and eliminate subjects.

A requisite for passing the course is having passed the practices. The practices represent the 40% of the final mark. The copy of any practice will involve not passing the course.

Evaluation Activities

Activity	Weighting	Min. Score	Individual/Group	Mandatory
Assessment Test-1	20%	---	Individual	SI
Assessment Test-2	20%	---	Individual	SI
Practises	40%	4	Group	SI
Group work	20%	---	Group	SI
Classroom involvement	0.5%	---	Individual	NO

The column weights is only indicative for being the first year that this course is taught. The professor reserves the right to modify these weights to adapt them to the specific circumstances of this academic course.

Bibliography

[1] Distributed Computing: Principles and Applications. M.L. LIU. 978-0201796445. Addison-Wesley; 1 edition (June 12th, 2003).

[2] Distributed Systems: Principles and Paradigms. Andrew S. Tanenbaum, Maarten Van Steen. 978-0132392273. Prentice Hall; 2 edition (October 12th, 2006).

[3] Distributed Systems: Concepts and Design. George Coulouris, Jean Dollimore, Time Kindberg, Gordon Blair. 978-0132143011. Addison-Wesley; 5 edition (May 7th, 2011).

[4] Parallel Programming in C with Mpi and Openmp. Michael J. Quinn. 978-0072822564. McGraw-Hill Science/Engineering/Math; 1 edition (June 5th, 2003)

[5] Introduction to High Performance Computing for Scientists An Engineers. 978-1439811924. Chapman & Hall/CRC Computational Science. 1 Edición (July 1st, 2010)