

Activity

Significant and Characteristics of cache memory

Cache Memory – is a chip-based computer component that makes retrieving data from the computer's memory more efficient. It acts as a temporary storage area that the computer's processor can retrieve data from easily.

It is readily available to the processor than the computer's main memory source, typically some form of DRAM (Dynamic RAM).

Cache memory is sometimes called CPU memory because it is typically integrated into the PCU chip or placed on a separate chip that has a separate bus interconnect with CPU. Therefore, it is more accessible to the processor, and able to increase efficiency, because it's physically close to the processor.

In order to be close to the processor, cache memory needs to be much smaller than main memory. Consequently, it has less storage space. It is also more expensive than main memory, as it is a more complex chip that yields higher performance.

Cache memory operates between 10 to 100 times faster than RAM, requiring only a few nanoseconds to respond to a CPU request.

The name of the actual hardware that is used for cache memory is high speed static random access memory (SRAM). The name of the hardware that is used in a computer's main memory is dynamic random-access memory (DRAM).

N.B: Cache memory is not to be confused with the broader term cache. Caches are temporary stores of data that can exist in both hardware and software. Cache memory refers to the specific hardware component that allows computers to create caches at various levels of the network.

Types of cache memory

Cache memory is fast and expensive. It is categorized as "Levels" that describe its closeness and accessibility to the microprocessor. There are three general cache levels

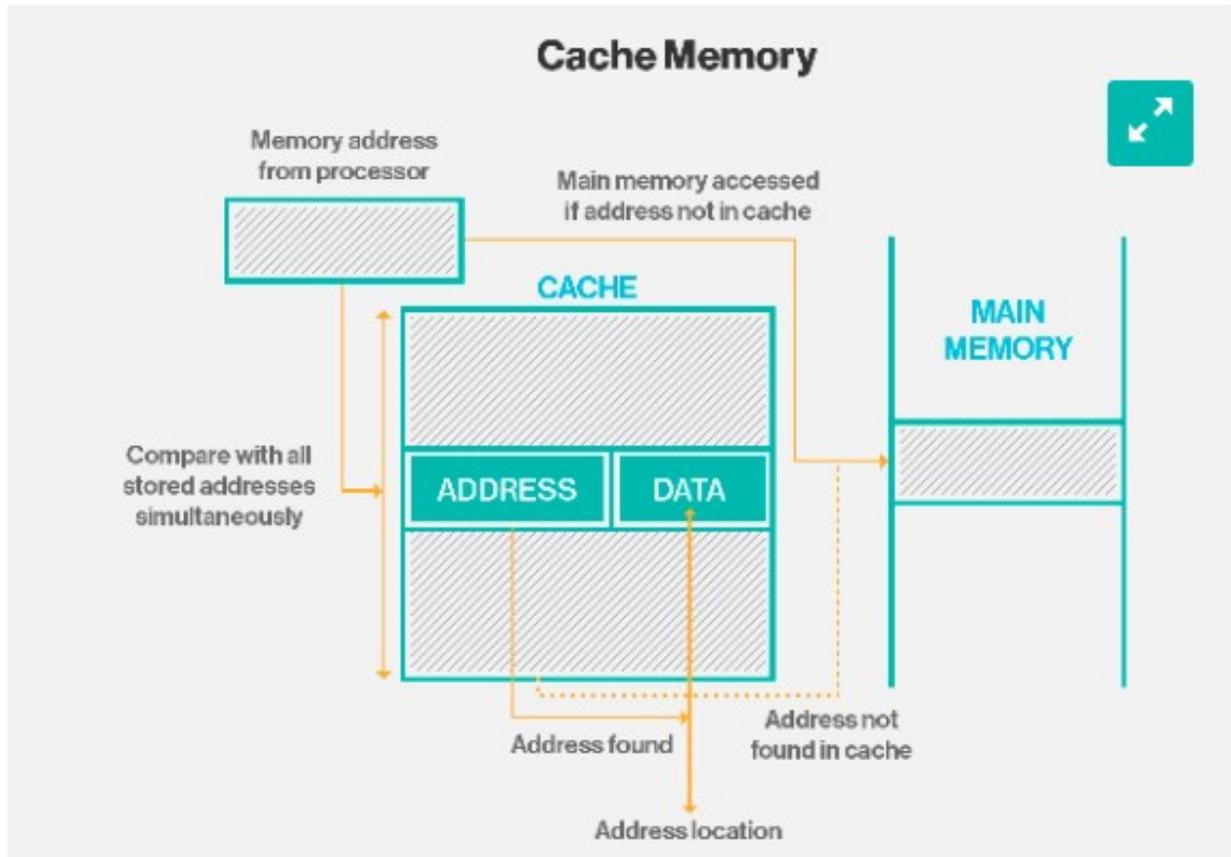
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L1 Cache (Primary cache), is extremely fast but relatively small and is usually embedded in the processor chip as CPU cache.

L2 Cache, or secondary cache is often more capacious than L1. L2 cache may be embedded on the CPU, or it can be on a separate chip or coprocessor and have a high-speed alternative system bus connecting the cache and CPU. That way it doesn't get slowed by traffic on the main system bus.

Level 3 (L3) cache is specialized memory developed to improve the performance of L1 and L2.

L1 or L2 can be significantly faster than L3, though L3 is usually double the speed of DRAM.



Characteristics

In general, caches create problems when there is a discrepancy between the cache and the main memory. This can happen if the main memory has been updated and the cache has not, so the cache will not reflect any recent changes.

Cache coherence thus becomes a challenge in more complex systems, and a computer crash can lead to lost data that hasn't been written to main memory - in addition to the risk of losing stored data if a drive can't be recovered.