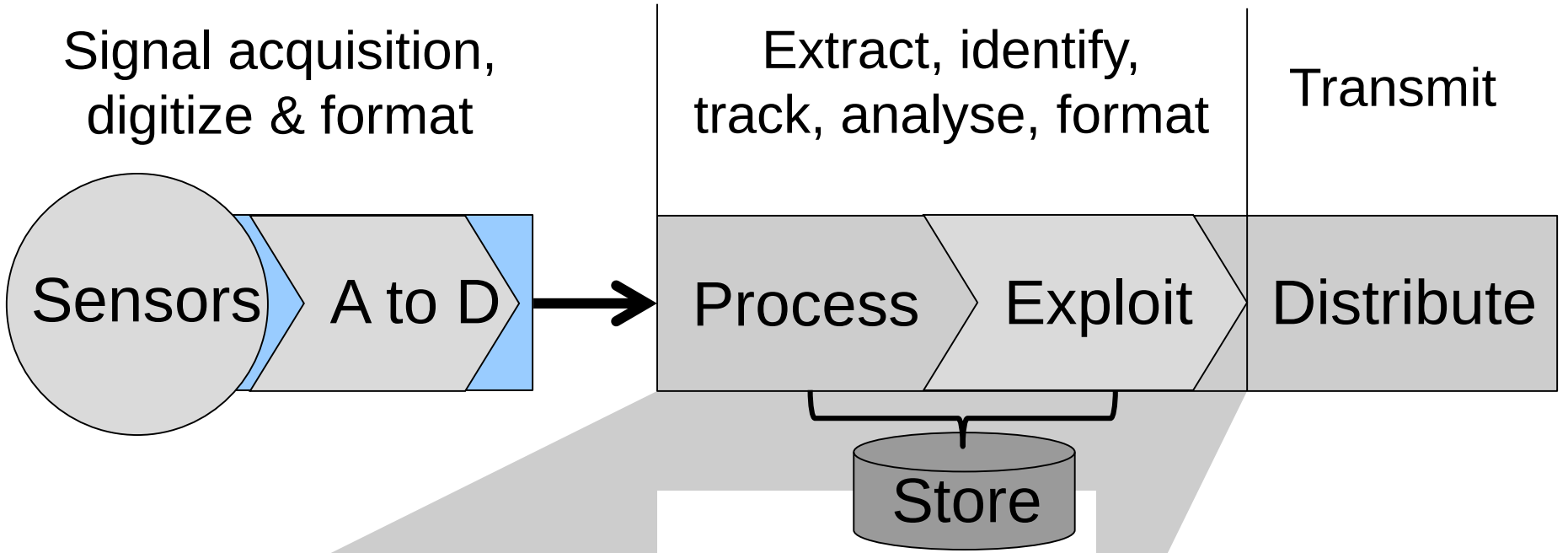
Addressing RADAR Processing needs with 3U OpenVPX COTS Solutions

