

Re: CAS, Lambda Calculus, Continuation and Functional Programming

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Robert A Duff wrote:

> Joachim Durchholz <*jo@durchholz.org*> writes:

>> *Recursion that's equivalent to loops can always be optimized back into*

> *^^^^*

>> *loop form when it comes to emitting code. This is not a problem with any*

>> *single functional programming language that I know.*

> *I don't think that's *quite* true. I agree that tail calls can be*

> *eliminated, and that tail calls are equivalent to loops.*

> *But there are recursive algorithms that are not tail recursive,*

> *but that are equivalent to loops.*

You and Joachim are using different definitions of equivalent :-)

If a loop is formulated in a recursive way (via tail calls) then the compiler will generate the same code. An recursive algorithm that are not tail recursive is not equivalent to a loop.

>>> *Is there anything that would*

>>> *prohibit using the same optimizations in an imperative language.*

>>

>> *Partly. Imperative aspects of a language may require global program*

>> *analysis to make sure that a tail call can indeed be eliminated, and*

>> *that makes tail call elimination less attractive for compiler writers.*

>> *I don't recall the full range of things that can prevent tail call*

>> *elimination, but the two that I do recall are exception handling and*

>> *setjmp/getjmp. I dimly recall that there were also issues with*

>> *destructors in C++, but I may be confusing things here.*

>

> *I don't know why exception handling should prevent tail-call*

> *elimination. Would someone care to enlighten me?*

>

> *Setjmp/longjmp is similar to exception handling. And destructors*

> *require something like an implicit exception handler -- when an*