FPGA/GPU Cluster

Overview

The FPGA/GPU cluster is a cloud-based, remotely accessible compute infrastructure specifically designed to accelerate compute intensive applications, such as machine learning training and inference, video processing, financial computing, database analytics networking and bioinformatics. Latest state of the art acceleration technologies including the Alveo FPGAs, and Tesla V100 GPUs, closely coupled with server processors constitute the backbone of this cluster. The software stack consists of a complete ecosystem of machine learning frameworks, libraries and runtime targeting heterogeneous computing accelerators.

Cluster HW

Cluster Configuration

Environment	Description	# Nodes
Accel - Cerebro	2 Alveo FPGA U200	3
Accel - Genisys	2 V100 GPUs	3
Accel - Synergy	1 Alveo FPGA U200 1 V100 GPU	2

1 Node Specifications

Dual 12 core 3.0 GHz CPU
192 GB RAM
300 GB local storage
100 Gb EDR node interconnect
10 GbE storage network

FPGA/GPU cluster Specifications

Key Platform Benefits

- Secure remote access
- Machine learning frameworks: Tensorflow, Caffe and MXNet
- Support for deep learning training and inference
- Customizability: Select the right combination of accelerators for your application
- Reference designs using software stack for OpenCL, MPI heterogenous cluster computing
- Scalability: Create one node neural network graph and scale up by using more nodes
- Fast automated setup and configuration
- Technical support and training from CMC Microsystems

About CMC

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CMC Microsystems delivers a nationwide, shared platform of tools and services to Canada's micro-nano innovators, helping to create the economy of the future.

- **25** multi-project wafer services available through nine foundries worldwide, offering industrial-scale manufacturing
- **40** university-based micro-nanotechnology (MNT) fabrication labs across Canada, helping researchers customize their designs
- **80** pieces of test equipment for loan in lab
- **560** CAD tools and modules
- **600** development systems
- **450** design flows, user guides and application notes

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Research Topics

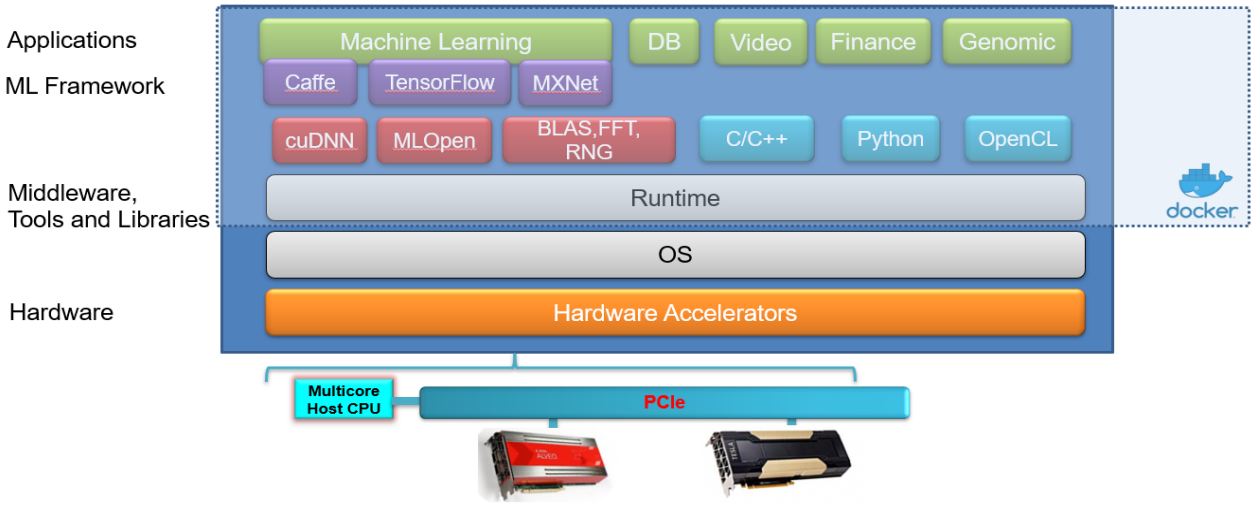
- Machine learning training and inference on heterogeneous computing systems (e.g. CNN, for object detection and tracking, speech recognition…)
- Case studies: Quantum chemistry, molecular dynamics, climate and weather, Genomics, Video Processing / Transcoding, Financial Computing, Database analytics and Networking.
- Software stack including: Parallel programming models, Compilers, Middleware, Runtime, Drivers and OSes.
- ASICs Prototyping: e.g., CMOS and other semiconductors, for implementing custom neural network accelerators.

FPGA/GPU Cluster Accelerators

Accelerator	Features	Host Interface	Compute Performance	Power
FPGA **Alveo U200**	892,000 LUTs 64 GB Off-Chip mem. 77 GB/s bandwidth	PCIe 3.0 x 16	Unavailable	225W
GPU **Tesla V100**	5,120 Cuda cores 640 Tensor cores 32GB /16GB HBM2 900GB/sec	PCIe 3.0 x 16	7 TFLOPS DP 14 TFLOPS SP 112 TFLOPS TP	250 W

FPGA/GPU Cluster Software stack

The FPGA/GPU cluster supports the three most commonly used deep learning frameworks, namely, TensorFlow, Caffe and MXNet. These frameworks provide a high-level abstraction layer for deep learning architecture specification, model training, tuning, testing and validation. Also included in the software stack are the various machine learning vendor specific libraries, that provide dedicated computing functions tuned for specific hardware architecture, delivering the best possible performance/power figure.



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