Subject: Re: Strange floating-point precision behavior
Posted by Kenneth P. Bowman on Sun, 09 Feb 2003 02:31:42 GMT
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In article <e41fb407.0302081533.3874340f@posting.google.com>,
 lloyd@lasp.colorado.edu (Tim Lloyd) wrote:

> I have written a routine that converts Earth-Centered Inertial
> coordinates in x/y/z to geodetic latitude/longitude/altitude using the
> WGS84 standard. I have one issue, however, that I believe is
> affecting my calculations of altitude so that they are accurate only
> to 1-meter resolution. I am defining the ECI coordinates as
> double-precision:
>
> IDL> boulder={x:-1283388.8693d0, $
> y:-4713016.9053d0, $
> z:4090191.0471d0} ;Boulder, CO, GPS station
>
> and yet IDL seems to be storing the data incorrectly:
>
> IDL> print,boulder,format='(3f20.10)'
> -1283388.8692999999 -4713016.9052999998 4090191.0471000001
>
> What am I doing wrong? I am fairly certain that this behavior is
> responsible for my calculations yielding 1674.6658 m as the altitude
> of the Boulder GPS station, and not 1674.7428 m (the actual altitude).
> This is on IDL 5.6 for Mac OS X.

Double precision gives you about 14 digits of decimal precision. You
are only providing about 10 digits, and you are getting out exactly what
you put in:

   -1283388.8693 = -1283388.8692999999

within better than 14 digits.

Ken Bowman