High Performance Computing Rugged Solutions with NVIDIA® GPUs

GPU computing is the use of a GPU (graphics processing unit) together with a CPU to accelerate general-purpose scientific and engineering applications. GPU computing offers unprecedented application performance by offloading compute-intensive portions of the application to the GPU, while the remainder of the code still runs on the CPU. Simply put, applications run significantly faster. CPU + GPU is a powerful combination because CPUs consist of a few cores optimized for serial processing, while GPUs consist of thousands of smaller, more efficient cores designed for parallel performance. Serial portions of the code run on the CPU while parallel portions run on the GPU.
NVIDIA GPUs

*Tesla GPU Accelerators for Servers*

Based on the NVIDIA Maxwell™ Architecture, Tesla accelerators are designed to deliver faster, more efficient compute performance for the most demanding data analytics and scientific computing applications.

From energy exploration to deep learning, scientists can crunch through petabytes of data with Tesla accelerators, up to 10x faster than with CPUs. Tesla accelerators deliver the horsepower needed to run bigger simulations faster than ever before. For enterprises deploying VDI, Tesla accelerators are perfect for accelerating virtual desktops to any user, anywhere.

**Tesla K80 GPU Accelerator**

A dual GPU board that combines 24 GB GDDR5 memory with blazing fast memory bandwidth and up to 2.91 Tflops double precision performance with NVIDIA GPU Boost™, the Tesla K80 GPU is designed for the most demanding computational tasks. It's ideal for single and double precision workloads that not only require leading compute performance but also demands high data throughput.
Tesla M60 GPU Accelerator
The Tesla M60 Accelerator is designed specifically for virtualization of desktop graphics. It’s a dual-slot PCI Express form factor for rackmount servers capable of supporting 32 concurrent users. With dual GPUs, 4,096 CUDA® cores, and 16GB GDDR5 memory, the M60 is a powerhouse.
Systel Rugged HPC Solutions
Powered by the latest NVIDIA Tesla and GRID GPU cards, Systel's rugged High Performance Computing (HPC) servers offer tremendous power and high performance. Systel's HPC solutions are designed and optimized for deployment in Military and Oil & Gas mission-critical applications in the harshest environments. Systel is proud to be an NVIDIA Specialty Original Equipment Manufacturer (SOEM) and is excited to feature NVIDIA qualified and certified rugged HPC systems.

NVIDIA GPUs accelerate performance, dramatically increase efficiency by reducing project processing times, and help drive your business towards success. GPU accelerated applications are benefited by Systel ruggedization technology to increase the durability and life of the overall system. As an NVIDIA SOEM, Systel offers a variety of cost-effective Tesla and GRID integrated solutions as well as NVIDIA's backline technical support.

Systel is proud to offer 3 HPC rugged rack mount servers: HPC1000 (1U), HPC2000 (2U), and HPC3000 (3U). These systems are built with the latest Intel Xeon E5-2600 v4 CPUs and up to 3 NVIDIA Tesla or GRID GPU cards. All Systel servers go through extensive in-house thermal and shock and vibration testing and are rated MIL-STD-810G.

Systel HPC Applications
Military applications include image processing, signal processing, and intelligent video analytics. GPUs have had a high impact speeding up image processing; an example of this is orthorectification, the process of removing the effects of image perspective (tilt) and relief (terrain) effects for the purpose of creating a correct image with a constant scale, wherein features are represented in their true positions. Orthorectification of high resolution satellite image data removes terrain distortions to facilitate reliable image data in support of GIS mapping. This allows for accurate measures of distance, measures, positions, and areas. GPU powered systems consistently see a greater than 5x performance over CPU only systems when used for signal processing applications such as software defined radio, synthetic aperture radar, and speech recognition. Intelligent Video Analytics, commonly known as Full Motion Video Analytics are another area where the use of GPUs greatly increases performance. GPUs allow analytics to be
performed on videos as it is ingested, i.e. in real time, which is very useful for facial detection or activity based analytics.

The performance of GPUs when combined with a CPU speed up applications and return results faster than a CPU only solution. With the benefit of improved application performance, an analyst can increase the problem complexity and still receive results in an acceptable amount of time. Additionally, GPUs allow for a much smaller footprint, providing a platform to use less power and space to solve a particular problem. The government customer has a goal of processing more data at the source of collection. GPUs allow for supercomputing performance to be delivered in a much smaller form factor, allowing deployed solutions without sacrificing any performance. GPU based solutions provide an excellent SWAP for the end customer.

Oilfield service customers use GPU powered Systel HPC systems for seismic imaging, reservoir simulation, and to better monitor well fracturing and well production in real-time. HPC servers allow faster modeling, high-definition 3-D imaging, and greater data processing and integration.