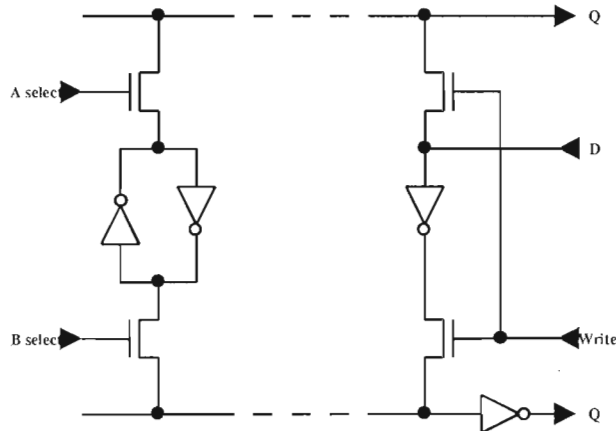


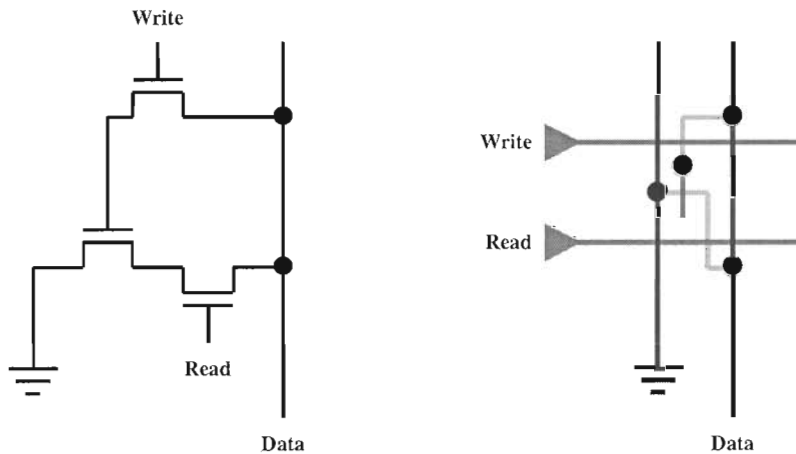
Answer

The simplest form of writeable memory (RAM) is static memory. A bit is stored in a pair of cross-coupled inverters, with separate circuits to control the reading and writing of the data.



The memory has two independent ports for reading; both selection lines are opened for writing. Six transistors are required to store each bit, plus some overhead for the control circuitry.

Dynamic memories stored information as charge, which has to be refreshed before it leaks away.

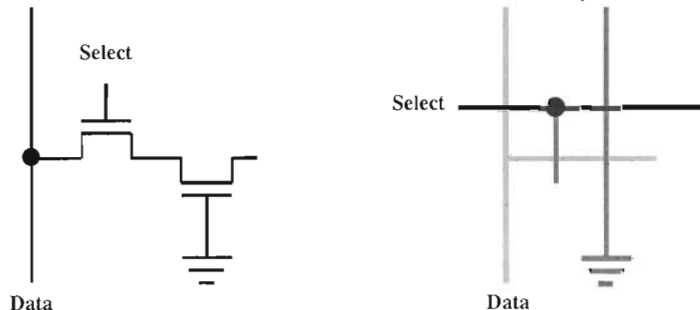


The three-transistor memory cell operates as follows:

- Write by putting data on **Data** and strobing **Write**
- Read by pre-charging **Data** and strobing **Read**; the value obtained has to be inverted.
- Refresh by reading and re-writing at least every millisecond or so.

Less circuitry is required for each individual bit at the expense of more sophisticated control circuits.

This is taken to an extreme with a one-transistor memory cell:



The bit is stored as charge under the grounded gate of a second transistor. Again, refreshing is required and reading requires the use of subtle analogue sense amplifiers. The tessellated layout is, however, very compact. Static memory might be used in a register file, dynamic memory might be used on a standard MOS chip and the one-transistor memory cell is used in large DRAM chips.