Compiler and Runtime Support for HAMTS

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Abstract

Many immutable collection data structures of functional programming languages including Racket, Scala, and Clojure are implemented as Hash Array Mapped Tries (HAMTs). This data structure provides efficient lookup, insertion, and deletion operations and has a small memory footprint. Various design changes have been implemented since the first introduction of HAMTs that further improve memory footprint and runtime performance. However, these HAMT implementations still keep redundant data in the trie node and do not fully address the cost of cooperating with garbage collection when initializing or updating nodes. A stencil vector is a new data structure built into Racket's compiler and runtime system. Its as an intermediate field of HAMTs results in better performance and smaller memory use for persistent sets and maps compared to previous implementations.