



# LOGISIM TUTORIALS



# Introduction to Memory Components

## What is Memory?

- Memory in digital systems stores data and instructions for the CPU to execute.
- Two key types of memory: RAM (Random Access Memory) and ROM (Read-Only Memory).

# What is RAM?

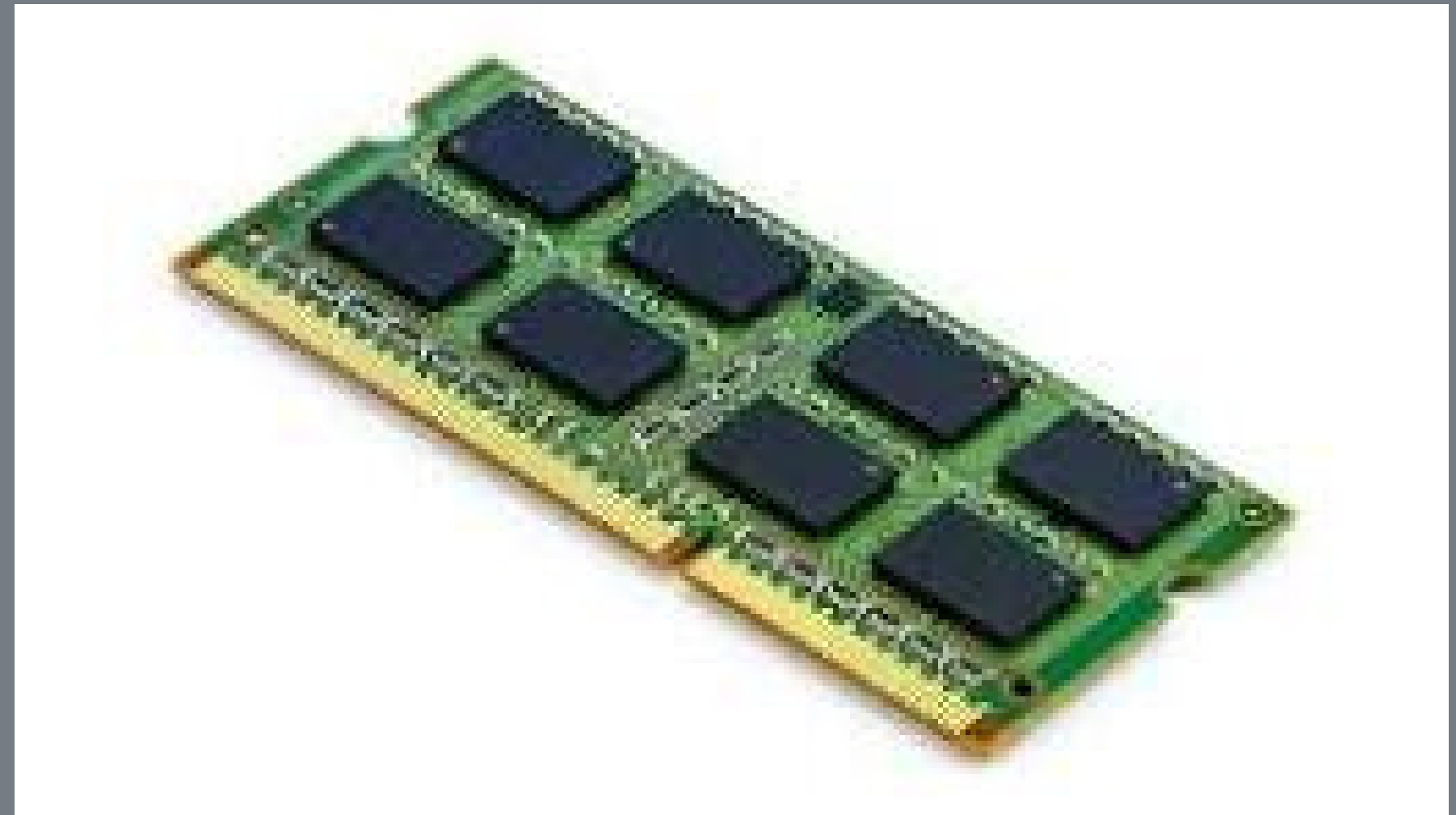
## Overview:

RAM is a type of volatile memory, meaning it loses data when the power is off.

Used to store data that is actively being worked on by the CPU.

## Types of RAM:

- SRAM (Static RAM): Faster, but more expensive and requires more transistors.
- DRAM (Dynamic RAM): Slower but cheaper and more common in computers.



# What is ROM?

## Overview:

- ROM is non-volatile memory, meaning it retains data even when power is off.
- Used to store firmware or permanent instructions that the CPU reads but doesn't modify.

## Types of ROM:

- PROM (Programmable ROM): Can be programmed once.
- EEPROM (Electrically Erasable Programmable ROM): Can be reprogrammed multiple times.



# What is Memory Addressing?

## 01

### Overview:

- Memory addressing is the process of identifying specific memory locations where data is stored.
  - A memory address is a binary number used to specify a location in memory.
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## 02

### How Addressing Works:

- Each memory module is divided into locations, each with a unique binary address.
- The number of address lines determines the amount of memory that can be addressed (e.g., 10 address lines can access  $1024$  locations).

# Designing a Memory-Based System

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A complete memory-based system integrates both RAM for temporary data storage and ROM for permanent instructions.

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## System Design:

- RAM: Stores volatile, temporary data during program execution.
- ROM: Stores non-volatile, permanent instructions like firmware.

## Multiplexer Control:

- A multiplexer (MUX) selects between RAM and ROM based on control signals.
- The control signals determine whether data is read from or written to RAM, or only read from ROM.

**Thank You**

