



Static Analysis via Horn Encoding From synchronous Dataflow Programs

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Context

Synchronous languages [1] have been developed since the middle of the 80s for the design and implementation of embedded reactive systems. They have been successfully applied to embedded control of critical systems, for which the physical environment often imposes hard real-time constraints [6]. In this work, we will more particularly focus on dataflow synchronous languages, with which the developer describes the application as an assembly of independent components that communicate only through FIFO channels, as is done in Kahn process networks [3].

In this work we propose to explore the static analysis of such programs via solving Horn Clauses, a quite recent logic formalism with efficient algorithmic, which has proven its suitability to prove complex properties such as array sortedness [4].

Subject

The candidate will have to propose a methodology for compiling synchronous dataflow programs, described in a subset of Lustre [2] and whose components manipulate multidimensional arrays through array iterators proposed in [5], into Horn Clauses, and also to prove safety properties on these synchronous programs. An implementation prototype will be developed in OCaml.

Références

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