CPA – Parallel Computing

Degree in Computer Science

T0. Parallel Computing

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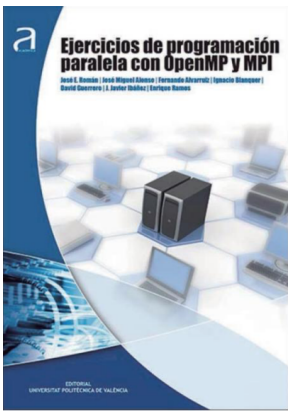
Data of the Course

- Name: Parallel Computing (11549)
- Credits: 4.5
  - 1.5 for theory in classroom
  - 1.5 for seminars
  - 1.5 for sessions in laboratory
- Module: Parallel Computing
- Semester 3A

Bibliography

Book of theory:
Introducción a la Programación Paralela
F. Almeida *et al.*
Ed. Paraninfo, 2008



Book of exercises:
Ejercicios de Programación Paralela con OpenMP y MPI
J. E. Roman *et al.*
Ed. UPV, 2018

Complementary bibliography:

- General: [Grama *et al.* 2003], [Wilkinson, Allen 1998]
- OpenMP: [Chapman *et al.* 2008], [Chandra *et al.* 2001]
- MPI: [Gropp *et al.* 1999], [Pacheco 1997]

Syllabus - Theory

1	Introduction to parallel computing	T1. Introduction
2	Shared memory model	T2. Shared memory
3	Task dependency graph	
4	Fundamentals of algorithm design	
5	Performance evaluation (I)	
6	Task decomposition	
7	Message passing model	T3. Message passing
8	Point-to-point communication	
9	Algorithmic schemes	
10	Performance evaluation (II)	
11	Task assignment	
12	Static assignment: domain decomposition	

Syllabus - Seminars

1	Programming in C	S1. Introduction
2	Basic concepts	S2. Programming with OpenMP
3	Paralelization of loops	
4	Optimization of loops	
5	Parallel regions	
6	Sections	
7	Synchronization	
8	Basic concepts	S3. Programming with MPI
9	Point-to-point communication (I)	
10	Point-to-point communication (II)	
11	Collective communication (I)	
12	Collective communication (II)	
13	Derived datatypes	
14	Exercises	

Syllabus - Laboratory

1	Basic exercises	P1. Parallelization with OpenMP
2	Image processing	
3	Prime numbers	
4	Advanced OpenMP (I)	P2. Advanced OpenMP
5	Advanced OpenMP (II)	
6	Basic exercises	P3. Parallelization with MPI
7	Point-to-point communication	
8	Collective communication	
9	Derived datatypes	
10	Exam P3	

Grading

70% Written exams

- Exam block 1 (35%, mid-semester)
- Exam block 2 (35%, end of semester - January)

30% Laboratory

- P2, OpenMP (15%, academic work)
- P3, MPI (15%, questionnaire in the lab)

Minimum grade and repetitions:

- Exams: minimum grade of 1.4 over 3.5
- Second chance per block, repetition at end of semester
- Rest of evaluation acts do not have minimum grade nor a second chance