STATEFUL IN-MEMORY COMPUTING IN EMERGING CROSSBAR MEMORIES

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Emerging memories such as MRAM, PRAM, and RRAM have been extensively studied due to its various advantages over the conventional memories. Because their performances are yet better than the conventional memories as DRAM and NAND Flash, researchers are primarily trying to find their applications at embedded memory or storages class memory applications. As such, when the emerging memories are used for memory or data storage, its application can be very limited to one of the computing elements in the conventional computing hierarchy. If an entirely new function—a computing function—can be implemented in the emerging memories, it could destroy the traditional computing hierarchy and change the computing paradigm. The stateful in-memory computing technology provides such capability to the emerging memories. The first concept of stateful logic was proposed in 2010 by the group of HP using the crossbar RRAM. Afterward, there have been many advancements for putting the technology into practical use. In this presentation, the most up-to-date stateful in-memory computing technology is presented. The stateful in-memory computing technology can apply to any emerging memories based on the crossbar architecture. Therefore, it would be an additional beneficial option for the emerging memories strengthening its functionality more than memory or storage.
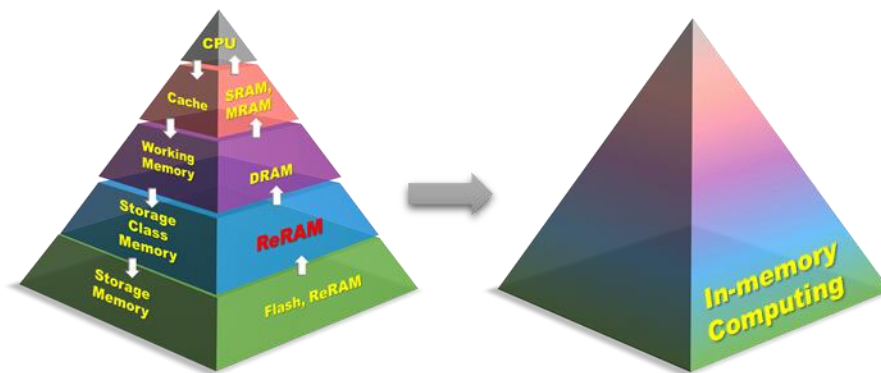

*Figure 1 – A conceptual schematic showing the computing hierarchy change
by the in-memory computing technology*