Title: A Finite Domain Constraint Solver for Haskell

Problem Background: Constraint Programming (CP) is a declarative programming paradigm for solving combinatorial search-based problems. CP makes the programmer’s job extremely simple: (s)he only has to state the constraints a solution should satisfy. The actual job of producing a solution is left to a constraint solver, that combine state-of-the-art search and consistency techniques from the field of artificial intelligence of which the programmer does not have to be aware at all. A popular class of constraint solvers are Finite Domain (FD) solvers, which support constraints over integers. Many problems can be reduced to FD constraints, ranging from Sudoku puzzles to planning and scheduling.

Haskell is by far the most popular Functional Programming language. It offers a unique blend of lazy evaluation, pure functional programming (without side effects) and an advanced type system. This combination of language features enables the rapid development of compact and robust programs, and libraries in particular.

Goals: The goal of this work is to bring the power of Constraint Programming to Haskell, while exploiting Haskell’s language features to provide a robust and elegant library interface. To do so, you will develop a Finite Domain constraint solver library, building on existing work of the first promotor.

Expected Tasks:

- getting familiar with Haskell and Finite Domain solvers for other languages such as c1pf in SWI-Prolog and Gecode for C++,
- design and development to a Haskell FD solver library, potentially interfacing to Gecode or another solver,
- evaluate the library on small to medium problems.

Requirements: Basic knowledge of Haskell, good knowledge of programming in general. When in doubt, consult the promotors.
Promotors: Dr. Tom Schrijvers, Prof. Gerda Janssens

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Number of students: 1 (2 on special request)