David Pepper
Product Manager/Core Computing Team
david.pepper@abaco.com

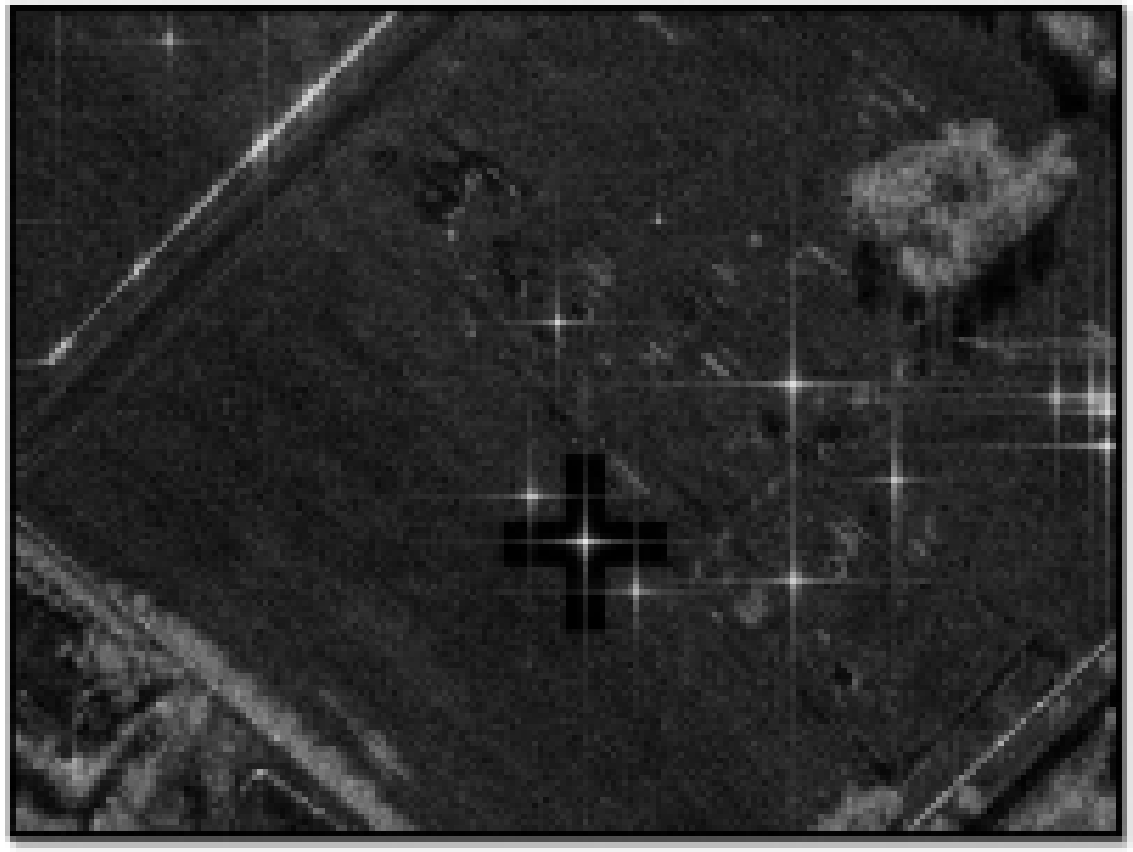
Platform trends – Back end processing



1. *Multi-core and many-core (GPP, GPU) processing*
2. *High bandwidth, low latency IPC & storage*
3. *Open System Architectures (OSA),*
   standard APIs, middlewares and performance libraries

