eDRAM

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eDRAM stands for "embedded DRAM", a capacitor-based dynamic random-access memory integrated on the same die or module as an ASIC or processor. eDRAM's cost-per-bit is higher when compared to equivalent standalone DRAM chips used as external memory, but the performance advantages of placing eDRAM onto the same chip as the processor outweigh the cost disadvantages in many applications.

Embedding memory on the ASIC or processor allows for much wider buses and higher operation speeds, and due to much higher density of DRAM in comparison to SRAM, larger amounts of memory can be installed on smaller chips if eDRAM is used instead of eSRAM. eDRAM requires additional fab process steps compared with embedded SRAM, which raises cost, but the 3× area savings of eDRAM memory offsets the process cost when a significant amount of memory is used in the design.

eDRAM memories, like all DRAM memories, require periodic refreshing of the memory cells, which adds complexity. However, if the memory refresh controller is embedded along with the eDRAM memory, the remainder of the ASIC can treat the memory like a simple SRAM type such as in 1T-SRAM. It is also possible to use architectural techniques to mitigate the refresh overhead in eDRAM caches.[1]

eDRAM is used in IBM's POWER7 processor,[2] Intel's Haswell CPUs with GT3e integrated graphics,[3] and in many game consoles and other devices, including Sony's PlayStation 2, Sony's PlayStation Portable, Nintendo's GameCube, Nintendo's Wii, Nintendo's Wii U, Apple Inc.'s iPhone, Microsoft's Zune HD, and Microsoft's Xbox 360 and Xbox One.

There are software utilities that allow modeling of eDRAM caches.[4]

References

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2. "Hot Chips XXI Preview" (http://realworldtech.com/page.cfm?ArticleID=RWT081209143650&p=2). Real World Technologies (http://www.realworldtech.com/). Retrieved 2009-08-17.
3. "Haswell GT3e Pictured, Coming to Desktops (R-SKU) & Notebooks" (http://www.anandtech.com/show/6892/haswell-gt3e-pictured-coming-to-desktops-rsku-notebooks). AnandTech. Retrieved 2013-10-07.
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External links

- http://www.cs.unc.edu/~jp/DRAM.pdf
- Day dawns for eDRAM (http://www.eetimes.com/story/OEG20030414S0040)
- http://www.necelam.com/edram90/
- http://www.findarticles.com/p/articles/mi_qa3751/is_200501/ai_n9521086
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- http://www.realworldtech.com/iedm-2010/3/

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