UNIVERSITÀ DI PISA

Computer architecture Laboratory activities

Project details

REQUIREMENTS

- One project must be developed to be presented to the Computer architecture exam
  - the project must be composed by two tasks:
    - CPU performance analyses
    - GPU performance analysis

- The problem must be the same for CPU and GPU analyses
  - one programming language can be used (either C/C++ or Python)
  - results must be motivated and compared between hardware modules (CPU-GPU)

- Complete this project demonstrates the acquisition of parallel programming skills, and tuning capability for programming each kind of hardware device

STEPS

- There is a set of steps to follow for the project: **propose**, **develop**, and **deliver**, i.e.:
  1. define the project in Team (1-3 people), and **propose** it to Professor or Me
     - the problem and its goals to conclude the project
  2. if the project is approved, start to **develop** it
  3. deliver the project material, i.e.:
     - project code, power point presentation with maximum 20 slides that summarizes the project for the oral exam, PDF document with project title, authors, and project description with analyses and results
       - project material must be sent **3 days before** the exam
       - project material must be sent via email to Professor and Me

TOY PROJECT EXAMPLE

- **Problem**: the aim of the project was to blur an image with the help of Gaussian Filter
- **Goal**: optimize and reduce the compute time
- **Activity**: the project started off with a compute time of 62,6 ms for this 1280x1600 image of the Leaning Tower of Pisa. Then, instead of separating each channel and computing them individually and then recombining them, separation and recombination code parts were removed! This itself gave a 2x boost in speed. After some more optimizations (using shared memory, etc.), it got it down to over 17 ms!
- **Result**: the system is almost 3.7x faster than the first implementation!

Conclusion

THE LABORATORY IS END