

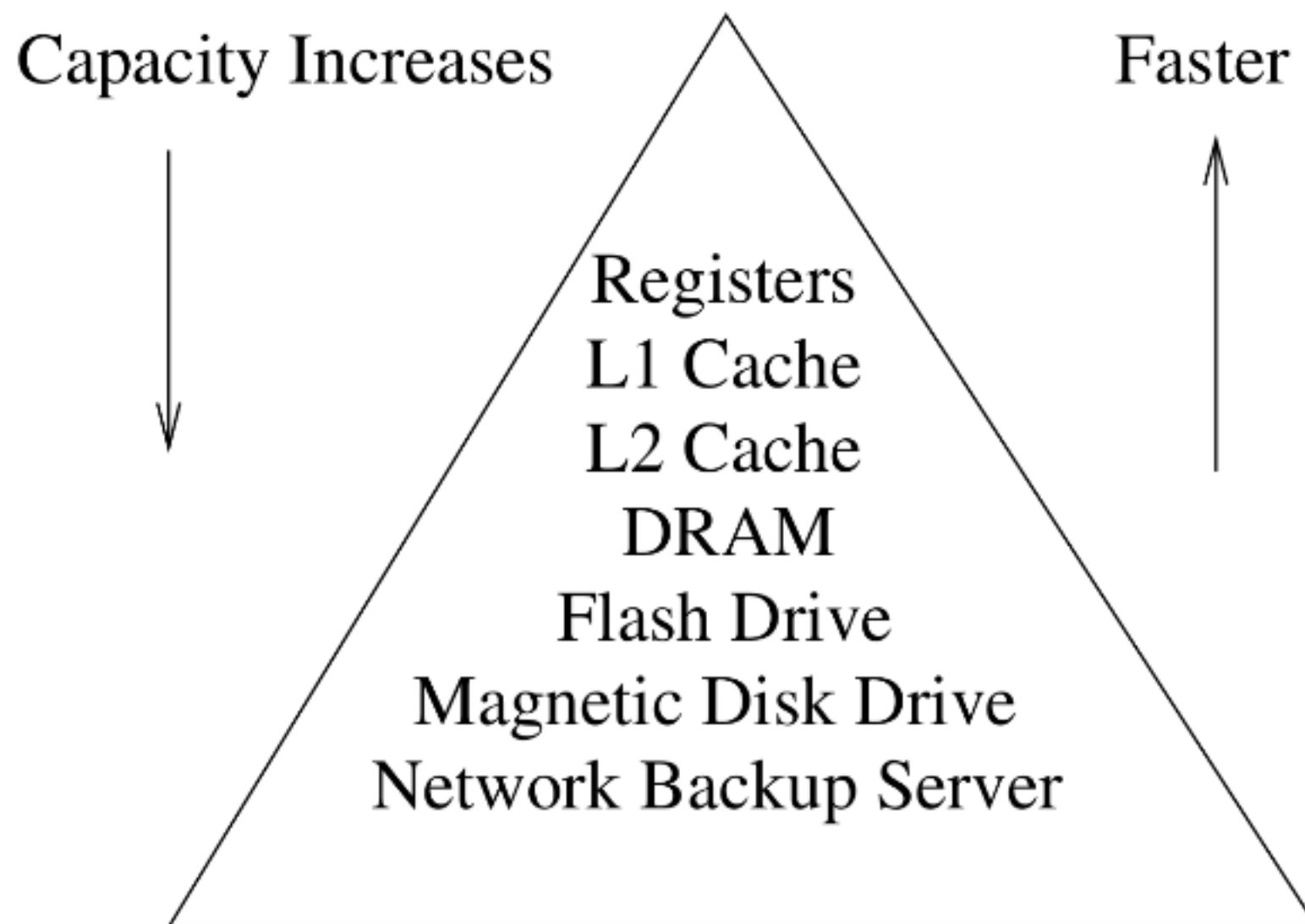
Memory

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Memory Hierarchy

Different storage technologies have different: access times, storage capacities, and costs per bit. In most computer systems there will be a range of different storage technologies employed. These different storage approaches will form a memory hierarchy of a system.



