A Description of the RCImmix Algorithm

Reference Counting with better heap allocation

Nathan Jervis

Department of Computer Science
McMaster University, Hamilton
jervisnd@mcmaster.ca

November 11, 2013

Overview

- Introduction to automatic memory management
- Problems with existing reference counting
- The RCImmix algorithm

Manual Memory Management

Manual Memory Management

- Difficult to use
- Can cause dangling pointers
- Leads to memory leaks

Much better if the compiler/runtime can manage memory for us

Automatic Memory Management

Tracing Garbage Collector:

- Periodically pause program and follow program references
- Collect anything not referred to

Reference Counting:

- Counter keeps track of how many things are pointing to it
- When counter reaches 0, free memory

Tracing Garbage Collector

Pros:

- Is lazy about collecting
- Can detect and collect all forms of garbage

Memory Management

Listing 1: First C example

```
int main()
{
    printf("Hello World!");
    return 0;
}
```

A displayed formula:

$$\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}$$

An itemized list:

- itemized item 1
- itemized item 2
- itemized item 3

Theorem

In a right triangle, the square of hypotenuse equals the sum of