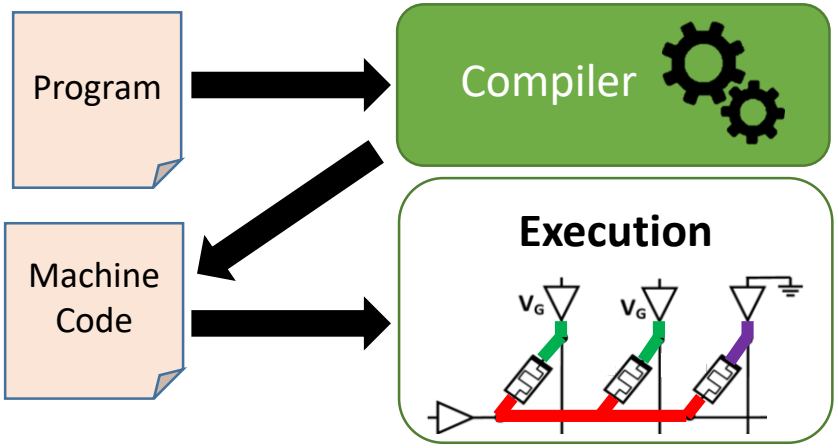
ASIC² Project: Developing a Compiler for a Memristor-Based Architecture

***Background**: Computers nowadays are based on von Neumann architecture, in which the memory and the processor are completely separated. Many applications require executing complicated computations on a lot of data, which causes heavy transportation between the memory and the CPU. This transportation slows down the computation process and consumes a lot of energy.*

In order to address this challenge, new memristor-based architectures which are not von Neumann have been developed recently. Memristors are new electronic devices which function as both memory elements and processing units. To support processing in memory, a hardware-software interface and a compiler which uses this interface need to be developed.



Project Description:

- In this project, a compiler for a memristor-based architecture will be designed and implemented. The students will learn how to develop a compiler and how to create a compiler which addresses the system requirements automatically.
- The unique requirements, design considerations and trade-offs of memristor-based architectures will be discussed and implemented in the compiler.
- Finally, the compiler will be evaluated by different testing programs.

Prerequisites:
Logic Design (044262 or 044252), knowledge in compilation – advantage, knowledge in scripting languages e.g. Python - advantage

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