Computing systems have seen tremendous growth over the past few decades in their capabilities, efficiency, and deployment use cases. The relatively slower progress in memory technology compared with that in processing units has continued to exacerbate the memory wall problem in the standard Von Neuman architecture. One viable solution is in-memory computing, where computing and storage are performed alongside each other. Another concurrent development in computing is the maturation of domains that are error resilient while being highly data and power intensive. These include machine learning, pattern recognition, computer vision, image processing, and networking. This shift in the nature of computing workloads has given weight to the idea of approximate computing, in which device efficiency is improved by sacrificing tolerable amounts of accuracy in computation. This study presents a mathematically rigorous foundation for the synthesis of approximate in-memory logic and its mapping to RERAM crossbars using search-based and graphical methods. Results are demonstrated on standard computing benchmarks and fundamental image processing kernels.

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The public is welcome to attend.