

# Re: complexity of numerical software

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  - *Date:* Fri, 09 Dec 2005 23:13:01 +0100
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Jaap Spies wrote:

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Yes. We have the same question!

Okay. I thought we were talking about code like SLATEC, NSWC, CMLIB, etc. They have (almost) nothing to do with algorithms to find subsets, which I would classify with discrete or combinatorics algorithms.

We were discussing the cost of a writing a system (a new CAS), not writing new "standard" libraries. In the "new" system there will be numerical programs using the well tested basic libraries. You have to see my remarks in this light!

When I write `sqrt(2)` in a CAS, or writing code that uses `sqrt()` I do not want to be bothered by the gory details of the underlying "low-level" libraries.

## Re: complexity of numerical software

This explains my statement

I you write a new CAS, it would be silly to use only those "standard" libraries: they compute with IEEE754, hence the precision is very limited for a CAS. You'd probably prefer a multiprecision library, but I don't know of a standard one... GMP and others only compute with integers, but you need approximate values of many transcendental functions.

You'll also need to write special algorithms for that, since the problem of computing with high precision numbers or with rationals have its own difficulties: among others, how do you reduce the size of numbers (to increase speed) appearing in computations, like the solution of a linear system of equations. These are also numerical computations, though not the classical "number crunching" BLAS.

Oh, and just an idea: what is *really* a CAS ? I have already used Maple, Mathematica and MuPAD, and then I discovered GAP: no more "formal" computations, but "true" mathematical objects :-) I mean, it looks like in Maple, the elementary object is an "expression", which can be almost anything. In GAP, there are no expressions, only values: polynomials, finite groups, matrices, are `_values_`. That makes a great difference I think. Maybe I'm wrong...

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