Get CEW Performance

White Paper

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Windows or Linux

Practically all of our testing efforts have been on commercial off the shelf (COTS) software packages running under Windows 7 Professional. We can say that drivers for the GPU are available but not always fine-tuned.

There are applications written to run under Linux. We have found that Linux applications have lower compatibility with the latest releases of GPU hardware than Windows and there are fewer drivers for Linux than Windows. This situation implies that Windows is more popular than Linux for applications in this area. Nevertheless, we understand that this applies to COTS only and may not apply to research situations or non-commercial scenarios where Linux is more popular.

Geforce or Quadro

We have done performance testing on 3 application packages individually and on the view-sets from 8 application packages with SPECviewperf11. The 3 application packages are AutoCAD 2011 from AutoDesk, Premiere Pro CS5.3 and Photoshop CS5.5 from Adobe. The 8 view-sets are from Lightwave 01 from Newtek, CATIA 03 and Solid Works 03 from Dassault Systeme, Ensight 04 from CEI, Maya 03 from AutoDesk, Pro Engineer 05 from PTC, Teamcenter Visualisation, and NX from Siemens.

For the individual application testing, we used one standard CEW workstation and we varied the GPU between GeForce GTS450 and Quadro 2000. We chose these 2 cards because they have similar hardware specifications. Their key specifications are the same being 192 CUDA cores and 1GB GDDR5 memory. Interestingly the three packages produced different responses to GeForce and Quadro. AutoCAD responded better to GeForce than Quadro (10% better on 3D). However, once we updated the Quadro GPU driver from Nvidia, Quadro performance shot through the roof (300% better on 3D). Photoshop did not really care if the GPU is GeForce or Quadro, whereas Premier Pro responded to Quadro better than to GeForce (10% better).

For the SPEC testing, we used a separate CEW workstation and we found that only 1 view-set responded to GeForce better than Quadro and this view-set is from Ensight. Ensight performed slightly better on GeForce, whereas the other 7 view-sets performed substantially better with Quadro.

Although GeForce provided respectable level of performance on many incidences, this series of GPU cards is positioned for the consumer market as against the Quadro series for the professional market. Quadro has features such as Serial Data Interface option, Serial Link Interface Frame Rendering, Full Screen Anti-Aliasing, and G-Sync option that are not available from GeForce.

CPU or GPU

The issue of whether an application package will respond better to GPU or CPU has been discussed in an earlier paper. It is a matter for the software vendor to decide. The trend is obviously in favour of GPU due to the contribution of CUDA to Tianhe-1A achieving the Number One Global 500 Supercomputer position in November 2010 and similarly to an AMBER workstation when it smashed a bio-molecular simulation record in May 2011.

As at July 2011, all systems require both CPU and GPU to handle professional applications for simulation, visualization, digital content creation and computer aided design etc. It is not a case of CPU or GPU. For low end graphics applications, the workstation can have a CPU with an integrated GPU.

We have done benchmarking tests to find out how the variation of CPU affects the performance of software packages given a fixed GPU. We used the same CEW machine and installed Core i3-2100 CPU and Core i7-2600K to see the response by the 8 view-sets covered by SPECviewperf11. Only Maya 03 responded vigorously to the extra CPU resources or capabilities (performance jumped up over 200%) whereas the other 7 applications responded mildly (less than 10%).

When we retested without Anti-Aliasing which is a GPU function (this implies that the previous tests were done with Anti-Aliasing), the impact of CPU variation on performance became more obvious. This is logical and can be expected.

To get more illumination or support of the above scenario, we did another round of benchmarking and this time we focussed on AutoCAD. We fixed the GPU with Quadro 2000 and varied the CPU from Core i7-950 to 2600K and Xeon 5680. The performance did change a bit more than as shown by SPECviewperf11, but is still within a range of 10% and is definitely not anything like 200%.

A further revelation is that the main memory installed beyond 4GB will not help performance even though Windows 7 64bit version is capable of using the extra memory. We tested with 4GB, 6GB and 8GB and the performance change is negligible and within the margin of error.

Will APU help?

AMD will be releasing APU for desktop use any time. We expect APU to perform better on graphics than Intel CPU with integrated graphics for 2 reasons. The first is that APU is similar in CPU performance as Intel Core i5 but it has more than 10 times the number of GPU cores as Intel. The second is that APU is capable of working with an add-on GPU card whereas Intel CPU is not capable. We will find out more and advise later.

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