

Virtual Memory

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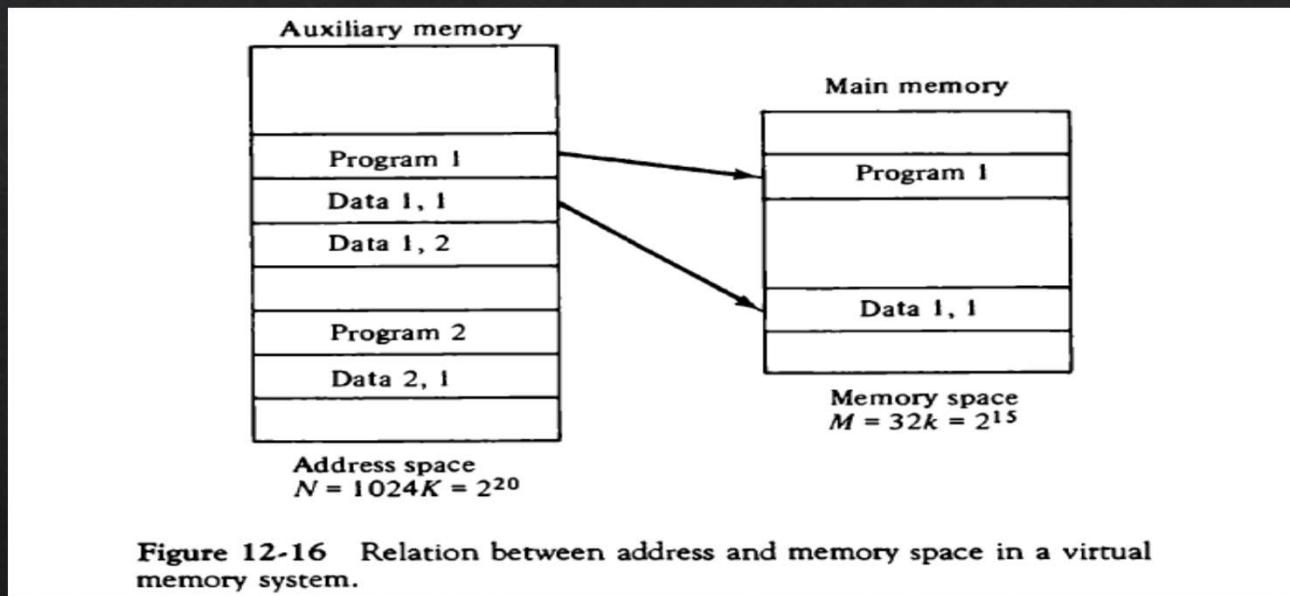
What is...

Virtual Memory is a concept used in some large computer systems that permit the user to construct programs as though a large memory space were available, equal to the totality of auxiliary memory (secondary storage).

Virtual memory is used to give programmers the illusion that they have a very large memory space, even though the computer actually has a relatively small main memory.

Address Space and Memory Space

- An Address Space is the set of addresses of Auxiliary Memory.
- A Memory Space is the set of addresses of Main Memory.

