VALPARAISO UNIVERSITY

COMPUTING AND INFORMATION SCIENCES

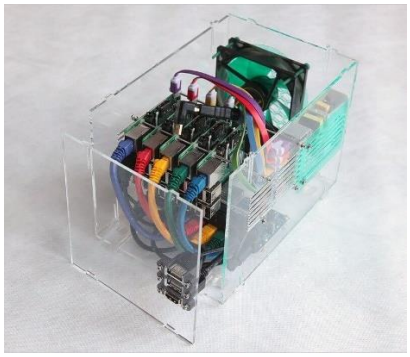
ODROID-XU4 *[Two 5 node clusters or One 10 node cluster]*

Background

The twin ODROID XU4 clusters provide a level of computational power between the sister Raspberry Pi units and the more powerful LittleFe system, and a level of parallel capability between the massively parallel CUDA-based platforms and the other compute nodes based on conventional X86 chips. Through reuse of the same configuration option and configuration as deployed to the Raspberry Pi clusters, it is possible to operate the 10 ODROID XU4 nodes as either a single 10 node or dual 5 node cluster(s).

Technical Specifications

- Processing (2/5 or 1/10 nodes): Samsung Exynos5422 Cortex™-A15 2Ghz and Cortex™-A7 Octa core CPUs (8 cores/node)
- Interconnect: Gigabit Ethernet (Both switch and nodes)
- Power: 7 DC adapters (1/node+fan+switch) per 5 node set; the cluster runs on 1 standard outlet and commodity power strips)
- RAM: 2Gbyte LPDDR3 RAM/node
- Storage: 16 GB+ MicroSD storage/node; shared NFS storage
- Operating System: Ubuntu Linux
- Cooling: 1x 90mm external fan per 5 node box (with blue LED) plus on-chip fan+heat sinks
- Custom acrylic enclosures – fabricated with assistance from Mech. Eng.



Curricular/Other Uses

- Parallel and Distributed Computing Elective (Graduate and Undergraduate levels)
- Conference demonstrations (American Meteorological Society, 2019)

Acknowledgements

Thanks to Terry Wade, CS Dept Technical staff, for system & enclosure build, and OS load/configuration,
Meteorology's Isaac Arseneau, Maxwell Grover and Prof. Kevin Goebbert for interest and support,
Prof. Dan Blood and the Accelerated 3D Printing Lab/Mechanical Engineering –
for help with laser engraving/cutting
Nick Smith of Climbers.net for the original housing designs and concept,
Angelina Coleman for support with purchasing, Erik Kispert for assistance with various supplies.

The design and teaching materials used for this system are derived from the work of:
Prof. David Toth, Centre College and the many contributors to CS In Parallel:
Prof. Suzanne Matthews, U.S. Military Academy * Prof. Elizabeth Shoop, Macalester College
Prof. Richard Brown, St. Olaf Colleg * Prof. Joel Adams and Jacob Caswell, Calvin College
Prof. Charles Peck, Earlham College