Subject: PS2 pwns Xbox 1
Posted by terminator 101 on Tue, 24 Jan 2006 23:14:47 GMT
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Quote:XBox vs. PS2

The CPU

Of course, the Central Processing Unit, the heart of every computer or console. Most of the calculations take place here. The XBox has a Intel processor which runs at a clock-speed of 733MHz. That's a lot higher than the 300MHz at which the PS2 CPU is running. But does that make the CPU better? Nope.

Here's why the PS2 CPU (Emotion Engine) is a lot more powerful:
-Data bus, cache memory as well as all registers are 128 bits on the PS2 CPU while the XBox CPU is 32 bits.
-It has a maximum performance of 6.2GFLOPS while the XBox CPU can only do a bit over 3 GFLOPS.
-It incorporates two 64-bit integer units (IU) with a 128-bit SIMD multi-media command unit, two independent floating-point vector calculation units (VU0, VU1), an MPEG 2 decoder circuit (Image Processing Unit/IPU) and high performance DMA controllers. Yes, this is all ON THE EMOTION ENGINE ITSELF.

Okay now what does this mean? It means that the PS2 can handle heavier physics and 3D engines (and can do more accurate realistic visual effects like splashing water and explosions). It also means that the PS2 can handle a lot more sophisticated Artificial Intelligence programming so that you have intelligent human-like opponents. And with a floating-point calculation performance of 6.2GFLOPS/second, the overall calculation performance of this new CPU matches that of a super computer. This is a completely new CPU architecture especially designed for sophisticated graphics and physics while the architecture of the XBox CPU is pretty old and simple and looks a lot like the architecture of the 486 CPU from back in the early '90s. The architecture of the Emotion Engine really is very sophisticated so I'm not going to explain it in detail here. But simply put the main advantage of the PS2 CPU is that it is subdivided into lots of other tiny powerful processors, all of them designed to do a special task and almost all of them can work independently from each other.

And another thing... the processor inside the box does not say "Pentium III" anywhere. It simply reads "Intel". The XBox's processor is NOT an Intel Pentium III, as Microsoft would have you believe, but in fact a Celeron II. It is a 700mhz Celeron, complete with 128kb of L2 cache (P3 coppermines actually have 256kb L2 cache), but overclocked to a 133mhz FSB, resulting in PIII/Celeron hybrid. What makes it a Celeron II is the fact that it is still using a Coppermine Core, with 8 way set associative L2 cache rather than your typical Celeron 4 way set Level 2 cache. What it ultimately comes down to is that this Coppermine core, which allows Microsoft to market the XBox as a PIII Coppermine, is about a 10% speed increase over the Celeron equivalent of this processor. Is the XBox CPU a Celeron? Not really. Is it a Pentium III CPU in the sense that everyone thinks of a PIII Coppermine? Nope. It's somewhere in between.

The Graphics Chip and VRAM

This is where the images are rendered. The XBox uses an Nvidia Graphics Processing Unit running at 250MHz and the PS2 uses the Graphics Synthesizer running at 150MHz. Again, judging by these specs the XBox looks better. The XBox GPU has a few advantages (or maybe not) over the PS2 GS, for example:

-The XBox GPU can do 125 million polygons while the PS2 GS can only do 75million polygons
-The XBox GPU has a max. Resolution of 1920x1080 and the PS2 GS can do 1280x1024 The rest of the graphics chip will be comparable to NV-20 chip, there are a lot of neat effects the XBox GPU can do with its hardware, but all those effects can be done by the Emotion Engine in software too (while the XBox' CPU is not powerful enough to do complex visual effects in software).

But the catch is that these advantages (talking about higher resolutions here) don't make a lot of difference on a TV screen, even on an HDTV screen the difference would be barely noticeable (when the console's hardware is used properly). So, is the XBox Graphics Processing Unit better than the PS2 GS? It doesn't look like it, the architecture of the PS2 GS looks far more advanced. For example, PS2 has a parallel rendering engine that contains a 2,560-bit wide data bus that is 20 times the size of leading PC-based graphics accelerators. The Graphics Synthesizer architecture can execute recursive multi-pass rendering processing and filter operations at a very fast speed without the assistance of the main CPU or main bus access. In the past, this level of real-time performance was only achieved when using very expensive, high performance, dedicated graphics workstations. There is a 48-Gigabyte/sec memory access bandwidth achieved via the integration of the pixel logic and the video memory on a single high performance chip. The quality of the resulting screen image is comparable to high quality pre-rendered 3D graphics. (that is once the game developers have learned how to use it properly) There has also been a misunderstanding about the VideoRAM on the PS2. The VRAM is included in the 32MB of main RAM on the CPU (the developer chooses how much of it he wants to dedicate to VRAM). Everyone thought the 4MB of memory on the GS was the VRAM while that is just a buffer in which all the rendering is done so no external bandwidth is needed (only for texture streaming). Another rumor that's been spread by several gaming sites is that the XBox is capable of texture compression and full scene anti-aliasing while the PS2 isn't. This is simply not true. The PS2 can compress/ decompress textures and do full scene anti-aliasing without causing as much slow-down as on the XBox. And although the XBox GPU can do a lot of effects that are not 'built-in' in the PS2 GS, the PS2 can do all these effects and more in software mode (but at least at the same quality) through the Emotion Engine.

