

COA

Chapter 06: | External Memory

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| AGENDA

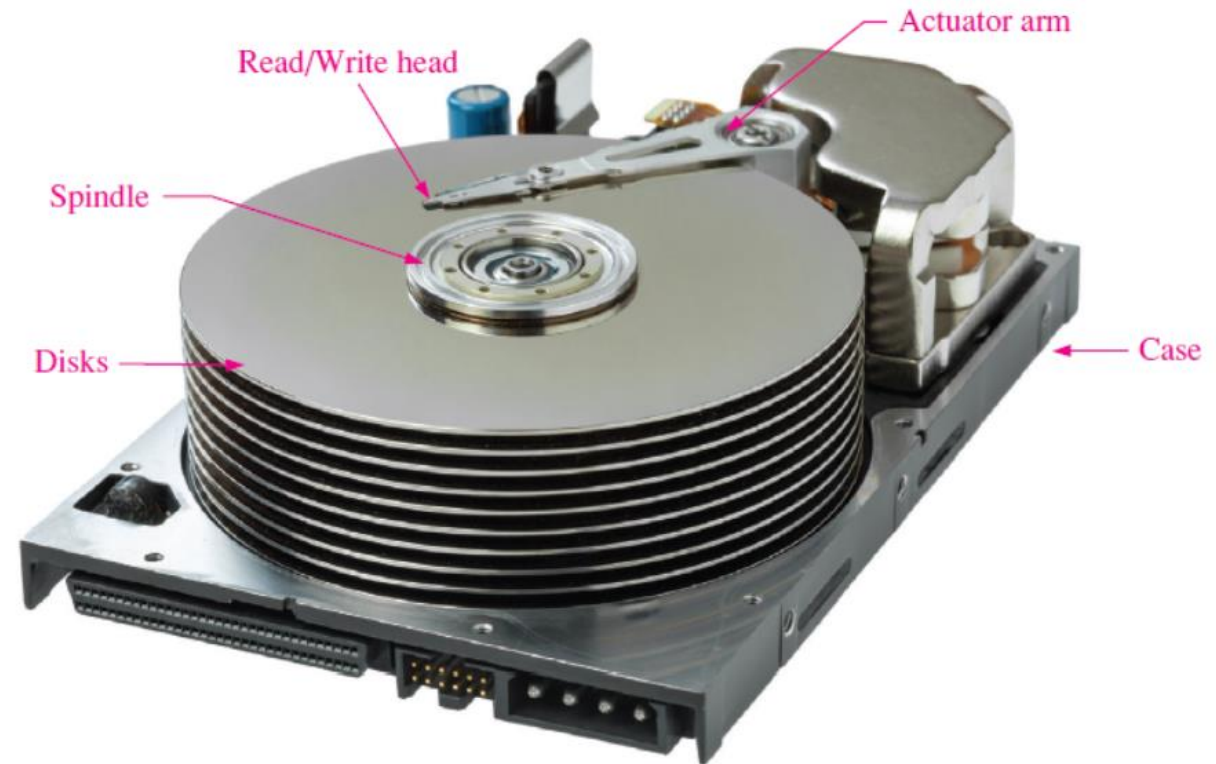
- Magnetic Disk
- Magnetic **Read** and **Write** Mechanisms
- Data Organization and **Formatting**

| Magnetic Disk

- They are used for **mass nonvolatile storage** of data and programs
- Magnetic disks are **rigid platters** made of **aluminum** alloy or a mixture of **glass and ceramic** covered with a magnetic coating.
 - Reduction in surface defects
 - Better stiffness
 - Better shock/damage resistance

