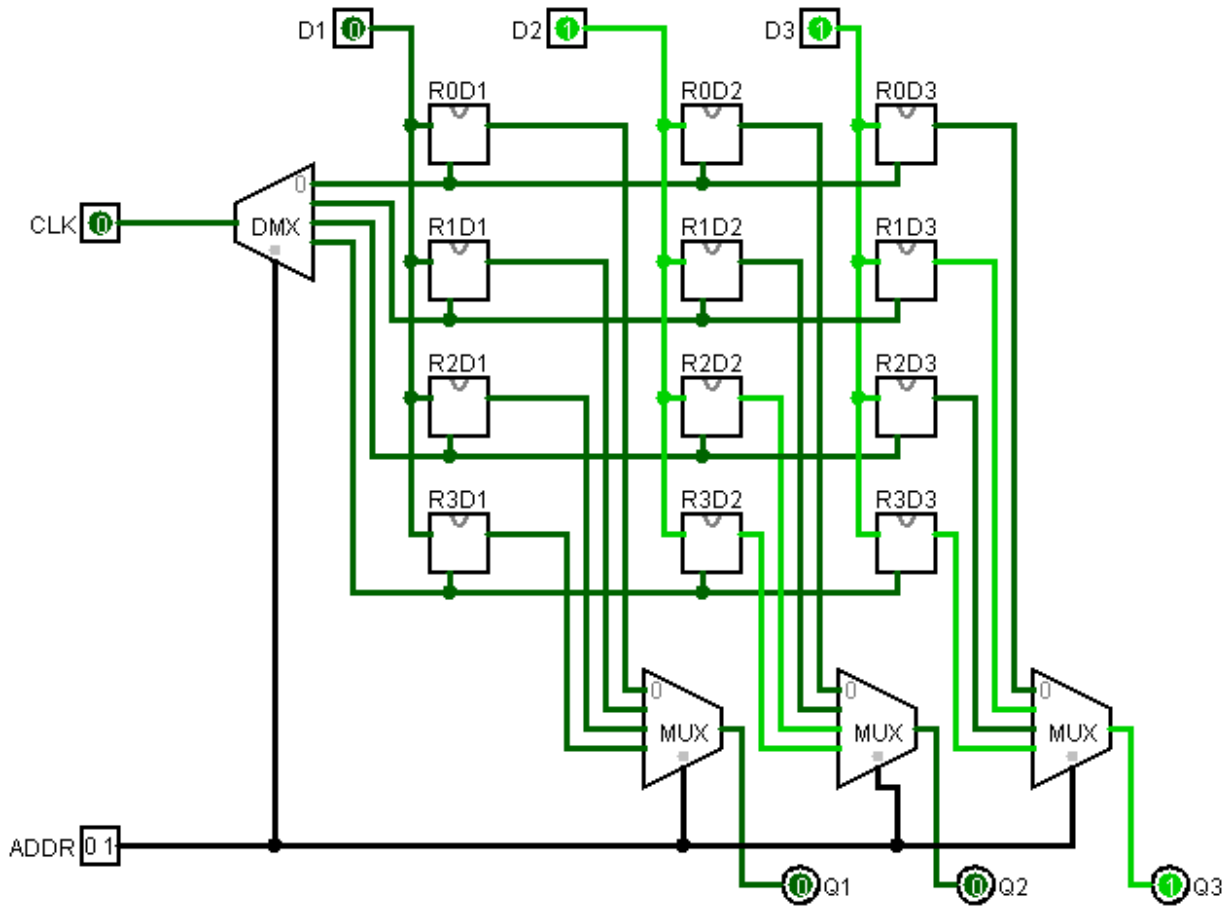
Superpages

A little background

Accessing Academic Papers

- Academic papers are often copyrighted
- Often conferences and conference providers like ACM and IEEE restrict download of full papers to protect copyright
- Binghamton University library has "corporate memberships" to many on-line databases of academic papers
  - All students have access, through the library, to these papers
  - See the library web site at https://www.binghamton.edu/libraries/index.html

Random Access Memory (RAM)



