Subject: Re: survey: accelerated 3D volumetric rendering
Posted by davidf on Tue, 27 Feb 2001 23:03:00 GMT
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Rick Towler (rtowler@u.washington.edu) writes:

> What are peoples experiences with accelerated 3d volumetric rendering. I am
> sure very high end unix viz workstations have the ability to accelerate
> volumetric rendering but what about lower end hardware. Is this the domain
> of high end video adapters only?
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> In my case we have a Sun Ultra60 with the Creator3d framebuffer and PC's
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My experience with volume rendering with several different
"inexpensive" graphics cards for PCs is that software
rending is *always* faster than hardware rendering. (Not
to mention prone to far fewer rendering errors.)

I pretty much always have software rendering on as the
default, and I make *sure* I have it on for any object
graphics programs I distribute that have anything unusual
going on in them.

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting
Phone: 970-221-0438 E-Mail: davidf@dfanning.com
Coyote's Guide to IDL Programming: http://www.dfanning.com/
Toll-Free IDL Book Orders: 1-888-461-0155

Subject: Re: survey: accelerated 3D volumetric rendering
Posted by Rick Towler on Wed, 28 Feb 2001 01:08:14 GMT

David, you are always pushing that software rendering..... :) I can't wait for the day the software renderer is retired.

Software rendering is useless for real time rendering of 3d object graphics scenes (at least the scenes I work with). It is true that hardware rendering comes with quirks but at least on the PC the latest generation of nvidia products are quite good. It all comes down to the drivers and in the consumer market nvidia is the only company that I know of shipping decent OpenGL drivers. The professional market is another question.

Most people probably shy away from volumes but I thought at least a few med imaging people would pipe up.

-Rick Towler

"David Fanning" <davidf@dfanning.com> wrote in message news:MPG.1505e00a9af63e39989d6e@news.frii.com...
> Rick Towler (rtowler@u.washington.edu) writes:
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Subject: Re: survey: accelerated 3D volumetric rendering
Posted by davidf on Wed, 28 Feb 2001 01:42:42 GMT
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Rick Towler (rtowler@u.washington.edu) writes:

> David, you are always pushing that software rendering..... :) I can't wait
> for the day the software renderer is retired.

Well, if nothing else, it's useful for comparing with
hardware rendering. As you well know, if you have done
any object graphics programming at all, you don't get
much feedback sometimes. I've spent hours and hours
trying to figure out what I was doing wrong programmatically,
only to discover there is a bug in my hardware OpenGL
implementation. (Number 9 VooDoo 3D, a hot card in its
day. But of course the company is now in Chapter 11).
I'd buy an NVidia card if I thought I could get it
installed without causing my computer to go bonkers for
two weeks. :-(

> Software rendering is useless for real time rendering of 3d object graphics
> scenes (at least the scenes I work with).

You and I are obviously rendering different 3D scenes. :-)
I don't find it useless at all. But I can imagine scenarios where
that could be the case.

> Most people probably shy away from volumes but I thought at least a few med
> imaging people would pipe up.

I think those guys have real jobs. Probably don't
have much time to debate on the newsgroups. :-)

Cheers,

David

--
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Subject: Re: survey: accelerated 3D volumetric rendering
Posted by Randall Frank on Wed, 28 Feb 2001 05:30:33 GMT
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Rick,
Ok, I'll bite. I don't want to get into the latter part
of this thread, but I see major speed increases in 3D performance
with GeForce and Quadro cards in HW over SW with a couple of notable
exceptions.

So, you want to volume render in HW well, you can do 3D
texturing or 2D texturing. With 2D texturing, you can use axis
aligned slices or shear-warp. Actually, many of the 2D texturing
methods can be done in IDL right now (a long time ago, I wrote
a HW volume rendering object in .pro for a demo). Volume
rendering is really a matter of fill rates, so standard PC gaming
HW does a very nice job. See any of the work by Ertl from
IEEE vis (code is available for download). The combination
of 2D texturing and multi-texturing works very well.

Rick Towler wrote:
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> hardware.

The (early) Creator3D was a rasterization only engine. All triangle transforms and lighting are actually in SW. Thus, the card can be poor with high polygon counts, but actually works pretty well for volume rendering applications.

