Role of persistent memory in computing for high performance computing

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High Performance Computing has historically demanded much from memory and storage. This trend has accelerated with rapidly increasing CPU core count and AI accelerator introduction coupled with data sets of increasing size accessed at increasing intensity. This presentation will focus on a new technology recently available to HPC systems, one that is only starting to be fully used, 3D XPoint memory in the form of Intel® Optane™ SSDs and most importantly for HPC, Intel® Optane™ persistent memory. This entirely new technology has an order of magnitude density advantage versus DRAM, is fast enough to be accessed as memory, and holds data persistently. In this talk, we will first introduce 3D XPoint memory and show how it fills an emerging technology-driven gap between DRAM and NAND in the memory and storage hierarchy. We will introduce subsystem level implementations of this technology both as SSDs and as persistent memory, showing the distinct capabilities and providing examples of system level use for each. Finally, we will explore HPC specific uses of Intel Optane persistent memory and the strong potential for additional applications enabled by both increased capacity and persistence.

Frank Hady is an Intel Fellow and the Chief Optane Systems Architect in Intel's Non-Volatile Memory Solutions Group (NSG). Frank leads research and definition of Intel® Optane™ technology products and their integration into the computing system. He led the first Optane product definitions through a careful co-architecture of media and system. Frank has served as Intel's lead platform I/O architect, delivered research foundational to Intel's QuickAssist Technology, and driven significant platform performance advances. He has authored or co-authored more than 30 published papers on topics related to networking, storage, and I/O innovation and presents often on memory and storage. He holds more than 30 U.S. patents. Frank received his bachelor's and master's degrees in electrical engineering from the University of Virginia, and his Ph.D. in electrical engineering from the University of Maryland.