

## NVIDIA CUDA – CPUs vs GPUs

Several years ago NVIDIA, best known for designing the graphics cards that power 3D video games, developed a programming interface called CUDA so that algorithms such as those used in seismic data processing could be run on GPUs.

Whereas CPUs have at most sixteen cores with current technology, GPUs have hundreds of cores and are designed to run many calculations in parallel. This is ideally suited to some of the algorithms used in seismic processing, and ffa's benchmarks have shown that calculations can be run up to 40 times faster on a GPU than a CPU (see Figure 4).

This has led to a dramatic improvement in the speed at which seismic data can be analysed. For example, compute times for volume attribute calculations on desktop hardware have shrunk by 99.9% in the last 10 years. As a result, processes that used to take a week to complete now run in around a minute.

"The power of the GPU is also the reason that we can utilise full colour volumetric displays," says Jonathan Henderson, ffa's Managing Director. "Until recently, virtually all volume visualisation systems were limited to displaying at most 256 colours or shades of grey. This meant that data had to be compressed before it could be viewed volumetrically resulting in large information loss. We can now work with volumetric colour displays showing more than 16 million colours. The use of such high resolution colour displays is critical in understanding the subsurface from seismic data as it greatly increases our ability to see, compare and analyse subtle but important features in our data."

ffa has been collaborating with NVIDIA over the last four years to incorporate CUDA

enabled algorithms into all its software packages and bring the benefits of accelerated data processing to the seismic interpretation market.

NVIDIA's latest Maximus workstations incorporate two GPUs as well as a CPU to enable accelerated data processing and visualisation simultaneously in a ready made platform.

Steve Purves, ffa's Director of Technology, said, "Geological Expression is all about maximising the amount of geological information that you can rapidly extract from 3D seismic. We've been working across multiple Quadro and Tesla GPUs in our workstations to do this for some time. Now, with NVIDIA Maximus certification for GeoTeric, and the additional supporting technology that comes with it, it is much easier for our clients to procure the Geological Expression platforms that are going to take their interpretation workflows to new levels of productivity."

"NVIDIA Maximus technology was tailor-made for dramatically accelerating tasks like seismic interpretation," said Jeff Brown, general manager, Professional Solutions Group, NVIDIA. "With GeoTeric utilizing Maximus, geological visualisation and simulations no longer need to occur on multiple systems or at different times. Simultaneous visualisation and simulations means better, faster, and easier workflows on a single workstation."

