The SADRAM Architecture

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Sadram Architecture

Why do we need a new architecture ?

What is SADRAM

How does it work

C++ extensions to exploit SADRAM facilities

(Applications: What is it good for ? **)**

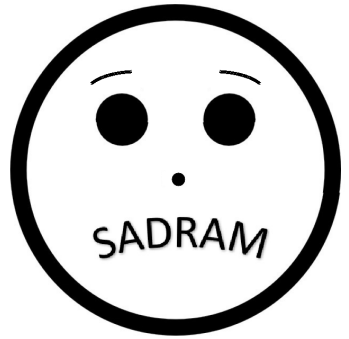
Memory …

- is the largest # transistors in a system
- is usually the largest cost element

But…

- consumes a significant fraction of the energy - half of which is just moving data to the CPU
- is the principal constraint on system performance

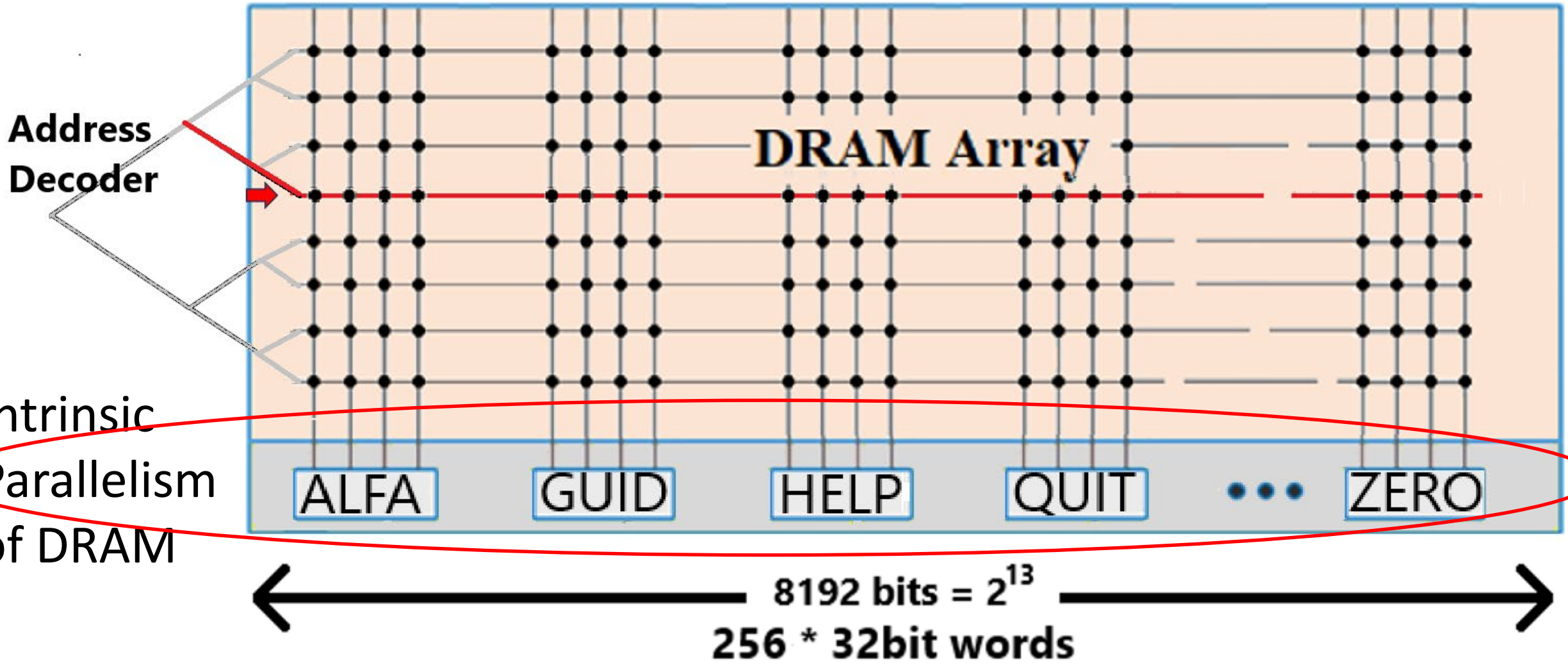
  R.L. Sites, 1996. "It's the Memory Stupid!"
- It is made from 'shitty transistors'



