The modern HDD was invented by IBM in 1956, just a few years before I was born. It had a capacity of a whopping 5MB and had to be moved with a forklift. The price to lease one was $650 per month, equivalent to more than $6,000 today.

We've come a long way in 64 years: Today, you can buy a disk drive that has more than 10,000 times the capacity for under $200.

Other than being physically much smaller, having thousands of times the storage capacity, and costing much less, today's spinning disks are not really all that different from the original 1956 version. Like the original version, data is stored in concentric rings on the surface of the spinning disk platter. This rings are called *tracks*. The data itself is written to each track as a sequence of sectors; a sector is the smallest unit of data that the disk drive can read or write. On most drives, each sector contains 512 bytes of data. But on some more expensive drives, the sector size is a whopping 4K.

You'll sometimes here the term *block* used in lieu of *sector*. A block is the smallest unit of data that an operating system recognizes on a formatted disk drive. Typically, blocks are 2K in size, meaning that each block requires four sectors on the disk.

Hard disk drives have many advantages — principal among them being low cost and high capacity. The biggest disadvantage of hard disk drives are their speed. The speed of a disk drive is limited by the fact that it relies on mechanical motion to access data.

To understand this limitation, consider what has to happen for a disk drive to read a specific sector of data:

1. Because each disk platter has thousands of tracks, the *read/write head* (the mechanism that actually reads or writes data to the tracks) must be moved so that it is positioned over the track that contains the sector to be read.
2. When the read/write head is in place, the disk has to wait for the data to rotate around the platter until it's under the read/write head. On average, the data will be exactly halfway around the platter from the read/write head; sometimes it will be closer, but the data is just as likely to be farther. Either way, the disk drive has to wait for the data to spin around the circle.

The exact amount of time that the disk drive has to wait for the data depends on how fast the disk drive spins. A typical disk drive spins at 7,200 revolutions per minute (RPM). That sounds really fast, but in computer terms it's interminably slow. 7,200 RPM is the equivalent of 120 rotations per second. That's 0.00833 second per revolution. Cut that in half and you can see that the disk