

Modeling Rowhammer in the gem5 simulator

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③ gem5 & Ramulator



gem5 modular computer is а architecture used simulator for research. It is used to define a custom architecture with cores and simulate and this memories, architecture running programs and operating systems.

However, its memory simulator is not timing-accurate.

Ramulator was introduced to bring timing-accurate main memory simulation to gem5.

bit = 064ms Time Voltage accross a storage capacitor

neighbors of a victim row can empty the charge of capacitors, effectively deleting the data (bit-flip).

ADA 6



This error rapidly became a major threat as attacks exploiting this error, named Rowhammer (RH) attacks, appeared to precisely flip bits to gain kernel privileges, even from sandboxes or without a malicious program running on the victim system.

Despite a timing-accurate main memory simulation with Ramulator, gem5 does not provide any implementation of unintended memory modifications like bit-flips caused by Rowhammer attacks. We created a gem5 module to introduce memory corruption to architectural simulations. This modification will allow the development of new attack methods and associated counter-measures.





(4) Memory-Corruption Module



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