

Visual Languages for Parallel Computing

Project Description

Many modern computational problems are inherently massively data-parallel. Research areas such as simulation, data-science and visual computing are increasingly dealing with data-parallel problems. For instance in visual computing parallel algorithms are needed for

image processing, geometry processing, visualization, computational imaging, and many other subfields where the data primitives are parallel.



In this project we develop novel domain specific languages that offer visual abstractions of different aspects of the programs. The parallel program development is aided by instantaneous visualizations of the underlying primitives of the algorithms. For instance in fluid simulation the parallel data primitives can be equipped with semantics like “particle” or “vector” which leads to different instantaneous visualizations.

The development of better parallel programming languages is a research field with increasing importance as most modern computational problems need to be tackled with data-parallel algorithms.

Your Role in this Project

You will work on a novel domain specific language for parallel computing that is integrated with an existing C++ and Qt-based framework [1]. You will learn how to implement a just-in-time compiled system that translates code for the execution on parallel architectures.

Requirements

You need to have:

- prior experience in C++ programming
- prior experience in GPU computing (any of CUDA/OpenCL/OpenGL)
- fluent English language skills
- openness for a multicultural environment

References

[1] <http://www.vislang.net/about.php>

