Projet d'Études et de Recherche

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This work is associated with LaBRI's project *Visidia* on simulation and proof of distributed algorithms. A fundamental characteristic of distributed algorithms is their combination of

- Local computations on each processor
- Interaction between processors, generally performed through message passing.

Thus, the analysis of the behaviour of a distributed algorithm is always a composition of the analysis of local computations, interactions, and how they result in the global behaviour of a complex system.

The *Visidia* software allows the user to simulate such algorithms. *Visidia* is written in the imperative/object-oriented language *Java*.

On another side, formal certification of such algorithm requires a representation of programs compatible with logical reasoning. Defining such a representation is an active field of research, and the paper from Adam Chlipala associated with this PER lies in this field.

Starting from this paper, we require the students to study the most recent techniques in program representation and their adecuation to formal reasoning, on programs, and more specifically on the kind of programs which are in *Visi-dia*'s scope.

It will be very important to illustrate your proposal by a small realization in a well-suited functional programming language. According to the knowledge and preference of the students, this language may be *Coq*, but also *Ocaml* ou *Haskell*.

Useful links

– The paper in pdf :

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.144.1181&rep=rep1&type=pdf - Visidia's page :

http://visidia.labri.fr/html/home.html

– Loco's page : http://www.labri.fr/perso/casteran/Loco/