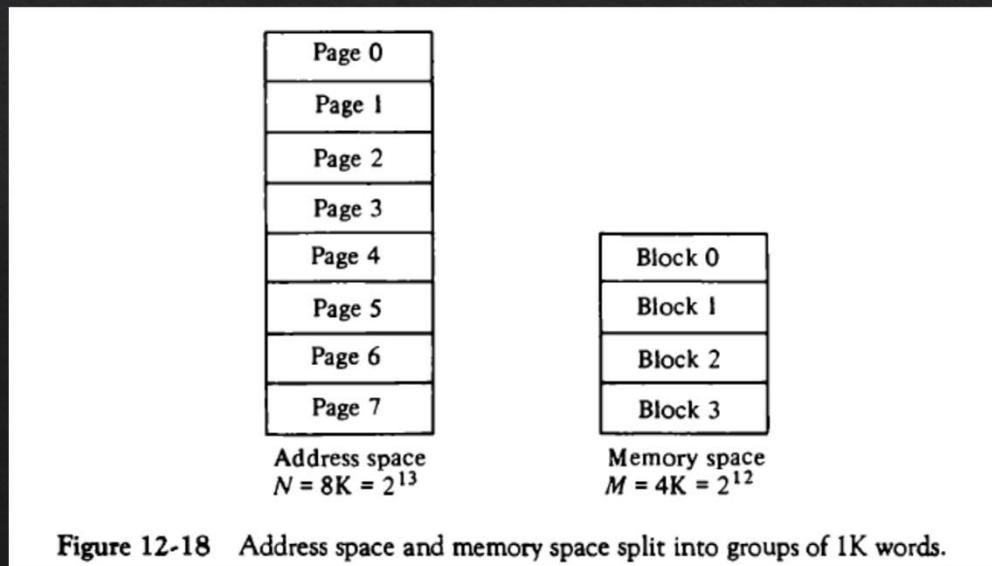


Page and Block

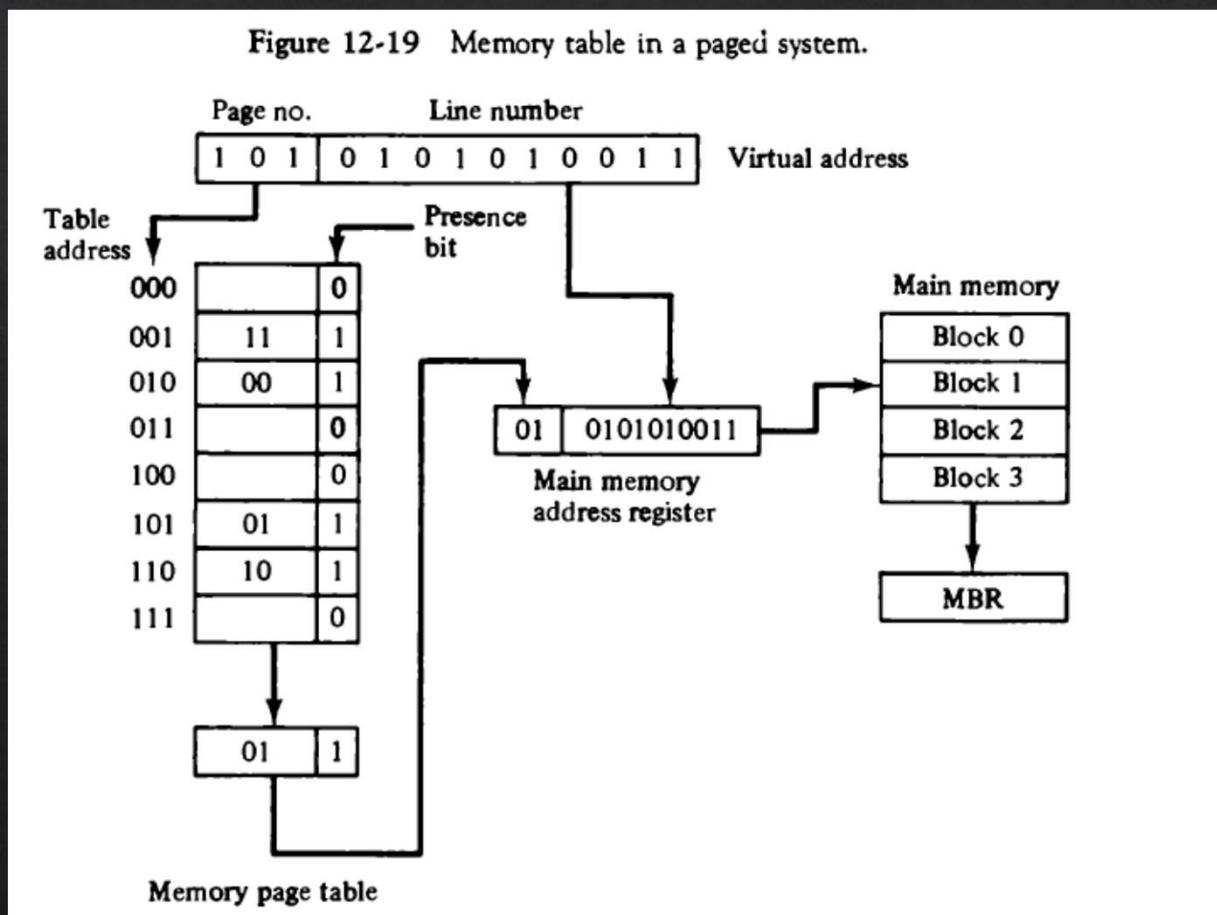
- The address and memory space are divided into groups of fixed sizes.
- The physical memory or the memory space is broken down into groups of equal size called blocks.
- The term page refers to groups of address space of same size.
- For example, if an auxiliary memory storage can store 2^{20} words and if a page consists of 1K words then address space is divided into $2^{20}/1\text{K} = 2^{20}/2^{10} = 2^{10} = 1024$ pages.
- If a main memory can store 32K words and a block consists of 1K words then memory space is divided into $32\text{K}/1\text{K} = 32$ blocks.

Address Mapping using Pages

- A page and a block both are split into groups of 1K words, a page refers to address space and a block refers to a memory space.
- The only mapping is required from the page no. to the block no.



Memory Table



MAR & MBR

- Memory Address Register (MAR) is the CPU register that either stores the memory address from which data will be fetched from the CPU
in other words,
MAR holds the memory location of data that needs to be accessed.
- Memory buffer register (MBR) is the register in a computer's processor, or central processing unit, CPU, that stores the data being transferred to and from the immediate access store.
in other words,
MBR contains the copy of designated memory locations specified by the memory address register.