Further Updates From the Coalface of Arm in HPC

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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 CPU
- 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:
  o OSes
  o Silicon vendors
  o Software stacks
  o Workloads
  o System sizes
  o System integrators

• SLES15 and RHEL8 support is important for production sites
  o As of RHEL8, aarch64 is present in the mainline, not an alternate architecture.
  o 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