MiniZinc for Formal Methods

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Abstract—MiniZinc is a free and open-source constraint modeling language, designed for solving discrete optimisation problems. You can use MiniZinc to model constraint satisfaction and optimization problems in a high-level, solver-independent way, taking advantage of a large library of pre-defined constraints encapsulting different combinatorial substructures of the problem. Your model is then compiled into FlatZinc, a solver input language that is understood by a wide range of solvers including leading CP solvers such as OR-tools from Google, and CP-optimiser from IBM, and leading MIP solvers such as Gurobi and Cplex.

MiniZinc is useful for Formal Reasoning problems where we reason about a bounded size problem on discrete objects (including integers). In this tutorial we will give an introduction to MiniZinc focusing, at least in the latter part, on where it can be applied to Formal Methods problems. Formal methods modelling through MiniZinc leads to different ways to model things such as state progression, and can take advantage of combinatorial substructures that occur in such problems, such as injective mappings. Overall MiniZinc gives an alternate, and often highly competitive, approach to using SMT for answering some kinds of formal reasoning questions.