Promotion in Generational Garbage Collectors

Thesis Proposal

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Abstract

Generational garbage collectors manage objects that survive their first garbage collection by promoting them quickly from young to middle-aged status, and then more slowly from middle-aged to old status. Collecting among middle-aged objects is more expensive than collecting among young objects, but not nearly as expensive as collecting among old objects.

If objects are promoted rapidly, then objects of intermediate lifetimes will receive old status before they die, yet will die not long after having been promoted, and the amount of old garbage will build up, increasing the frequency of collections among old objects. If objects are promoted slowly, then each long-lived object will be traced by the garbage collector a number of times before it finally becomes old, increasing the amount of work the garbage collector spends on it and reducing the advantage of generational collection over non-generational collection.

I hypothesize that a collector that takes information about the survivors of a garbage collection into account in its promotion policy can be more effective than a collector that does not, and I propose to design and implement two new promotion policies, one based on a feedback model and the other based on a nonpredictive model, and to compare the new algorithms to several previously proposed and implemented promotion mechanisms.