Virtual and Cache Memory: Implications for Enhanced Performance of the Computer System

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Abstract

This paper looks at the performance enhancement which virtual and cache memory brings about in our computer systems. It focuses particularly on their implementation mechanisms and also tries to identify the numerous benefits these memories offers that leads to an overall better performance of computer system. The motivation for this discussion is that many usually wonder if virtual and cache memory is actually needed in the computer system. Some erroneously think that virtual and cache memories perform the same functions as the random access memory (RAM) or even the secondary storage devices. The basic idea with virtual memory is to create an illusion of memory that is as large as a disk and as fast as memory. A computer with virtual memory artfully juggles the conflicting demands of multiple programs within a fixed amount of physical memory. Cache memory on the other hand is a small but very fast chunk of memory that is usually situated very close and directly communicates with the CPU. Cache keeps frequently used data and code very close to the CPU so that repeated use of the same data and areas of memory does not result in repeated slow transactions to main
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memory each time they are needed. The operations of virtual and cache memory enhances multiprogramming. It also helps to eliminate fragmentation, ensure process flexibility, ensures effective memory management and memory protection. Understanding the mechanism of virtual and cache memory will help operating system students and professionals to appreciate how multiple processes are treated without conflicts.

References


Index Terms

Computer Science

Information Sciences

Keywords

Virtual memory, cache memory, enhancement, replacement algorithm, paging, segmentation