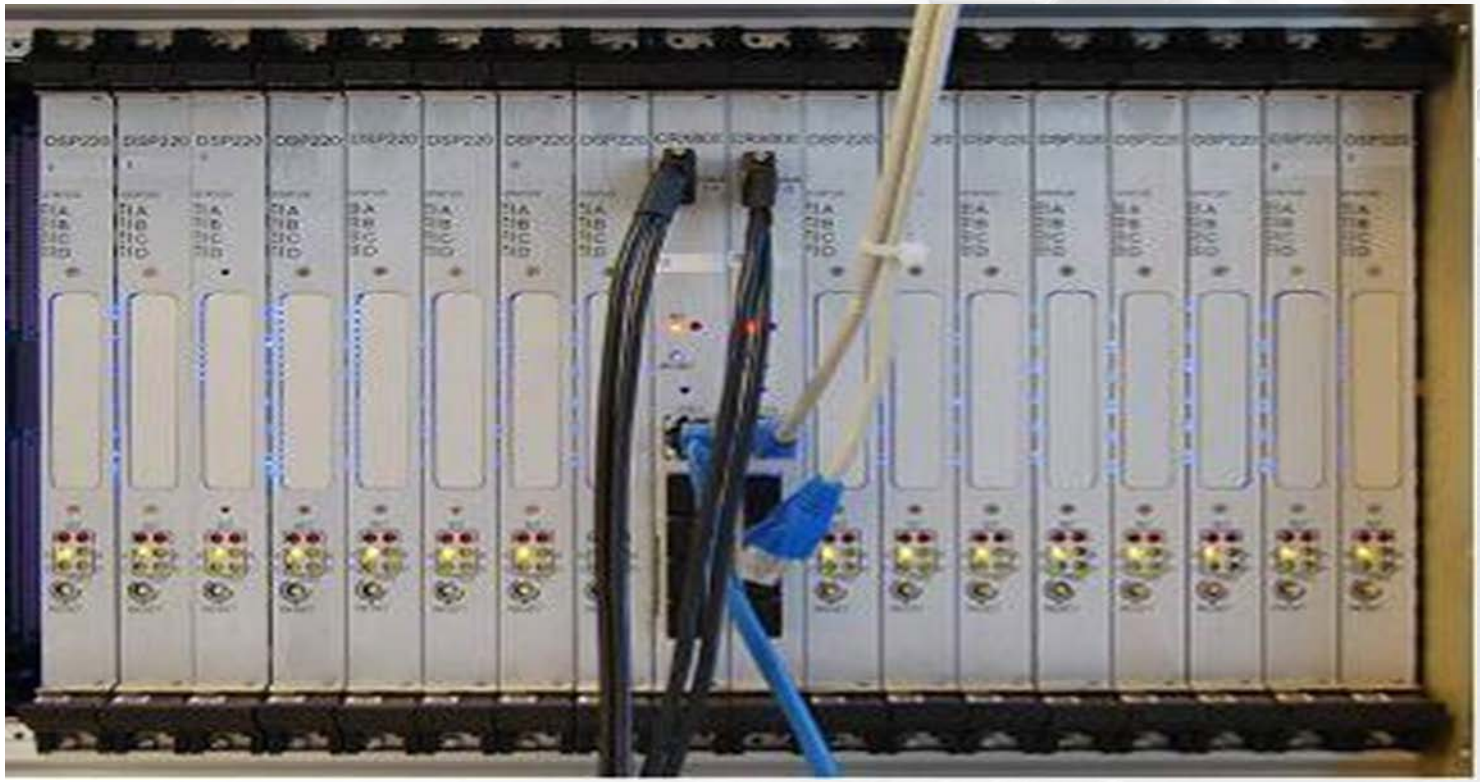
= HPC clusters

SAR and GMTI applications present significant processing challenges



abaco SYSTEMS

Legacy high-performance air-cooled system

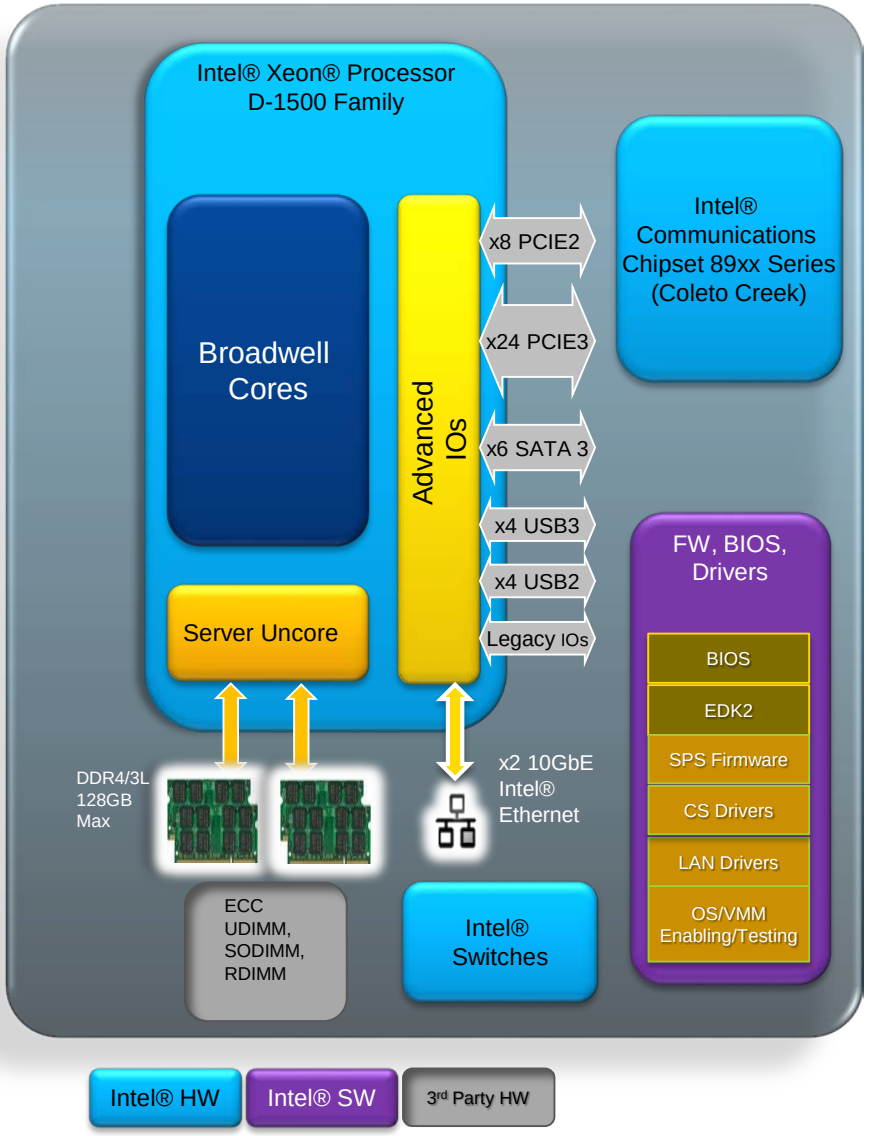


>3 cu ft., 105 lbs., 2000W

576 GFLOPS peak

abaco SYSTEMS

Intel® Xeon® Processor D-1500 Platform Overview



CPU
- Up to 16C BDW Xeon© SMT (14nm) *
- Targeted TDP ~20W - 65W
- Intel® Xeon® Features

