KiCS2: A New Compiler from Curry to Haskell

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We present our first steps towards a new system to compile functional logic programs of the source language Curry into purely functional Haskell programs. This system is based on a translation scheme where non-deterministic values are explicitly represented, i.e., by extending each type with two additional constructors to represent failed computations and a choice between several values. This enables the application of various search strategies (e.g., depth-frist, breadth-first, parallel) to extract values from the search space, as well as the encapsulation of non-deterministic computations. Logic variables are represented by non-deterministic operations that generate all possible values for those variables. To preserve the call-time-choice semantics of functional logic languages, non-deterministic choices are decorated with unique identifiers to implement the sharing of such choices. Our implementation has the property that deterministic computations are translated into purely functional programs so that they are executed with almost the same efficiency as their purely functional equivalents. Several benchmarks show that our implementation can compete with or outperforms other existing implementations of Curry.