Hewlett Packard Enterprise

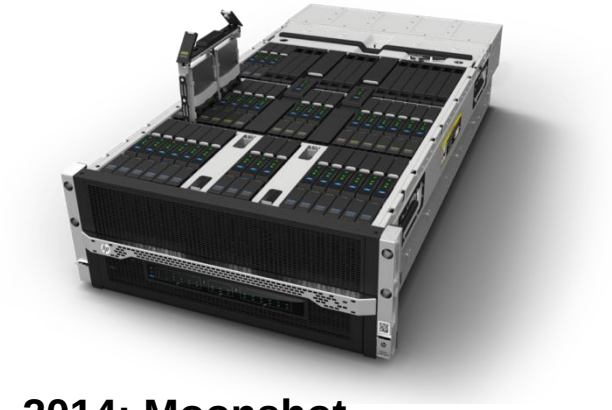
Further Updates From the Coalface of Arm in HPC

Andy Warner, Distinguished Technologist

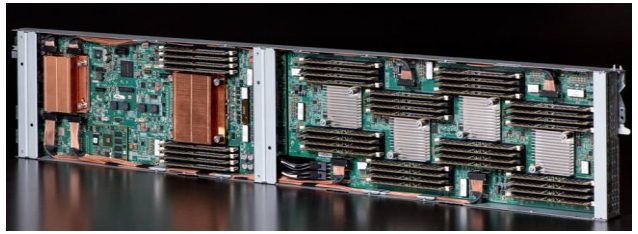
Arm HPC User Group | 18 November 2019 | Denver, CO

HPE and ARM: Long-standing Partnership

2012: Redstone
- Calxeda low power CPUs
- 288 nodes in 4U
- ARMv7 32bit
- 4 cores, 1.4GHz



2014: Moonshot
- Calxeda, TI, Applied Micro
- 45 XGene cartridges in 4U
- ARMv8, 64 bit
- 8 cores, 2.4 GHz



2016: "The Machine" (prototype)
- Broadcom Vulcan CPU
- 160 TiB of addressable memory
- Gen-Z fabric
- Fabric Attached Memory
- Integrated fabric optics

2017: Comanche
- TX2 very early access program
- Four 2P nodes in 2U
- 32 cores, 2.2GHz

2018: Apollo70
- 28c & 32c SKUs offered
- Astra - Top500 system
- CatalystUK

2019: Fujitsu, A64fx & NVIDIA GPU
- Fujitsu partnership
- CS500 with eight A64FX
- Apollo 70 with NVIDIA GPU supporting development and early adopters

Liquid-Cooled Apollo 70 Technology Demonstration

- Multiple TX2 SKUs tested
  - 28 core parts throttle turbo due to 150W power cap
  - 32 core parts run at 100% turbo
- Modifications limited to CoolIT cold plates and associated plumbing
- Unmodified enclosure, firmware or software
- Project extended to include NVIDIA V100 GPUs
- On display in HPE†, Marvell, Arm† & CoolIT booths here in Denver

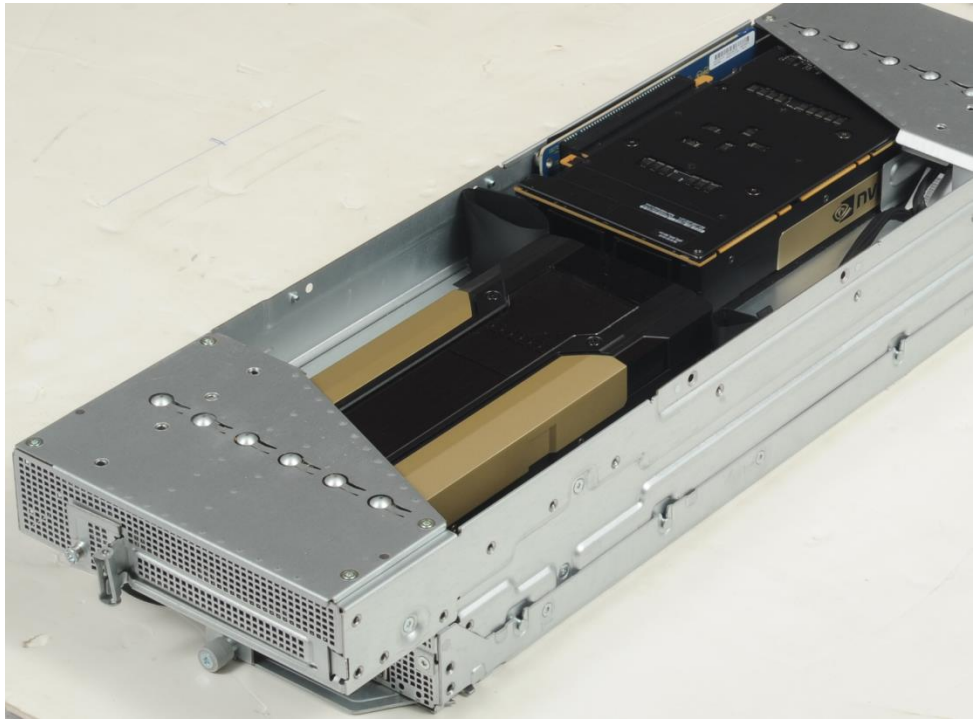
(†) GPU tray on display in these booths

Deployment at Scale Matters

- The Arm HPC ecosystem is maturing quickly, helped by deployments across a range of:
  - OSes
  - Silicon vendors
  - Software stacks
  - Workloads
  - System sizes
  - System integrators
- SLES15 and RHEL8 support is important for production sites
  - As of RHEL8, aarch64 is present in the mainline, not an alternate architecture.
  - RHEL8 is particularly important for CUDA and A64FX support.

GPU/CUDA Update

- NVIDIA announced intention to add CUDA support for Arm host processors in June at ISC in Frankfurt
- Apollo70 2U enclosure was already GPU ready
- HPE has worked aggressively with NVIDIA since ISC to support their port to aarch64. Progress is a testament to the robustness and breadth of the underlying infrastructure required
- Multiple partners successfully running CUDA applications on Apollo70, including:
  - LAMMPS
  - NAMD
  - GROMACS
  - MILC
  - HOOMD-blue



Is That All There Is ?

- A great deal has been accomplished since ISC within the Arm HPC community
- Much of HPE's contribution in this period has been behind the scenes
- Cray acquisition
  - HPE & Cray both acknowledged leaders of the ARM HPC community
  - Historically different approaches
  - Complimentary strengths
  - Complimentary products