DIPARTIMENTO DI INFORMATICA
UNIVERSITÀ DEGLI STUDI DI SALERNO
DIPARTIMENTO DI ECCELLENZA

Course Introduction

Biagio Cosenza
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UNIVERSITÀ DEGLI STUDI
DI SALERNO

Course Information

General information
- 48 hours of lab / 6 CFU
- language: English

Schedule
- ⊘ Monday 15:30–13:00 (room P6)
- ⊘ Tuesday 9:00 –11:00 (room P6)

Teaching material on
- public website (teaching material)
  https://unisa-hpc.github.io/hpc-course/
- e-learning platform (forum, projects)
  https://elearning.informatica.unisa.it/
  el-platform/course/view.php?id=1194

Taught by Prof. Biagio Cosenza
- ⊘ office hours: Mondays 14:00–15:30
- ⌂ office in building F, 4th floor, room 63
- ⓘ http://www.cosenza.eu
- ✉ bcosenza@unisa.it (🇬🇧 🇮🇹 🇩🇪)

Teaching Assistants (TA)
- Lorenzo Carpentieri
- Luigi Crisci
- Antonio De Caro
- Saleh Jamali Golzar

Course Objectives

Goal: Be able to program high performance computing systems

- *Programming models*: multi-threading, vectorial instruction, heterogeneous and GPU programming
- *Parallel patterns* and how to rewrite a program to exploit parallelism
- *Optimization*: code and compiler optimization, profiling and tools
- *Applications*, with focus on image processing, neural networks and irregular applications

Four parts: (1) multithreading, (2) vectorization, (3) GPU, (4) advanced topics

- note that is MPI covered by the PCPC course (cloud computing curriculum)

Strong focus on practical aspects and exercise sessions in lab

- each lecture has programming exercises
- lab on the UNISA and ISISLab clusters
- projects on the Intel Cloud (thanks to Intel!) and CINECA's supercomputers

Teaching Material

Provided teaching material (available in public website and the e-learning portal)

- ▶ slide notes
- ▶ publications
- ▶ code examples on the course GitHub
  https://github.com/unisa-hpc/hpc-course

Books

- 📑 McColl, Robison, Reinders. *Structured Parallel Programming: Patterns for Efficient Computation*
- 📑 Mattson, He, Koniges. *The OpenMP Core: Making OpenMP Simple Again*
- 📑 Reinders, Ashbaugh, Brodman, Kinsner, Pennycook, Tian. *Data Parallel C++: Programming Accelerated Systems Using C++ and SYCL* (free pdf)
- 📑 Kirk, Hwu. *Programming Massively Parallel Processors*

Course Grading and Examination

Final grade: project evaluation + written examination

Group project (1 to 3 students per group), topic can be

- reproducibility: replicate a scientific result published in a top conference
- exploration: to investigate a problem on a specific target architecture
- either pick a project from our list or propose your idea

Written examination (dates to be announced soon)

- pre-appello: early June
- primo appello: late June or early July
- secondo appello: late July
- appello settembre: early September