

# Flip-N-Write: A Simple Deterministic Technique to Improve PRAM Write Performance, Energy and Endurance

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# Motivation

Suppose that you had a rewritable storage medium with the following characteristics:

- The values of individual bits can be changed independently.
- Updating a bit from 0 to 1 or from 1 to 0 is a relatively expensive operation (in time, energy, or both), compared to the cost of leaving a bit unchanged.

How can you minimize the cost of updating the information stored in this medium?

# Practical Justification: PRAM

- Phase-change random access memory (PRAM) may soon replace flash memory and DRAM in many applications.
- Each memory cell contains a material that has two phases with very different electrical properties.
- An “amorphous phase” exhibits high resistivity, while a “crystalline phase” has much lower resistivity.
- Reading the bit value stored in a cell consists of sensing its resistivity (a fast, low-power operation).