Memory
- 2 Memory Channels, 2 DIMMS/channel
- DDR3L/DDR4
- 128GB Max Capacity

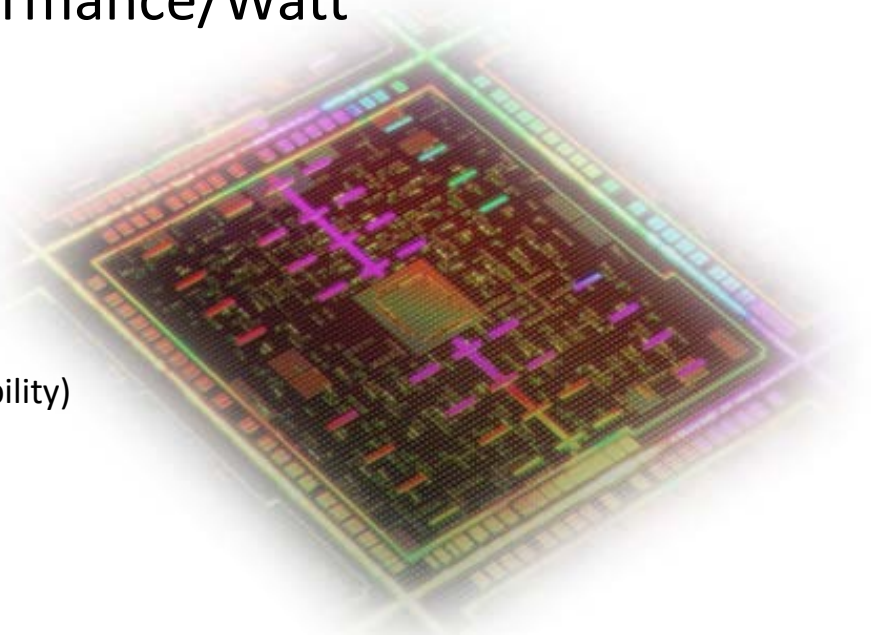
Integrated IOs
- x24 PCIE 3.0, x8 PCIE2.0
- x6 SATA3
- x4 USB 3.0, x4 USB 2.0
- x2 10 GbE Intel® Ethernet

Storage/Network Features
- Storage/Network Environment (Reliability, Temp, Availability)
- Validated with external Crypto accelerator (Coleto Creek)
- Non-Transparent Bridging (NTB), Asynchronous DRAM self-refresh (ADR), Intel® QuickData Technology