ADDR	DATA		
00	0	0	0
01	0	0	1
10	0	1	0
11	1	1	1

Random Access vs. Content Addressable

RAM

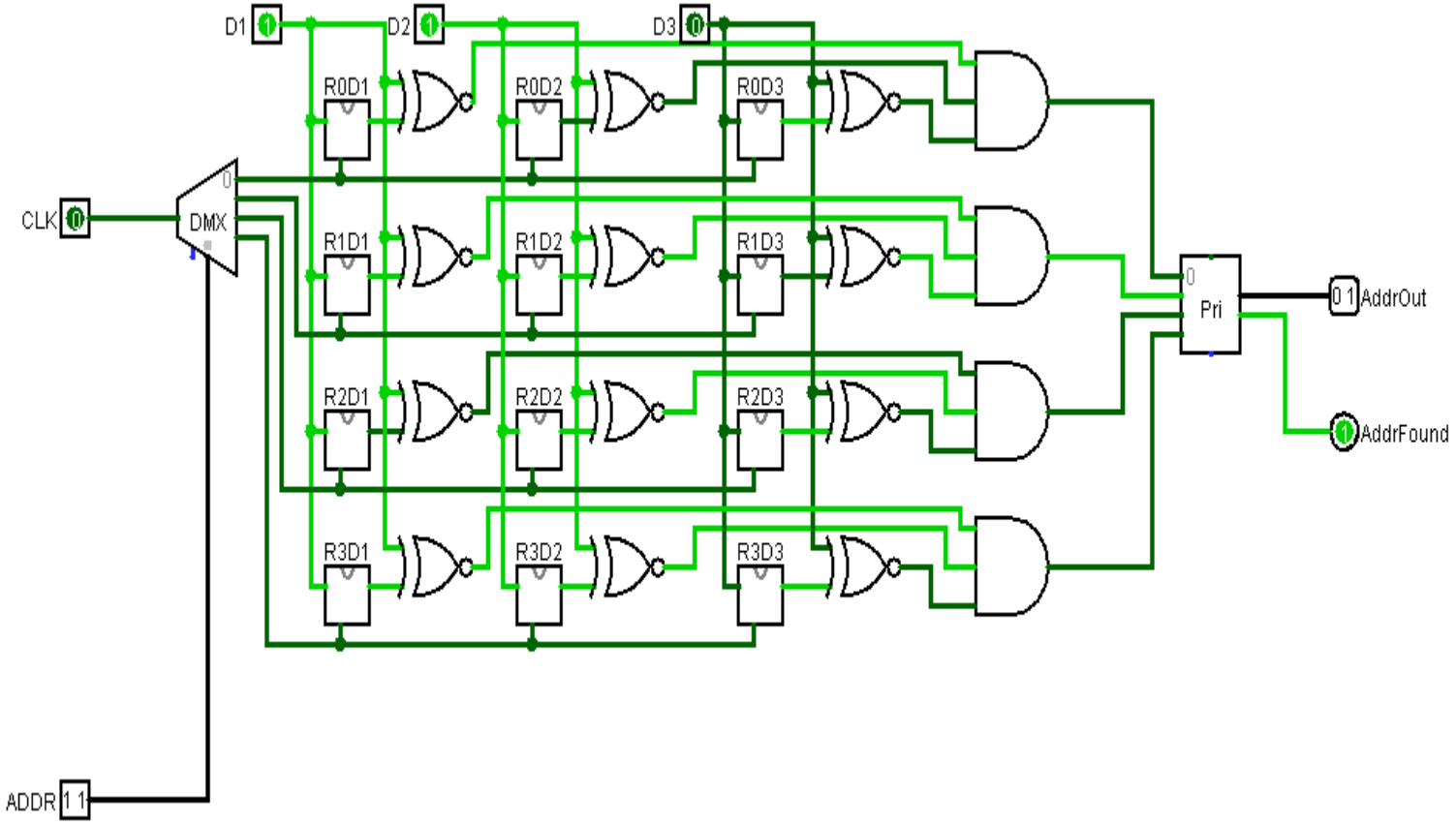
- Write(address,data)
  - Writes data to the address row
- data=Read(address)
  - Reads data at the address row

CAM

- Write(address,data)
  - Writes data to the address row
- address=Read(data)
  - Returns the address of the row that contains the data
  - Or returns “data not found”

Content Addressable Memory (CAM)

A.K.A. Associative Memory



ADDR	DATA		
00	1	0	1
01	1	1	0
10	0	0	1
11	1	1	1

Page Ejection by “era”

- When a page is referenced, set “reference bit” to true
  - including first reference after a swap-in
- When a page ejection is required
  - Find first page for which “reference bit” is false
  - If no such pages exist, set all pages reference flag to false (new “era”)
- Advantages / Disadvantages
  - Relatively cheap and fast
  - Occasionally (once an era) requires reset (Full page table update)
  - Early in the era, occasional “bad” choice – eject a page which is being used
  - Late in the era, close to Least Recently Used (LRU)
- Cheap version of LRU

Memory Mapping (mmap)

- Open a file using mmap
- That file is then "memory mapped", i.e. it's contents take space in your address space.. the file starts at address 0x??????? and goes on for ?? bytes.
- References to that memory cause (4k?) pages of the file to get swapped into real memory, and the page table (and TLB) updated, as required.
- Writes to that memory cause the page dirty bit to get set.
- When the file is closed (munmap), or the page is ejected, dirty pages are written back to disk in the file's space