

Logical Block Address



What is Logical Block Addressing (LBA)?

Logical Block Addressing (LBA) is a method used by hard disk drives (HDDs) and solid-state drives (SSDs) to specify the location of data on a storage device. It assigns a unique numerical address to each sector, allowing the operating system to locate and access specific data.

In the past, storage devices used a physical addressing system to locate data on a disk. This method required the operating system to track the physical location of each block of data on the disk, which could be a time-consuming and error-prone process. With the introduction of LBA, the operating system can simply specify the block number of the data it wants to access, and the storage device itself handles the mapping of that logical address to a physical location on the disk.

LBA uses a simple numbering system to assign logical block addresses to each block of data on a storage device. The first block of data on the device is assigned the LBA of 0, and subsequent blocks are assigned consecutive LBAs in ascending order. The size of each block is typically fixed, and is determined by the hardware and firmware of the storage device.

When a computer wants to read or write data to a storage device using LBA, it sends a command to the device that includes the LBA of the block it wants to access, as well as the number of blocks to read or write. The storage device then uses its firmware to translate the logical address to a physical address on the disk, and performs the requested operation.

LBA addresses are typically used in conjunction with the [ATA \(Advanced Technology Attachment\)](#) or [SCSI \(Small Computer System Interface\)](#) protocols for communicating with storage devices. This addressing scheme is used to [overcome the limitation of CHS \(Cylinder-Head-Sector\) addressing](#), which is limited to addressing a maximum of 1024 cylinders, 256 heads and 63 sectors.

LBA addressing allows for larger storage capacities by addressing each sector with a unique number, regardless of its physical location on the storage device. This eliminates the need for the operating system to keep track of the physical location of each sector and simplifies the process of accessing data. Each 512-byte sector is assigned a unique LBA, from zero (0) to the number required based on the size of the disk. The host requests a specific block of data using the assigned LBA. When the host requests to write data, an LBA address is returned at the end of the write telling the host where the data is located. This becomes important in the transition to 4K sectors, since there are eight different possibilities for where the host LBA starts.

Summary

Logical Block Addressing is an addressing scheme used to locate and access specific data on storage devices, which simplifies the process of accessing data and allows for larger storage capacities. Overall, LBA is a simple and effective way to address data on a storage device, and has become the de facto standard for hard disk drives and solid-state drives.