And so…

- whatever we do must be dirt-simple

DRAM

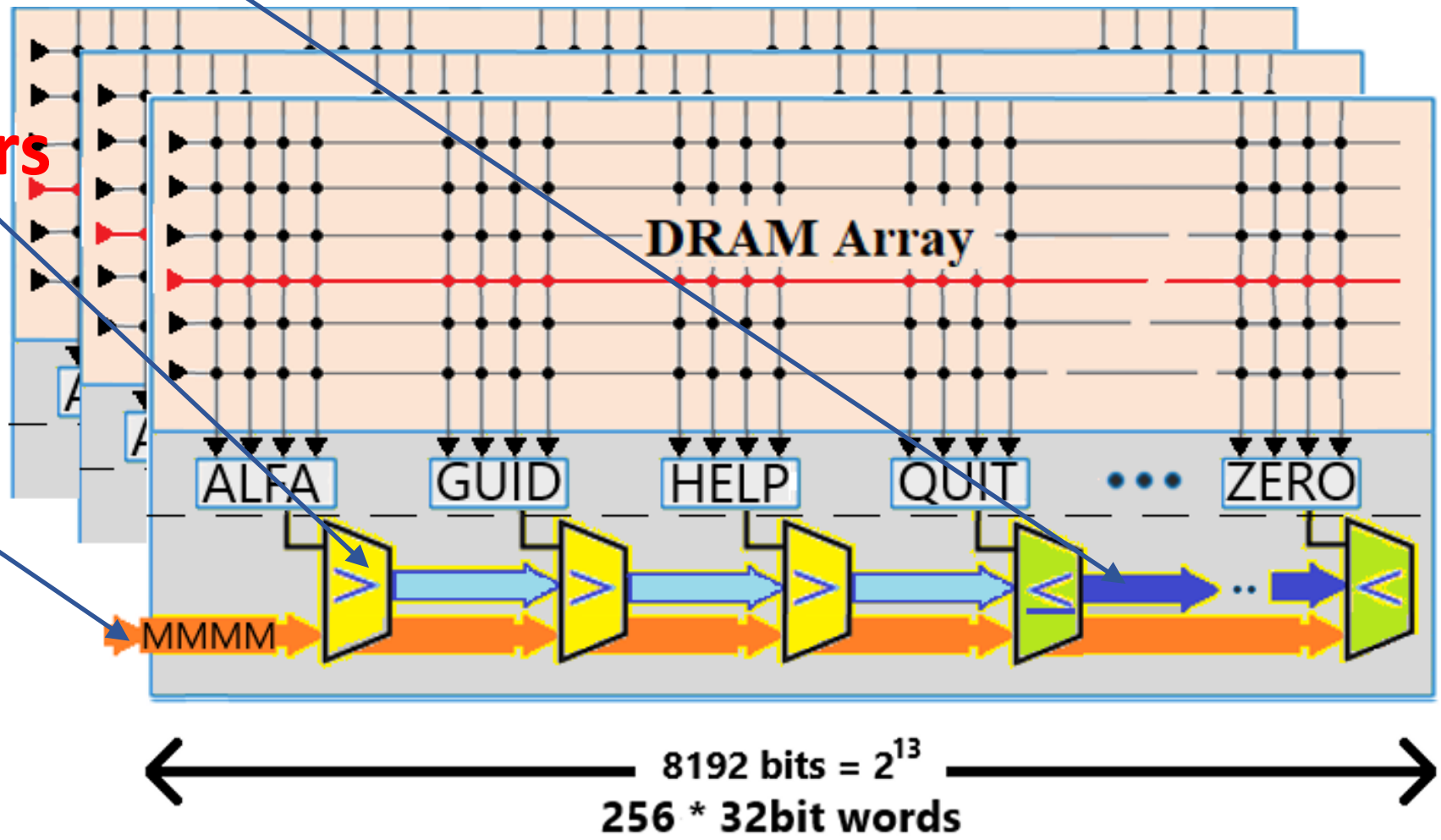


Intrinsic Parallelism of DRAM

SADRAM BASICS

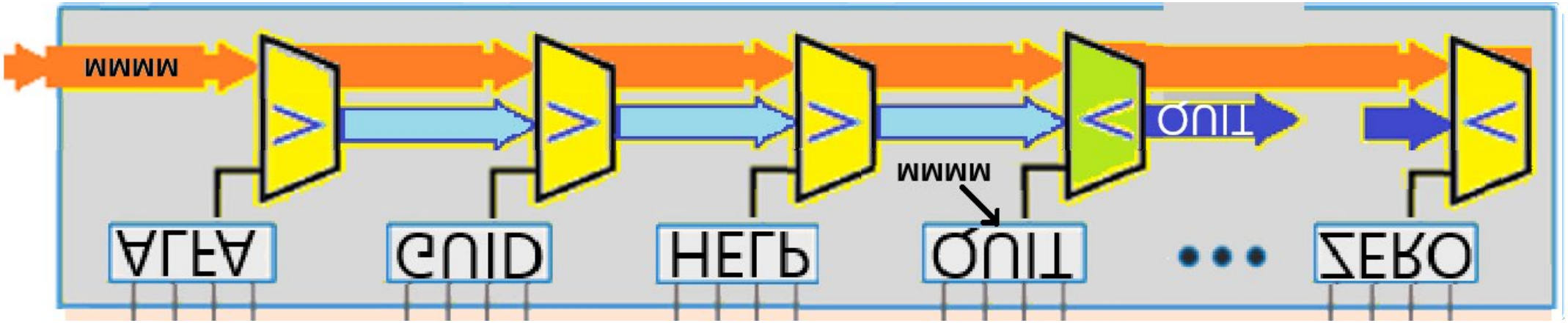
- Pipeline move
- Vector of comparators
- Target Word

Keep Entire Block in SORTED ORDER



SORT-IN-MEMORY

- **25-50% of all computer cycles are spent doing sort**
- Donald E. Knuth, 1998. *The Art of Computer Programing*



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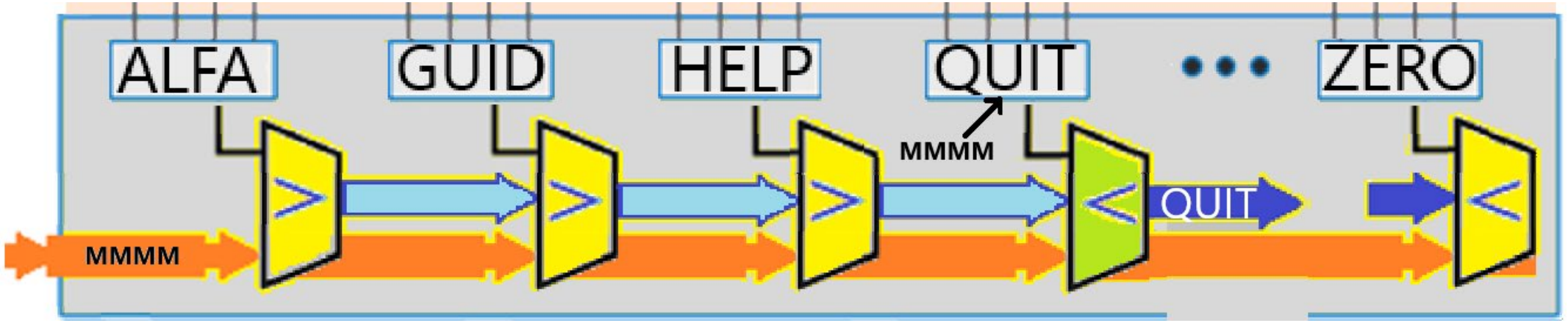
- **Read<“HELP”>**
- **Database**

(Self Addressing DRAM)
(Symbolically Addressed DRAM)



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- **Read<“HELP”>** **(Self Addressing DRAM)**
- **In-RAM databases** **(Symbolically Addressed DRAM)**

- **Changes to the GCC compiler to provide direct access to Sadram capabilities**
  - **New organizational type:** **sart: mySart<“key”>**
  - **Operations on sart arrays:** **sartA */+ sartB**

C++ Extension: Sart

- float myArray[1000]; //unsorted

- float sart mySart[1000]; //sart – acronym for sorted array

- float sart //unkeyed

- float sart //keyed

- structure sart //keyed

Why

What & how

C++ (+)

- Questions
- Suggestions
- Laughter