The GeForce 3 (announced this week) does have 3D textures if that is what you mean by "volumetric rendering". Up to 512^3 in size. However, the effective framebuffer fill rate of that card has not increased over the GeForce 2. Thus, it will not really be much faster for volume rendering until someone writes a renderer using the pixel pipeline to move "chunks" of the blends into the pixel combiner paths (which could be done). In the current class of cards, the HP, 3D labs and ATI cards all have 3D texturing (actually, the nVidia drivers support it, but it is in SW until the GF3) and there are demos on their sites.

If you are looking at the low end, the ATI card is less than $300. You can also use the multi-texturing stuff on the GeForce to get a good approximation of 3D textures (again, see the Ertl papers and web site) for around $400. Or, wait for the GF3 for around $600. For many applications, axis aligned planes with 2D texturing will work. The key to volume performance is fill rate, so it is hard to beat a VooDoo 5500 or GeForce 2 Ultra today (if used correctly). Several people around here use the HP fx10 for volume rendering and like it as well. Finally, the 3D Labs GVX420 and Wildcat cards work pretty well for volumes.

Bottom line, I would suggest you not get too caught up in equivocating 3D texturing with volume rendering. This will get very murky soon with DX8 and cards like the GeForce 3. You can definitely get good volume rendering in low end PC cards today. 3D textures are available for several PC cards today as well.

Now, how this relates to IDL, short of my initial comments, I am not sure... and this is all IHMO.

Ref:
http://wwwvis.informatik.uni-stuttgart.de/eng/research/pub/p ub2000/wgh00-rezk.pdf

Hope it helps.

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> -Rick Towler

--
rjf.
Randy Frank | ASCI Visualization
Lawrence Livermore National Laboratory | rjfrank@llnl.gov
B451 Room 2039 L-561 | Voice: (925) 423-9399
Livermore, CA 94550 | Fax: (925) 423-8704

Subject: Re: survey: accelerated 3D volumetric rendering
Posted by Richard Tyc on Wed, 28 Feb 2001 15:31:38 GMT
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David Fanning <davidf@dfanning.com> wrote in message
news:MPG.1505e00a9af63e39989d6e@news.frii.com...
> Rick Towler (rtowler@u.washington.edu) writes:
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It is my understanding that for volume rendering (using IDLgrVolume) you have no choice but software rendering (its a software based ray tracing scheme) regardless of the hardware/software rendering switch. IDL does not yet include OpenGL support for volume rendering so advanced graphics cards would not help anyway. Multiple CPU's will help since you can set the HINTS property to use multiple CPU's. Until a standard OpenGL volume rendering scheme becomes available on all platforms IDL supports, they may not jump into it. I hope they do.
I got into this a while back when I was looking at a new PC workstation for our lab. I was considering buying the high end Wildcat 4110 card which is blistering fast, especially on our CAD/CAM machines. I opted for a dual Pentium Dell workstation with a G400 dual head card to speed up real time viewing/rendering of our volume objects.

One interesting thing to note: on our dual Pentium III 733Mhz Dell, the real time rendering of volume objects is not that much faster than my single CPU office PC (only a Pentium II 350). I would have thought it was at least 2x faster running the same app, but not so with my simple subjective test. My crude measurement is based on spinning a 3D object in our medical app (using Trackball) and visually observing how fast the image is rendered. The worst thing is , my Dell has 512Mb RAM (Win NT4), office PC has 64Mb RAM (Win 98) !!

Rich

Subject: Re: survey: accelerated 3D volumetric rendering
Posted by Paul Woodford on Wed, 28 Feb 2001 17:47:45 GMT
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In article <97j5ma$d01$1@canopus.cc.umanitoba.ca>,
"Richard Tyc" <richt@sbrc.umanitoba.ca> wrote:

> One interesting thing to note: on our dual Pentium III 733Mhz Dell, the real
> time rendering of volume objects is not that much faster than my single CPU
> office PC (only a Pentium II 350). I would have thought it was at least 2x
> faster running the same app, but not so with my simple subjective test.

I once did a IDLgrVolume rendering speed test with a dual-processor Windows NT PC, and found almost a 2x speedup when I set the hints property to use multiple processors. I think the volume was something like 128 x 128 x 32.

--
Paul Woodford, Ph.D.
Essex Corporation

For faster email response, replace us dot net with essexcorp dot com