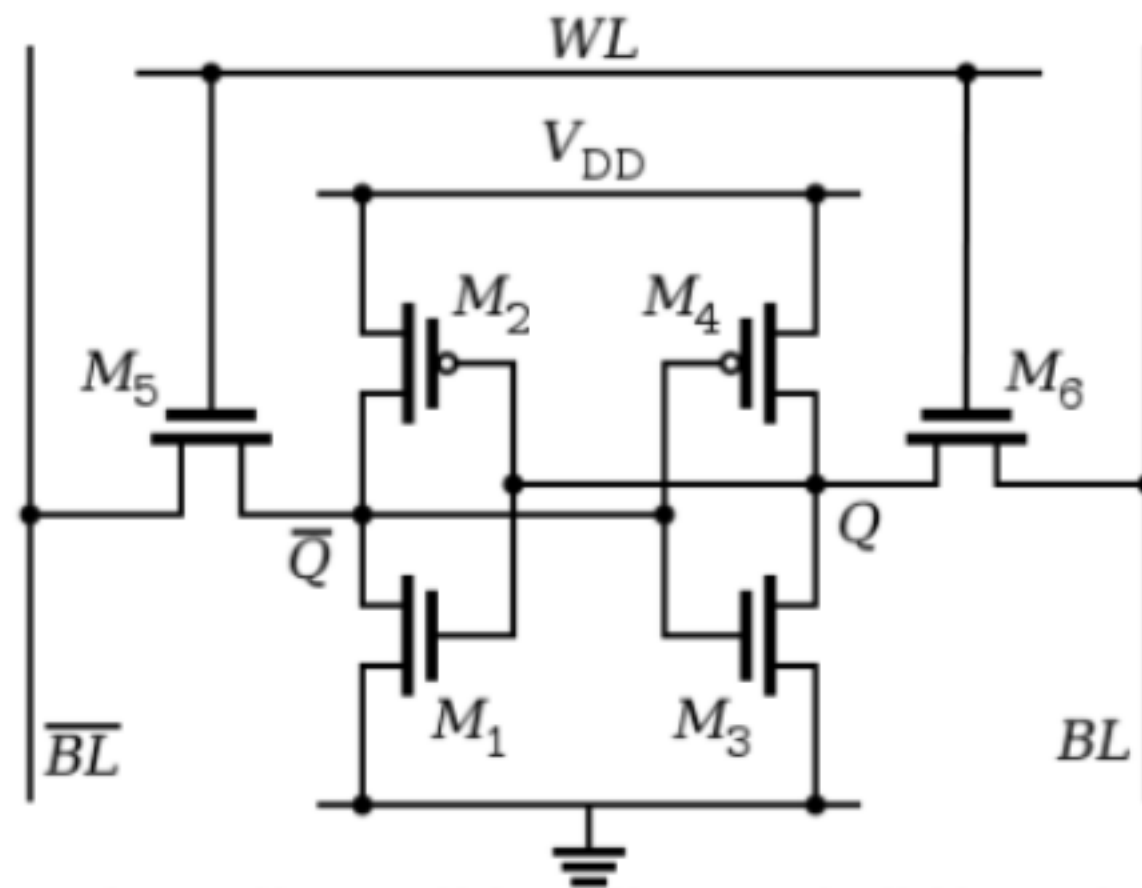


Memory Types - SRAM

Static random access memory (SRAM) is fast volatile memory that is simple to interface with, however, it uses a lot more area than DRAM.

SRAM will be found in: CPU caches, buffers for various devices within a computer system, and also in simple embedded devices.

