Computer and virtual data buffer

Technology, Computer

In computer science, a buffer is a region of a physical memory storage used to temporarily store data while it is being moved from one place to another. Typically, the data is stored in a buffer as it is retrieved from an input device (such as a microphone) or just before it is sent to an output device (such as speakers). However, a buffer may be used when moving data between processeswithin a computer. This is comparable to buffers in telecommunication. Buffers can be implemented in a fixed memory location in hardware—or by using a virtual data buffer in software, pointing at a location in the physical memory.

In all cases, the data stored in a data buffer are stored on a physical storage medium. A majority of buffers are implemented in software, which typically use the faster RAM to store temporary data, due to the much faster access time compared with hard disk drives. Buffers are typically used when there is a difference between the rate at which data is received and the rate at which it can be processed, or in the case that these rates are variable, for example in a printer spooler or in online video streaming.

A buffer often adjusts timing by implementing a queue (or FIFO) algorithm in memory, simultaneously writing data into the queue at one rate and reading it at another rate. Buffers are often used in conjunction with I/O to hardware, such as disk drives, sending or receiving data to or from a network, or playing sound on a speaker. A line to a rollercoaster in an amusement park shares many similarities. People who ride the coaster come in at an unknown and often variable pace, but the roller coaster will be able to load people in bursts (as a coaster arrives and is loaded).

The queue area acts as a buffer—a temporary space where those wishing to ride wait until the ride is available. Buffers are usually used in a FIFO (first in, first out) method, outputting data in the order it arrived. A cache often also acts as a buffer, and vice versa. However, cache operates on the premise that the same data will be read from it multiple times, that written data will soon be read, or that there is a good chance of multiple reads or writes to combine to form a single larger block.

Its sole purpose is to reduce accesses to the underlying slower storage. Cache is also usually an abstraction layer that is designed to be invisible. A " Disk Cache" or " File Cache" keeps statistics on the data contained within it and commits data within a time-out period in write-back modes. A buffer does none of this. A buffer is primarily used for input, output, and sometimes very temporary storage of data that is either en route between other media or data that may be modified in a non-sequential manner before it is written (or read) in a sequential manner.