Technology Tutorial

In the Matter of Certain Memory Modules and Components Thereof and Products Containing Same

Inv. No. 337-TA-1023
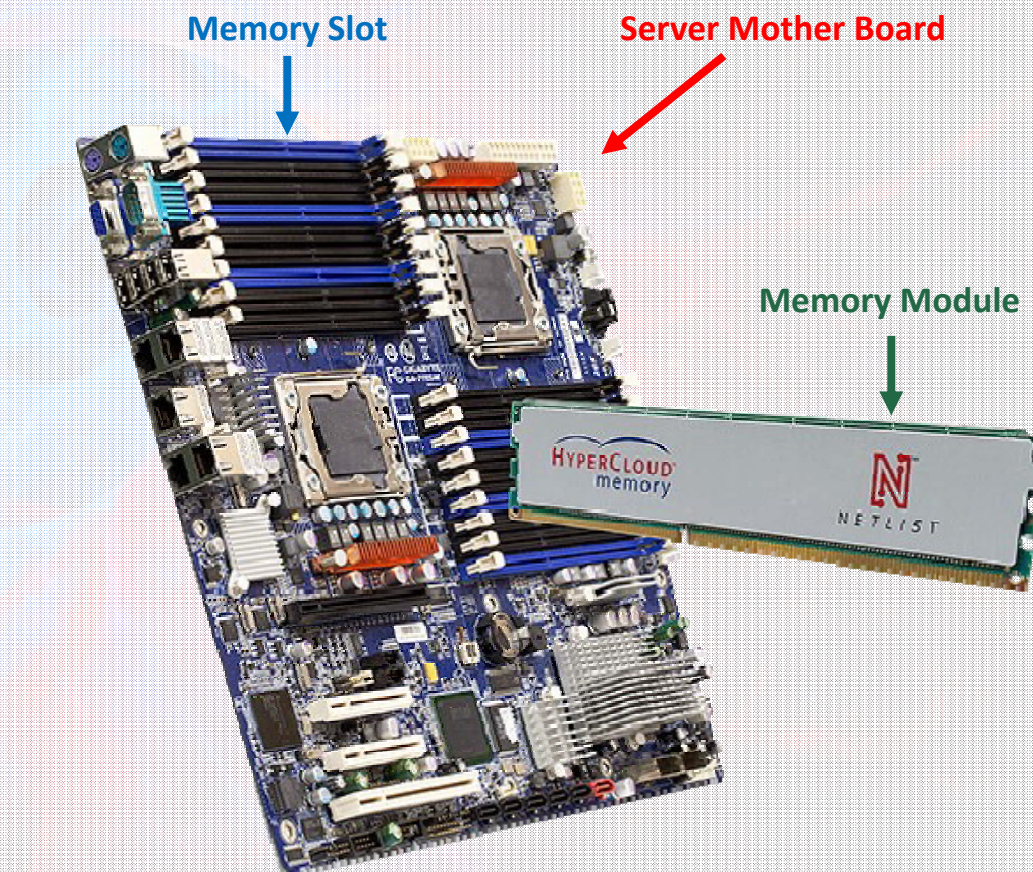
May 8, 2017

NETLIST

CDX-200.1

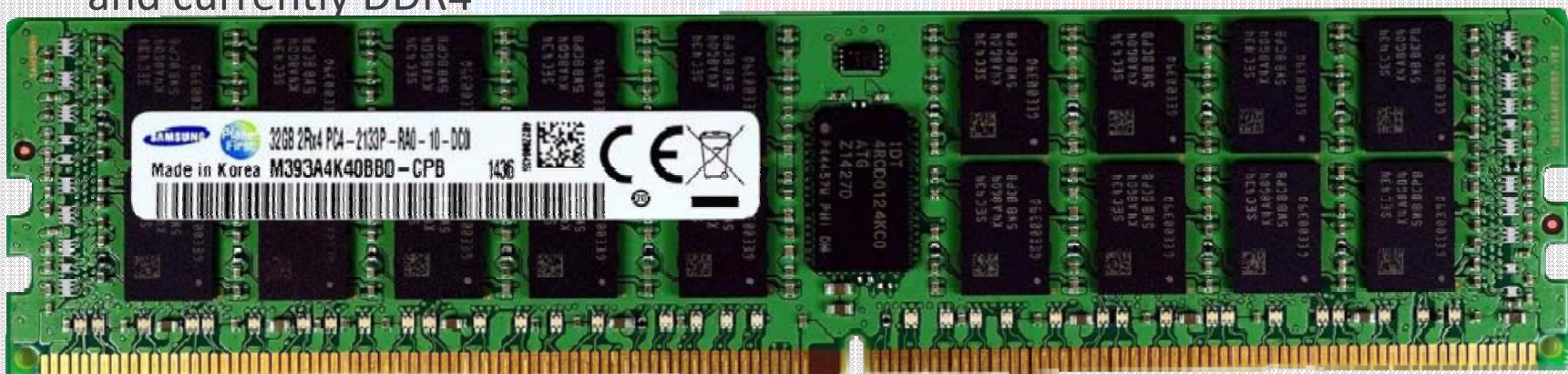# Technology Overview: Memory Module

The Netlist Patents relate to memory modules in a server

- A memory module is inserted in a memory slot in a server's mother board

- Memory modules are called Dual In-Line Memory Modules (DIMMs) because there are in-line connections on each side of the module

