BC3.04a Advanced Programming for HPC

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Course Introduction

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Goals

- Be familiar with the principles of parallel algorithms
- Write GPU accelerated programs
- Do the project
 - and (hopefully!), pass the exam

Content

- Review of distributed systems
- Introduction to CUDA programming
- GPU thread and memory model
- "Map-Reduction" pattern
- "Gather-Scatter" pattern

P.S. You're going to spend a lot of time programming.

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Format

- 2.5 ECTS = 25 hours
- Lecture / Practical work : 10h / 15h
- Prerequisites: Python Programming
- Environment: Linux/Mac
 - Windows isn't supported
- Assessment:
 - Project / Final Exam

Policy

- Collaborations!
 - During exercises
 - Not in the project
 - Nor in the final exam
- All students finish, we move to the next exercise

Labwork

- Several Python Programs
 - Understand what you learnt
 - Show your ability to apply it to new problems
- Compilable on Linux/Mac
 - Windows is not supported (by me!)
- Don't copy paste. I have checker tools \bigcirc
- Should be well organized and well written

Bad programmers worry about the code. Good programmers worry about data structures and their relationships.

- Linus Torvalds

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Labwork

- Git : Version Control System
- Github
 - Initial repository and instruction
 - https://github.com/SonTG/advancedhpc2022

	COMMENT	DATE
0	CREATED MAIN LOOP & TIMING CONTROL	14 HOURS AGO
0	ENABLED CONFIG FILE PARSING	9 HOURS AGO
0	MISC BUGFIXES	5 HOURS AGO
0	CODE ADDITIONS/EDITS	4 HOURS AGO
0	MORE CODE	4 HOURS AGO
0	HERE HAVE CODE	4 HOURS AGO
0	ARAAAAAA	3 HOURS AGO
6	ADKFJSLKDFJSDKLFJ	3 HOURS AGO
0	MY HANDS ARE TYPING WORDS	2 HOURS AGO
0	HAAAAAAAANDS	2 HOURS AGO

AS A PROJECT DRAGS ON, MY GIT COMMIT MESSAGES GET LESS AND LESS INFORMATIVE.

Figure 1: Don't be lazy with your commit messages

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Exams

- 3 sheets of A4 documents are allowed
- No laptop / mobile phone / internet
- No discussion, of course

References

- Books
 - An Introduction to Parallel Algorithms, Joseph JáJá. Addison-Wesley Professional. 1992.
 - CUDA Programming: A Developer's Guide to Parallel Computing with GPUs, Shane Cook.
 - Numba Documentation