John Carmack 5/18/94
>so let me restate the answer to your question ; yes, it uses MCGA 320x200x256c and no it does not do any page-swaps,
>it can't, MCGA 320x200x256c only has 1 page.
nope.
DOOM uses 320*200*256 VGA mode, which is slightly different from MCGA mode (it would NOT run on an MCGA equiped machine).
I access the frame buffer in an interleaved planar mode similar to Michael Abrash's "Mode X", but still at 200 scan lines instead of 240 (less pixels == faster update rate).

DOOM cycles between three display pages. If only two were used, it would have to sync to the VBL to avoid possible display flicker. If you look carefully at a HOM effect, you should see three distinct images being cycled between.

Steve Larsen 5/19/94
Scott Amspoker wrote:
>I've been doing some reading lately about VGA/SVGA graphics and wondered specifically what Doom was doing with the hardware.
> I assume Doom is using 320x200x256 resolution. Is this correct? Also, how is Doom performing frame witching in this mode?
Doom is in 320x200x256 mode X. Mode X implicitly allows double-buffering, so no real "work" is required here.

Scott Amspoker 5/20/94
John Carmack wrote:
>DOOM cycles between three display pages. If only two were used, it
>would have to sync to the VBL to avoid possible display flicker.
This is interesting. You switch pages in the middle of a video frame? Do you just cycle through pages as fast as you can?

Ed Hurtley 5/22/94
Steve Larsen wrote:
> Doom is in 320x200x256 mode X. Mode X implicitly allows double-buffering, so no real "work" is required here.
Check, please... In case you haven't hit ESC ever, the Options menu has a Low/High resolution toggle... Low is 320x200, High is 640x400, with the border graphics (the score bar, menu, etc...) are still 320x200... (Just the same graphics files)

Ben Morris 5/22/94
John, You're using a planar graphics system for a bitmapped game that updates the entire screen at a respectable framrate on a 486/66? That's pretty incredible. I would have thought all the overhead for programming the VGA registers would kill that possibility.

John Carmack 5/22/94
Ed Hurtley wrote:
>Check, please... In case you haven't hit ESC ever, the Options menu has a Low/High resolution toggle... Low is 320x200, High is
> 640x400, with the border graphics (the score bar, menu, etc...) are still 320x200... (Just the same graphics files)
Low detail is 160*200 in the view screen. This is done by setting two bits in the mapmask register whenever the texturing functions are writing to video memory, causing two pixels to be set for each byte written.

Ben Morris wrote:
>You're using a planar graphics system for a bitmapped game that updates the entire screen at a respectable framrate on a 486/66?
Its planar, but not bit planar (THAT would stink). Pixels 0,4,8 are in plane 0, pixels 1,5,9 are in plane 1, etc.

Ben Morris wrote:
>That's pretty incredible. I would have thought all the overhead for programming the VGA registers would kill that possibility.
The registers don't need to be programed all that much. The map mask register only needs to be set once for each vertical column, and four times for each horizontal row (I step by four pixels in the inner loop to stay on the same plane, then increment the start pixel and move to the next plane).

It is still a lot of grief, and it polutes the program quite a bit, but texture mapping directly to the video memory gives you a fair amount of extra speed (10% - 15%) on most video cards because the video writes are interleaved with main memory accesses and texture calculations, giving the write time to complete without stalling.

Going to that trouble also gets a perfect page flip, rather than the tearing you get with main memory buffering.

Mark Mathews 5/22/94
> Doom is in 320x200x256 mode X. Mode X implicitly allows double-buffering, so no real "work" is required here.
I thought mode X is 320x240x256.

Steve Larsen 5/24/94
Mark Mathews wrote:
> I thought mode X is 320x240x256.
No, that is just one of the many mode X's. 320x240 is nice because of its square aspect ratio. However, 320x200 has the advantage that the 256K of VRAM for the VGA allows 4 complete pages to be stored on the video card. Since we now have it on good authority that Doom is using triple-buffering, that leaves one free page that might be being used to store bitmaps and intermediate screen states.

Scott Amspoker 5/27/94
Mark Mathews wrote:
> I thought mode X is 320x240x256.
The main "feature" of mode X is the un-chained state when cycling through the 4 bitplanes. This gives you the ability to use display memory for page switching and smooth scrolling. With some tweaking of the VGA control registers you can also get 320x240 pixels. Doom does not bother with the extra resolution.

Antony Suter 5/30/94
Ed Hurtley wrote:
> Low is 320x200, High is 640x400, with the border graphics (the score bar, menu, etc...) are still 320x200...
Err, no, High Detail is equivalent to 320x200 and Low Detail is equivalent to 160x200.