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Introduction of Fujitsu's HPC Processor for the Post-K Computer

August 22nd, 2016
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Key Message

■ Fujitsu, as a "lead partner," has been collaborating closely with ARM and contributed to the development of the HPC extensions (called SVE) for ARMv8-A, a cutting-edge ISA optimized for a wide range of HPC applications

■ Fujitsu is developing a new HPC processor conforming to ARMv8-A with SVE for the Post-K computer, based on our own microarchitecture, as used in our ongoing SPARC64 and mainframe processor development

Post-K Processor Overview

- Enhances and inherits the superior features of the K computer, PRIMEHPC FX10 and FX100
  - High performance for a wide range of real applications
    - Many-core processor with 512-bit wide SIMD
    - Fujitsu HPC compiler for the ARM ISA, optimized for our microarchitecture
  - High scalability
    - Scalable, integrated Tofu interconnect
    - Assistant cores for daemons, IOs & MPI asynchronous communications
  - Optimized performance-per-watt

	Post-K	PRIMEHPC FX100	K computer/ PRIMEHPC FX10
ISA	ARMv8-A+SVE	SPARC-V9+HPC-ACE2	SPARC-V9+HPC-ACE
SIMD	512-bit	256-bit	128-bit
Four-operand FMA	✓Enhanced	✓	✓
Gather/Scatter	✓Enhanced	✓	
Predicated Operation	✓Enhanced	✓	✓
Math. Acceleration	✓Enhanced	✓Enhanced	✓
HW Barrier* / Sector Cache*	✓Enhanced	✓Enhanced	✓

* Fujitsu extensions, utilizing the ARM ISA's "implementation-defined" space

Post-K Development at Fujitsu

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- Fujitsu has 40 years' experience in supercomputers, where we have consistently adopted the most appropriate ISA for each project, such as the HPC extensions for SPARC-V9 called HPC-ACE

- Fujitsu chose to adopt ARMv8-A with SVE in order to best position the Post-K computer to contribute to a wider user base and utilize the assets. This decision was also a natural result of collaboration with ARM on the development of the HPC extensions

- The Post-K computer will be a massively parallel supercomputer system based on Fujitsu's ARM ISA-equipped HPC processor, leveraging Fujitsu's trusted HPC technologies to protect and enhance users' application assets

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