Memory Slot

Server Mother Board

Memory Module
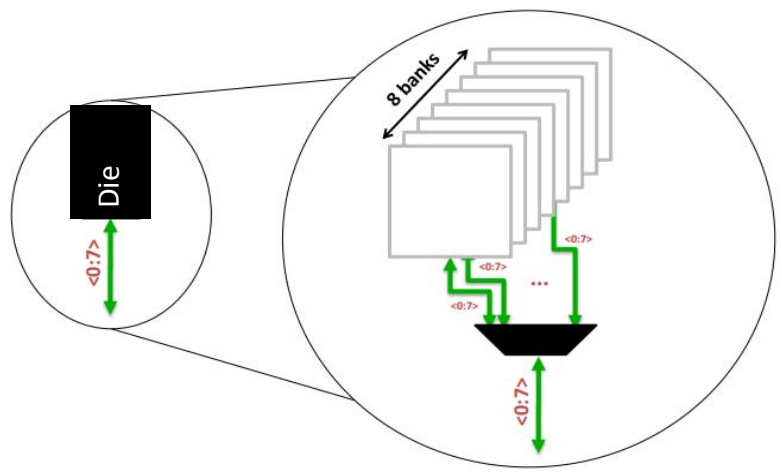
Technology Overview: What is Memory?

- Memory is used to store information for fast access by the processor

- Memory commonly used today is SDRAM or synchronous dynamic random access memory

  - SDRAM emerged in the 1990s and has been standardized by the JEDEC (Joint Electron Devices Engineering Council)

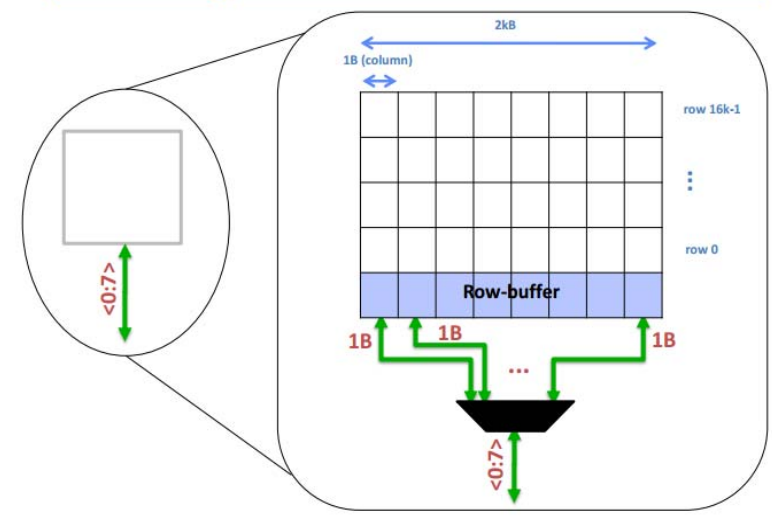 - SDRAM has evolved in several generations, including DDR, DDR2, DDR3 and currently DDR4

CDX-200.4

SDRAM contains several sections called banks

Breaking down a Chip

Each bank consists of rows and columns of memory

Breaking down a Bank

Samsung Ex. 1077, p. 4
Samsung Electronics Co., Ltd. v. Netlist, Inc., IPR2022-00996

Technology Overview: Memory Ranks

- A rank is a set of DRAMs that are written to or read from together

- For example, a memory controller reads or writes 64 DQ (data) bits at a time
  - Each DRAM reads/writes 8 DQ bits (x8, or by eight)
  - Need 8 DRAMs in a rank to provide the 64 bits at once
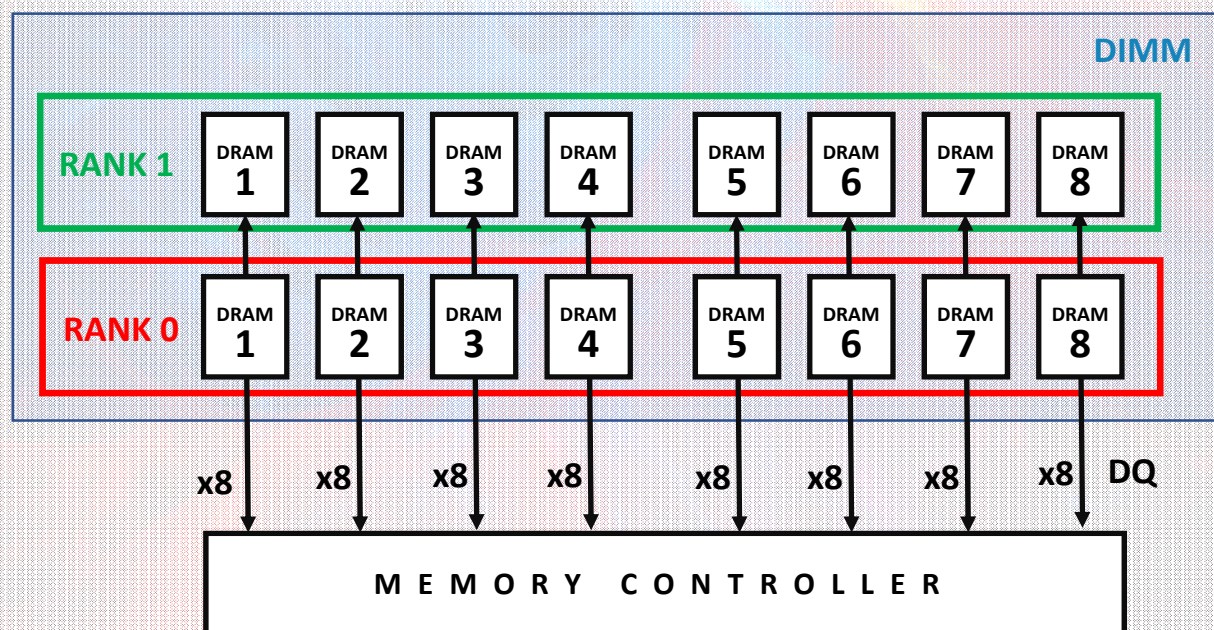
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