Subject: Re: Specify the degree of accuracy of a floating point number
Posted by Kenneth Bowman on Fri, 23 Feb 2007 16:43:39 GMT
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In article <MPG.20478eaa542e4575989e91@news.frii.com>,
David Fanning <news@dfanning.com> wrote:

> A pretty harmless change, it seems to me. Then I tried the
> program:
>
> IDL> a = 432.49584738273845D
> IDL> print, round_off(a, 0.0000001)
> 2.9991178
>
> Huh!? What did I do wrong?

This is a round-off error issue. The function works by multiplying the input by a factor, rounding to a LONG, and then dividing by the same factor to convert back to a floating-point type.

When you are trying to preserve a lot of precision (digits), you get round-off issues with the LONG. This can be avoided (in most cases), by rounding to a LONG64.

See examples below

IDL> a = 432.49584738273845D

This works for small precision
IDL> print, DOUBLE(ROUND(100.0D0*a))/100.0
432.50000

This fails for large precision
IDL> print, DOUBLE(ROUND(100000000.0D0*a))/100000000.0
21.474836
% Program caused arithmetic error: Floating illegal operand

But works if 64-bit integers are used
IDL> print, DOUBLE(ROUND(100000000.0D0*a, /L64))/100000000.0
432.49585

Cheers, Ken