PhD Proposal for the MAP-i

Title

Develop Portable Applications for Multiple Target Architectures using Skeletons

Objectives

- To develop applications at a **high level**, applying high level patterns.
- To write **structured**, **portable** and **complex** parallel applications.
- To allow programmers non-skilled with parallel programming to use **efficiently different target architectures** that are parallel (by nature).

Summary

- A **skeleton** is mainly a higher order function used to model/structure a computationally complex schema, hiding from the code some computational details that may be not relevant to the programmer.
- Some of the skeletons commonly applied in parallel programming are **pipe**, **farm**, **map**, **loop**, **split & join**.
- Examples of **parallel architectures,** widely targeted nowadays, are multi-core based systems, GPUs and FPGAs.
- Although it is yet possible to write applications on HLLs and implement them on GPUs and FPGAs, achieve a certain **performance** and **portability** are unsolved issues.
- Skeleton based programming can solve both of the previous issues:
    - With skeletons, being high level and parameterized patterns, we achieve **portability**.
    - Using performance models for every patterns and target architecture we achieve **optimized implementation**s.

Supervisors

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