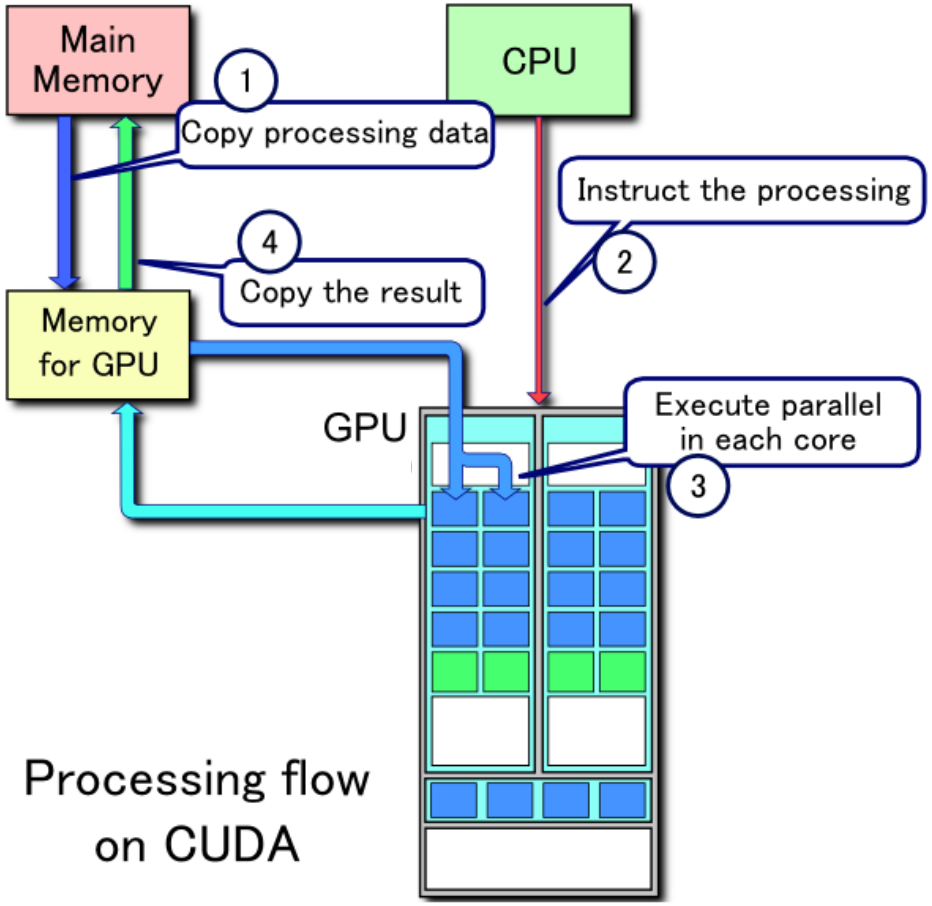
Recent changes in red
* 8/12 core Extended Temperature Versions

NVIDIA GM107 Maxwell GPU

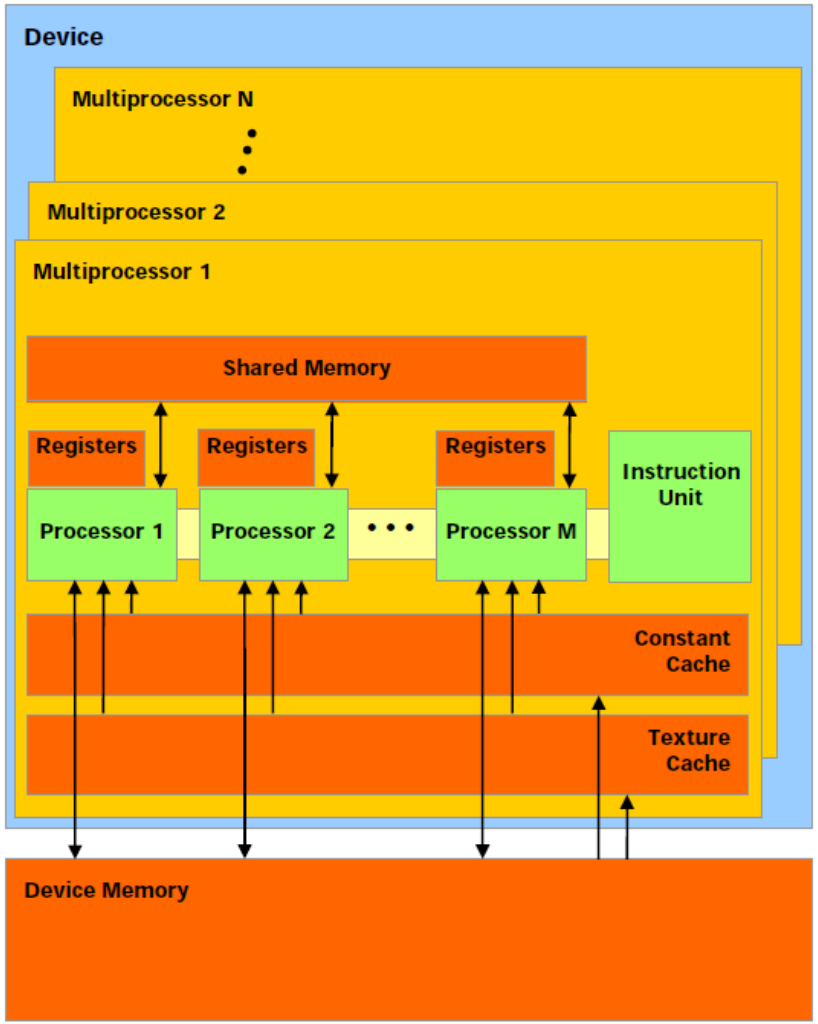
- Maxwell architecture targets performance/Watt
- 640 cores
- 1.1 TFLOPS (theoretical)
- 128-bit dual-bank memory
- PCI Express Gen 3 (subject to system compatibility)
- 28 nm process technology
- CUDA Compute 5.0
- Shader Model 5.0, OpenGL 4.4, PhysX, DirectX 11.2
- Commercial equivalent is the *GeForce GTX 850M*



