Proposition de recherche doctorale

Imperative type theory, classical linear logic and applications to implicit complexity

Mots clés :
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Résumé du projet de recherche (Langue 1)

In a seminal series of papers, Landin proposed in the sixties a direct translation (as opposed to a continuation-passing style translation) of an idealized Algol into the $\lambda$-calculus. This direct translation required to extend the $\lambda$-calculus with a new operator $J$ in order to handle non-local jumps in Algol. This operator was the first control operators in functional languages (such as the famous call/cc of Scheme or Standard ML of New Jersey). A type system for control operators which extends the so-called Curry-Howard correspondence to classical logic first appeared in Griffin's pioneering work, and was immediately generalized to first-order dependent types (and Peano's arithmetic) by Murthy in his thesis. The following years, this extension of the formulas-as-types paradigm to classical logic has then studied by several researchers, but always in the context of functional programming. It was thus tempting to revisit Landin's work in the light of the computational interpretation of classical logic. In [3], the authors followed this path and extended the formulae-as-types notion of control to imperative programs with higher-order procedural mutable variables and non-local jumps. The resulting framework can be seen as a classical imperative type theory. The semantics of this imperative type theory is defined by translation into a classical functional type theory. Although this translation is sufficient to derive the correctness of imperative programs, and it successfully accounts for the fact that mutable variables take on different values during computation, it does not capture the idea that an assignment destructively alters the contents of the store. This approach could however be refined to model properly in-place updates using (as in [5]) a linear $\lambda$-calculus as the target functional system. However, to deal with control mechanisms, a classical linear $\lambda$-calculus similar to the one described in [2] would be required.

Résumé du projet de recherche (Langue 2)

Informations complémentaires (Langue 2)