



Amirkabir University of Technology
(Tehran Polytechnic)

Memory Technologies Course By

Dr. Hammed Farbeh

CE5431 | Spring 2024

Teaching Assistants

Morteza Adelkhani (Madelkhani@aut.ac.ir)

Sarah Zamani (sara.zamani73@aut.ac.ir)

Question 1:

- A) Name at least four simulators of memory technologies and examine them in detail. In your description, explain how to use each simulator, what programming language is required, what applications it can support, and what challenges it may face. At the end, fill in the following table for each simulator.

	Application	Programming Language	Weaknesses	strengths
Simulator 1				
Simulator 2				
Simulator 3				
Simulator 4				

- B) Imagine you're leading a team of computer architects tasked with designing a next-generation processor architecture that heavily relies on innovative memory technologies to boost performance and energy efficiency. As part of this endeavor, you need to select the most suitable memory technology simulator to aid in the design and optimization of cache or main memory subsystems.

Your team's goal is to develop a processor architecture that optimally utilizes memory technologies such as non-volatile memory (NVM), high-bandwidth memory (HBM) or conventional memories, ensuring seamless integration and maximum performance gains. This requires thorough simulation and analysis of various memory hierarchies, cache configurations, and memory access patterns.

In the context of designing both cache and main memory subsystems for our next-generation processor architecture, which memory technology simulator, would you recommend and why?

Question 2:

One of the tools used for simulating digital circuits is HSpice software from the Synopsys company, primarily employed for implementing memory banks. Based on this, answer the following questions:

- A) What are the reasons for the emergence of other simulators developed in languages such as C++, Python, etc.?
- B) Discuss the importance of implementation using tools like Hspice.