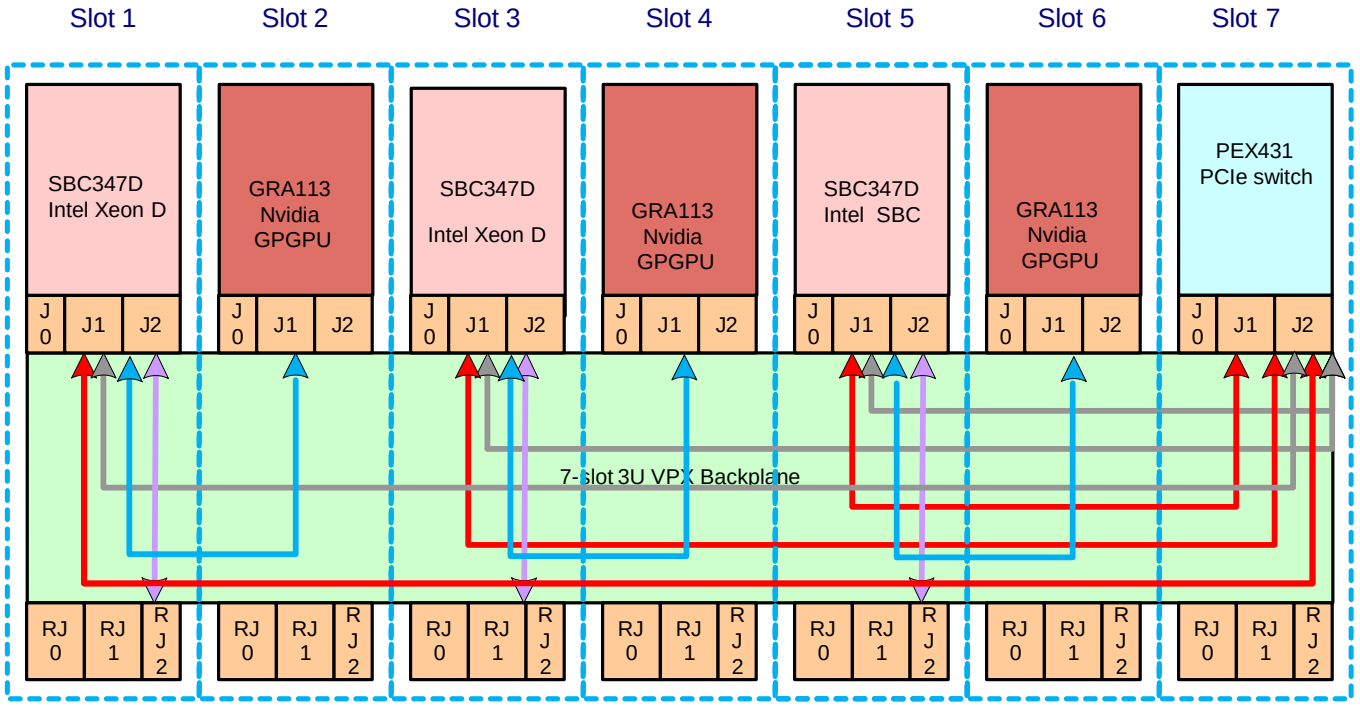
CUDA model



1 Multiprocessor = 8 Processors



Putting it all together in 3U OpenVPX



x16 PCIe Gen 3

1000Base-BX ethernet

x4 PCIe Gen 3

<1 cu ft., <45 lbs., <500W

>4.5 TFLOPS peak

abaco SYSTEMS

Considerations

- Radar applications such as SAR and GMTI suit CPU/GPGPU combinations
- Throughput on the backplane is trending from PCIe Gen 3 to Gen 4
- and 10 to 40GE
  - 10GBASE-KX4 and 10GBASE-KR with a view towards 40GBASE-KR4
  - Optical Interconnects have to be considered at or above Gen 4 and 40GE
- CPU cores will continue to trend upwards
- Nvidia’s next generation Pascal GPGPU will be over 1,000 cores
- 3U OpenVPX is a great way to address SWaP in space/weight constrained environments

abaco SYSTEMS

abaco
SYSTEMS