
Subject: Re: Why are transforms 4 x 4?

Posted by [Karl Schultz](#) on Mon, 15 Dec 2003 15:41:29 GMT

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"Thomas Brueckner" <profxtjb@earthlink.net> wrote in message
news:52e94d00.0312141710.2a29c8f2@posting.google.com...

- > My geometry knowledge is limited, so I am unsure why IDL uses 4 x 4
- > transform matrices to rotate, translate and otherwise mess with
- > three-dimensional vectors. Can someone please render an explanation?
- > There must be a reason. Is it just that they like to be able to
- > handle four-vectors and the ever-popular Lorentz xfm? :)

Affine transformations are made up of a linear transformation followed by a translation. The linear part can be composed of scaling, shear and rotation operations and can be applied to a 3D point with a 3x3 matrix. The translation step can be added on later as a simple addition, but it would be nice if it can be performed at the same time the matrix is applied to the point. So, if you add an additional 4th coordinate to the 3D vector with value 1, you can put the translation factors in the 4th row or column of the matrix and perform the entire transformation with one matrix operation.

These vectors with the extra value are called homogeneous coordinates, if you need a term to use to google for more information.

Karl