D-Latch 1-bit SRAM





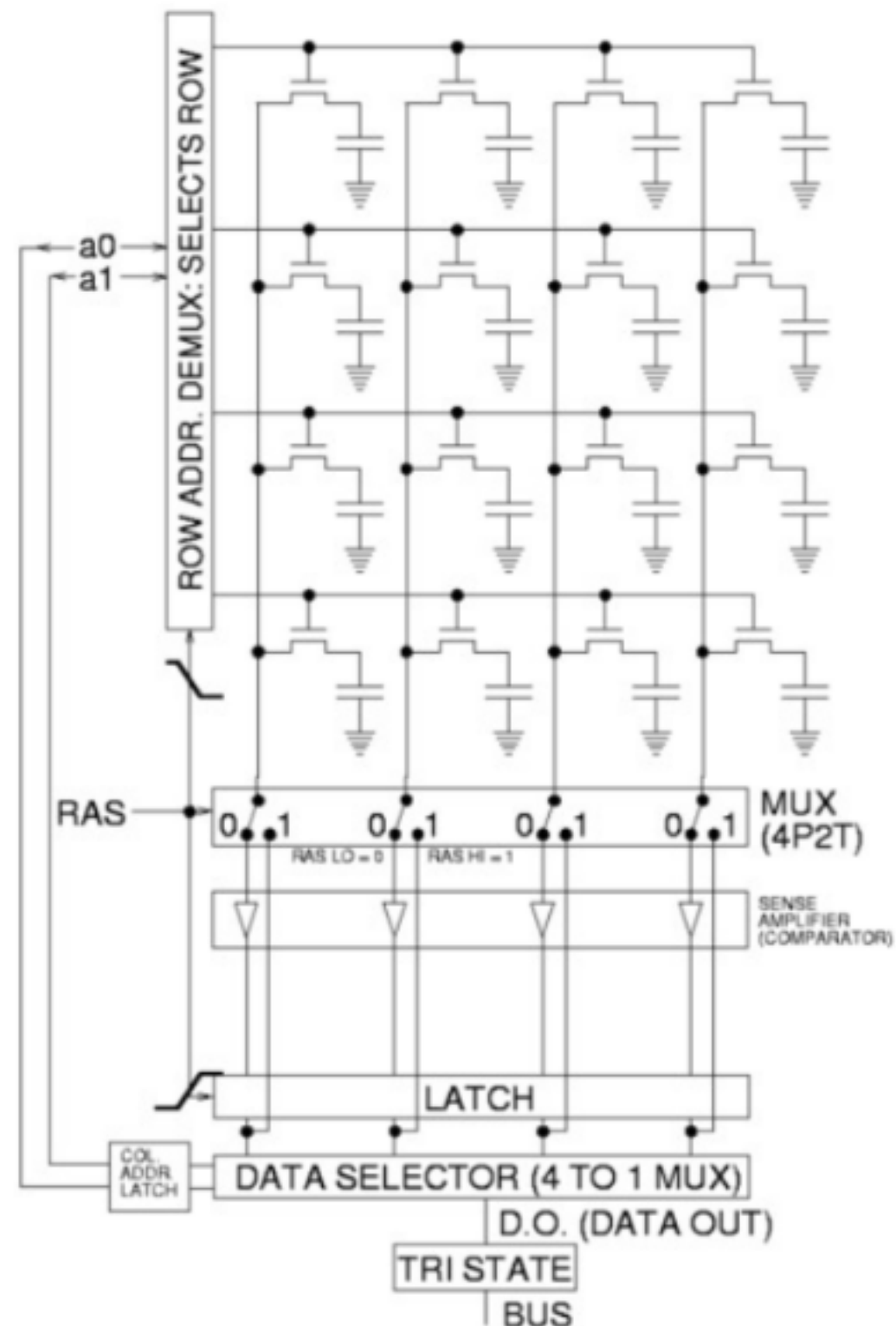
Dynamic random access memory (DRAM) only requires a single transistor and capacitor per bit, this enables much higher density memory (compared with SRAM). However, it is considerably slower and more complex to access.

- one bit of information is stored in a leaky capacitor.
- The the capacitor's charge is read and refreshed via a transistor.
- The capacitor stores just 40,000 electrons.
- Each bit needs refreshing typically every 10-100ms.



Memory Types - DRAM

DRAM



ROM (Read Only Memory)

- ROM technology has become larger and more flexible over the years (mask ROM, PROM, EPROM, EEPROM, NVRAM).
- ROM is non-volatile so state is maintained without power.
- Programs stored in ROM are called firmware. The BIOS is an example of this.