Now let's take a look at how Microsoft got the idea that their graphics chip can do 125 million polygons...

The PS2's Graphics Synthesizer has the highest pixel fill rate of the next generation of consoles. Most remeber the 4.0 GPixels on Microsoft's spec comparence sheet. Well, Microsoft was nice to include a "(anti-aliased)" next to it. What does "4.0 GPixels (anti-aliased)", mean? It's misleading. The Xbox has hardwired 4x FSAA, when this is turned on the actual total of 1.0 GPixels is re-rendered 4 times to remove aliasing. Another possible reason for Microsoft to say Xbox's fill-rate is 4 GPixels per second. Is that the 1 GPixels is with 2 texture layers, if it is NOT used

Xbox would not gain any performance and if it is used Xbox wouldn't lose any performance. It remains 1.0 GPixels w/ 2 textures, so what MS possibly did was it doubled the fill rate twice. Trying to compare it to PS2's fill rate w/ no texture. What MS did was it came up with misleading numbers. The Xbox can't go higher than 1 GPixels per second.

The NV2a in the Xbox has 4 pixel units running at 250 MHz, that's 1 billion pixels/second. While the GS in the PS2 has 16 pixel units running at 150 MHz, which is 2.4 billion pixels every second.

Now let's talk about polygons. Right here I'm talking about polygon rendering and not polygon transformations. To calculate polygon rendering performance, you take the pixel fill rate, and write it in millions. So PS2s pixel fill rate is 2400 Million. When Sony says polygons, it is referring to 32 pixel polygons. Divide 2400 Million by 32. You get 75 Million (32-pixel) polygons per second. That is raw and doesn't include textures, they use up pixels also. Now let's take Microsoft's alleged pixel fill rate of 4000 Million, which MS has on it's spec sheet and divide it by 32, you get, yes you guessed it, 125 Million (32 pixel) polygons per second. Here's the problem, the NV2a doesn't have a 4000 M fill rate but a 1000 M fill rate. So it's 31 Million (32 pixel) polygons per second. This isn't raw, since there's also 2 texture units for each pixel unit. So that's 31 million with 2 texture layers, the PS2 is around 38 Million with 1 texture layer and 20 million with 2 texture layers. The Xbox maxes out at 31 MPolygons per second, if textures aren't placed on those polygons- Xbox will not gain a polygon rendering increase in performance. The PS2's Graphic Synthesizer could render 75 MPolygons per second with no texture. The NV2a in the Xbox can't render higher than 31 MPolygons per second at all.

Okay now take that all into account and then check out the following...

"Is the XBox graphics chip the same as a GeForce 3 card? Not quite. The NV2A chip that powers the XBox is quite similar to the GeForce 3, but isn't quite a GeForce 3. The GeForce 3 is a 64mb card with 350mhz RAMDAC. The XBox's NV2A is a card that SHARES it's memory with the XBox's system RAM and has a 250mhz RAMDAC. The NV2A compensates for this by having a Second Vertex Shader, as opposed by the GeForce 3's single vertex shader. However, Microsoft claims that this second vertex shader instantly bumps the XBox's theoretical max poly count from the 31 million that Nvidia lists for the GeForce 3, all the way up to 125 million pps. According to most experts, the area that will actually see the most improvement from this will actually be in Bump Mapping. Microsoft has yet to explain how the second vertex shader yields an additional 94 million polygons per second."

I don't know enough to go more in detail about this but this is definitely an interesting point, and either way you turn it, it doesn't seem like the XBox has the advantage here.

I can understand that this is all a bit confusing if you're not a real tech-freak. It comes down to this: when developers have learned how to use the power of the PS2 GS properly they'll get a lot more out of it than XBox developers will get out of the XBox GPU. The PS2 GS combined with the EE can do a lot more advanced visual effects than the XBox GPU combined with its CPU.