Polymorphic Types with Polynomial Sizes

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Résumé

We present a compile-time analysis for tracking the size of data-structures in a statically typed and strict functional language. This information is valuable for static checking and code generation. Rather than relying on dependent types, we propose a type-system close to that of ML: polymorphism is used to define functions that are generic in types and sizes; both can be inferred. This approach is convenient, in particular for a language used to program critical embedded systems, where sizes are indeed known at compile-time. By using sizes that are multivariate polynomials, we obtain a good compromise between the expressiveness of the size language and its properties (verification, inference).

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