DATASHEET

MERCURY COMPUTER SYSTEMS

Sensor Stream Computing Platform

GPU-Based Development Platform for Embedded, Sensor Stream Computing and Exploitation

- Rapid technology insertion leverages latest GPU architectures
- VXS form factor easily supports migration to rugged deployed units
- Scalable to support the most demanding parallel computing applications
- Third-party software support

The Sensor Stream Computing Platform from Mercury Computer Systems is a VXS-based development system that harnesses the tremendous processing power of commercial Graphics Processing Units (GPUs) for high performance, data-parallel computing, in a broad range of defense and commercial applications.

Built on Mercury's in-depth expertise in algorithm and processor optimization, the six-slot Sensor Stream Computing Platform incorporates a Mercury VX6-200 dual dual-core Intel® Xeon® Single-Board Computer (SBC), Mercury VXS-GSC5200 dual Mobile PCI Express Module (MXM) module, and up to 4 MXM GPU modules from AMD/ATI or NVIDIA.

Benchmark, Evaluate, Migrate

With the Sensor Stream Computing Platform, customers can benchmark and evaluate application performance in their choice of GPU environments, and then migrate to a larger deployed solution closer to the sensor. The Platform offers unsurpassed scalability in compute power, performance, and thermal management, and allows for much greater, tunable performance for a variety of commercial and defense applications.

An Inside View

The Sensor Stream Computing Platform conforms to VITA 41.0 VXS specifications and contains 5 available slots (3 VXS mesh payload slots and 2 VME slots). The dual dual-core Intel Xeon processors on the Mercury VX6-200 VXS SBC host offer unprecedented levels of performance in addition to a selection of I/O interfaces including quad Gigabit Ethernet, RS-232 serial I/O, high-speed serial ATA-150 (SATA), USB 2.0, and SVGA; most of these are available at the front panel for easy connectivity. For added versatility and flexibility, the VX6-200 features a single-wide PMC-X/XMC expansion site that supports both front-panel and rear I/O.

At the heart of the Sensor Stream Computing Platform is the VXS-GSC5200 dual MXM GPU module, which offers unsurpassed scalability in power, performance, and thermal management per VXS slot. The VXS-GSC5200 board connects to the host through an x4 PCIe connection over the backplane, providing up to 1 GB/s bandwidth to each GPU from the host, and 4 GB/s between GPUs. Up to 3 monitors (1 analog and 2 digital) can be driven by one MXM, and up to 6 monitors (2 analog and 4 digital) can be driven by 2 MXMs. All video output capability is exposed at the front panel.

The Sensor Stream Computing Platform architecture supports 4-way symmetric multiprocessing (SMP), providing significant performance advantages to the GPUs in the Platform.

Stream Computing on GPUs

Historically, GPUs have been viewed as compelling, programmable floating-point graphics rendering engines designed specifically for personal computers, workstations, and gaming consoles. Also, the availability of embedded GPU solutions suitable to the stringent requirements of high-performance signal processing has been scarce.

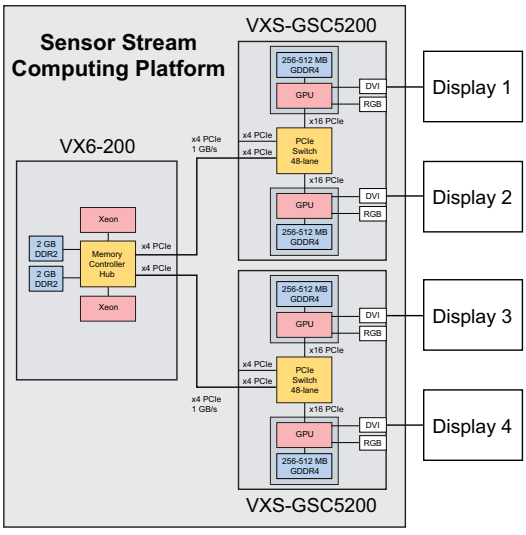

Figure 1. *Sensor Stream Computing Platform functional block diagram*

With recent architectural advancements, the algorithmic scope of GPUs has grown dramatically. Non-video applications such as signals intelligence (SIGINT), oil & gas exploration, security, signal processing, and video transcoding can now be addressed using GPUs – with excellent results. GPUs excel at traditional signal processing algorithms (like the FFT), and industry performance benchmarks on implementing GPUs in high-performance signal processing applications have shown that GPUs can obtain 20x performance improvement and more over other processors (see the Georgia Tech Research Institute report at http://gpu-vsipl.gtri.gatech.edu/*).

Getting Closer to the Sensor – CSN™ and the Sensor Stream Computing Platform

Moving data exploitation processing on the platform and closer to the sensor is especially important, as the time it takes to get information out of today's dissemination architecture is not aligned with the tempo of market requirements – whether the market is semiconductor inspection or ISR (Intelligence, Surveillance, and Reconnaissance).

The Mercury Converged Sensor Network™ (CSN™) is a single, unified architecture that combines sensor signal processing with information management technologies to enable the convergence of multiple sensors, missions, and users in order to deliver transformational access to information in the tactical edge.

The Mercury Sensor Stream Computing Platform is well-aligned with the CSN Architecture in providing a flexible environment to design, simulate, and implement data exploitation algorithms, including stabilization, segmentation, ortho-rectification, and coherent change detection. The Platform assists in moving data exploitation closer to the sensor, mitigating the latency and bandwidth limitations of current sensor access solutions.

GPU MXM Configurations

The Mercury Sensor Stream Computing Platform supports the following configurations:

Hardware Component	Basic NVIDIA Config	Dual NVIDIA Config	Basic AMD Config	Dual AMD Config
VXS 6U 5-slot chassis with power supply	1 chassis	1 chassis	1 chassis	1 chassis
VX6-200R C Dual Dual-Core Xeon VXS Single-Board Computer	1 board	1 board	1 board	1 board
VXS-GSC5200	1 board	2 boards	1 board	2 boards
with NVIDIA MXM modules	dual	quad		
with ATI/AMD MXM modules			dual	quad

Specifications

Chassis

5-slot VXS Mesh backplane in a 4U W x 12"D x 17"H
(7.00" x 290mm x 84HP)
Conforms to VITA 41.0 VXS specifications
3 VXS mesh slots
2 VME64X slots with P0 connectors
500W Power One plug removable power supply
+5V@50A, +3.3V@60A, +12V@12A, -12V@4A outputs

Software

Operating System
Red Hat 5.2
Windows Development Environment
Microsoft Visual Studio 2005 or 2008
DirectX SDK
GPU Development Software and Drivers
Provided by NVIDIA and AMD/ATI
CAL for AMD/ATI
CUDA for NVIDIA

Environmental

Temperature
Typical lab or office operating temperatures

Consult Mercury for rugged environmental options.

* GPU VSIPL: High-Performance VSIPL Implementation for GPUs, Georgia Institute of Technology, Georgia Tech Research Institute, http://gpu-vsipl.gtri.gatech.edu/

Some of Mercury's products are subject to the jurisdiction of the U. S. International Traffic in Arms Regulations (ITAR). Please contact your Mercury sales representative for more information.

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MERCURY COMPUTER SYSTEMS

Corporate Headquarters
201 Riverneck Road
Chelmsford, MA 01824-2820 USA
+1 (978) 967-1401 • +1 (866) 627-6951
Fax +1 (978) 256-3599
www.mc.com

Worldwide Locations
Mercury Computer Systems has R&D, support and sales locations in France, Germany, Japan, the United Kingdom and the United States.

For office locations and contact information, please call the corporate headquarters or visit our Web site at **www.mc.com**.

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