ASIC² Project:
In-Memory Searching Vs. Conventional Architectures

Background: **Nowadays, the performance of computer systems is significantly limited by the speed of the memory. Data transportation between the memory and the processor is time consuming and wasteful in energy.**

Searching quickly is one of the most desired capability in the big data era. In conventional architectures, as the data size increase, the latency for searching increases, since more data has to be transferred from the memory which stores the data to the processor which performs the searching. One of the leading ideas for solving these issue is to transfer the search process into the memory itself.

A new computer architecture approach, based on a memristor-based memory, enables performing computations within the memory.

The memristor is a passive circuit element, predicted in 1971 by the circuit theorist Leon Chua. The first prototype of this element was unveiled in 2008 by HP labs. The device remembers its history, by varying its own resistance, so it can be used for memory applications. It also enables the formation of basic logic circuits, based on the MAGIC logic gate. The combine of memory with logic enables to perform logic operations within the memory itself, thus to explore advanced non-von Neumann architectures.

In previous work we developed an algorithm for searching within memory.

Project Description:

- In this project, the students will explore state of the art architectures which perform searching within big chunks of data and compare with results of in-memory computations.

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