
Subject: Re: bizarre number transformation
Posted by [R.Bauer](#) on Fri, 26 Jul 2002 06:58:53 GMT
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Craig Markwardt wrote:

>
> James Kuyper <kuyper@gsfmail.gsfc.nasa.gov> writes:
>
>> Paul van Delst wrote:
>>>
>>> Michael Ganzer wrote:
>>>>
>>>> As plenty postings already were dealing about how to use a double precision
>>>> number i wanted to ask u something different...
>>>>
>>>> Whatever you do with 443496.984 in multiplication or something else.....
>>>> does it really matter at that number size if there is more than one digit
>>>> exact after the digit separator???
>>>
>>> My goodness. 443496.984 is not a "big" number. What if you have to add it to 0.004657?
>>
>> The point is, that it's pretty rare to need that many significant
>> digits. There aren't many real-world numbers that can be measured to
>> within one part in a billion. Precision needs like that can come up in
>> intermediate steps of a calculation, (for instance, if you need to
>> calculate "sin(theta)-theta" for small values of theta), but that's
>> merely an indication that the calculation is badly organised (for small
>> theta, you can get more accurate results with the equivalent series
>> expansion: $-(\theta^3)/6 + (\theta^5)/120 - \dots$)
>>
>> However, having written a lot of such code, I've found that loss of
>> precision due to roundoff can sneak up on you far too easily. It's
>> almost always a lot faster (considering CPU time + developer time) to
>> use double precision. I save such tricks for the somewhat rarer cases
>> where double precision is inadequate.
>
> Okay, I'll give a couple examples from my own needs:
>
> * absolute pulsar timing at the microsecond level, measured in Julian
> days, requires a fractional precision of 4d-13
>
> * the most stringent pulsar timing (not mine) requires better than
> 100 cm positioning within the solar system, or 6 parts in 1d12
>
> * one can determine pulse frequencies of 400 Hz pulsars to a
> precision of 1 nHz, or 3 parts in 1d12
>
> * the most precise Doppler tracking of spacecrafts requires 2

> milliHertz precision using a carrier of 2 GHz, or 1 part in 1d12
>
> Admittedly those are pretty specialized applications :-)
>
> Most ordinary differential equations, especially if they are
> numerically stiff, require double precision.
>
> Also, solving a curve fitting problem with MPFIT, where the parameters
> vary in magnitude by more than one part in 1d7, will fail unless
> double precision is used.
>
> So, for me at least, double precision is the de facto choice for most
> applications, unless the memory usage is prohibitive.
>
> Craig
>
> --
> -----
> Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
> Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
> -----

Dear Craig,

thanks for these statements we do need double precision too.
I hope someone of INTEL will read sometimes this discussion,
because they have dropped double precision from their processors.

Reimar

--
Reimar Bauer

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a IDL library at ForschungsZentrum Juelich
http://www.fz-juelich.de/icg/icg-i/idl_icglib/idl_lib_intro.html
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