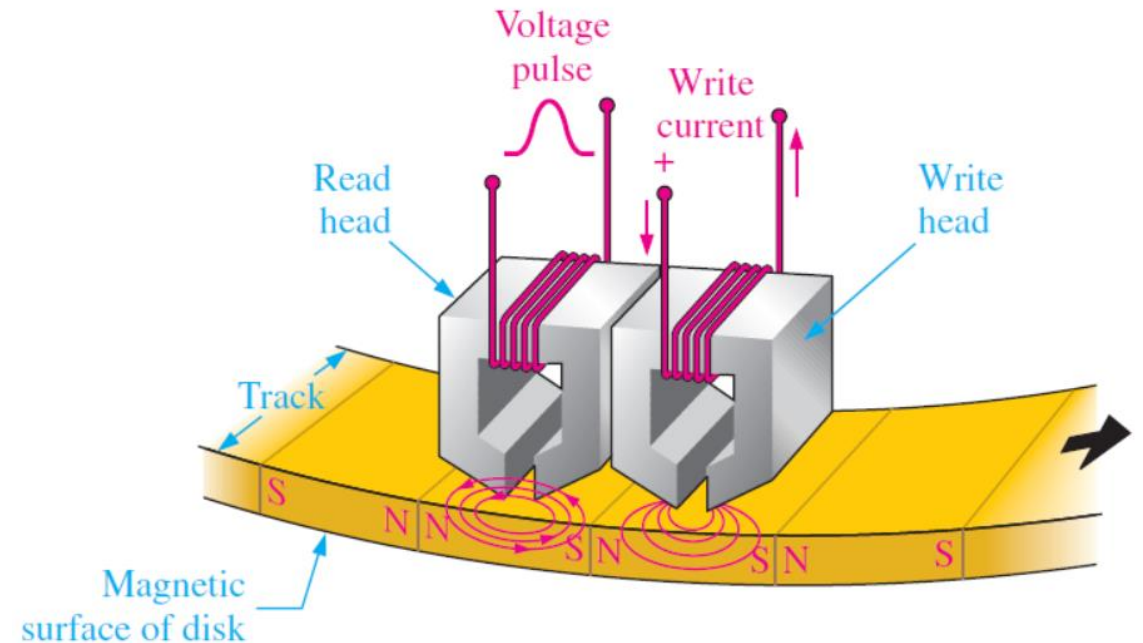
| Magnetic Read and Write Mechanisms

- Head – Conducting Coil
- **Two heads**, a read head and a write head.
- Write
- Read
- Read - contemporary

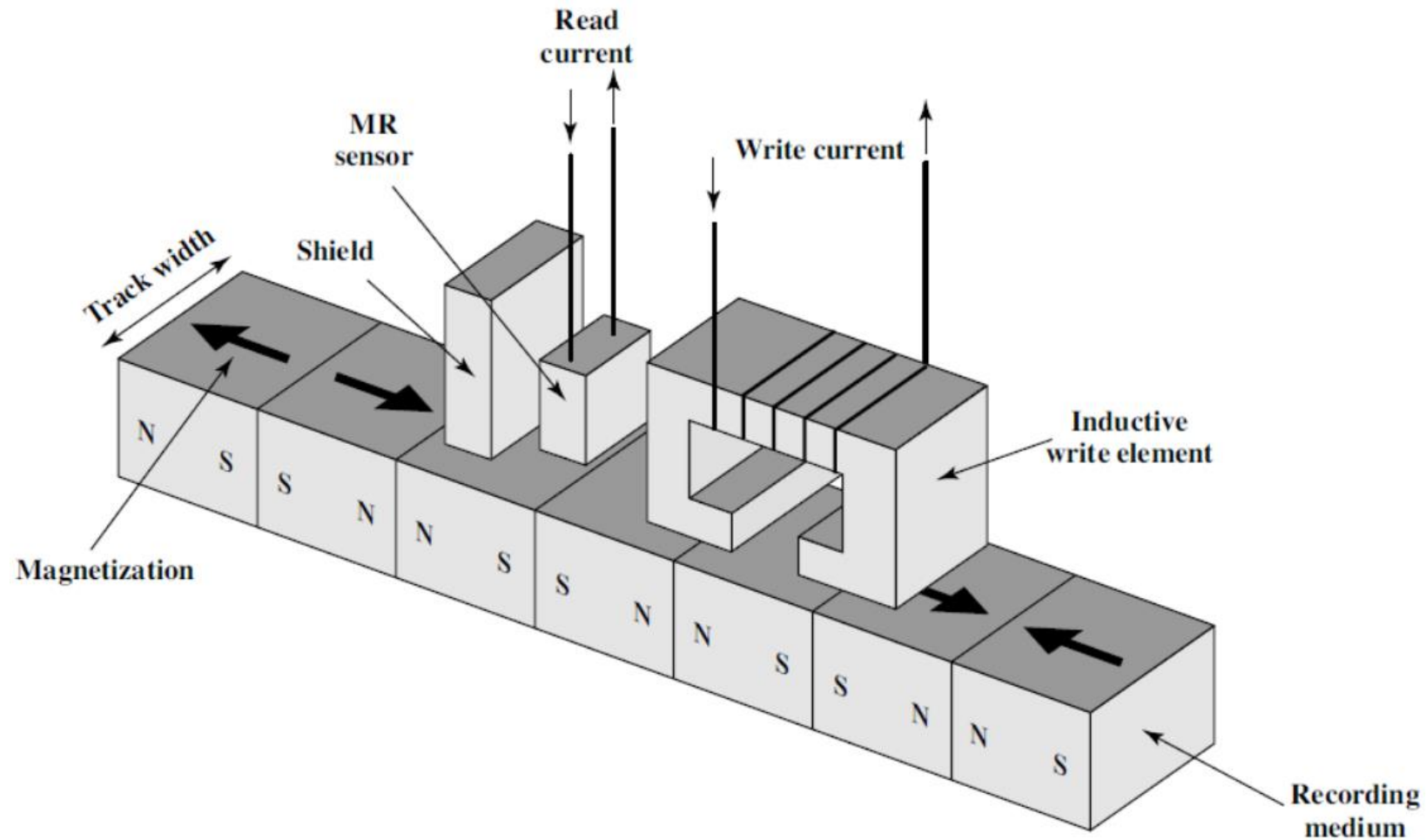


| Magnetic Read and Write Mechanisms

- Partially shielded magneto resistive (**MR**) sensor
- Direction or Polarization
- Magnetic flux
- **Once a spot** on the disk surface is magnetized, it **remains** until **written over**

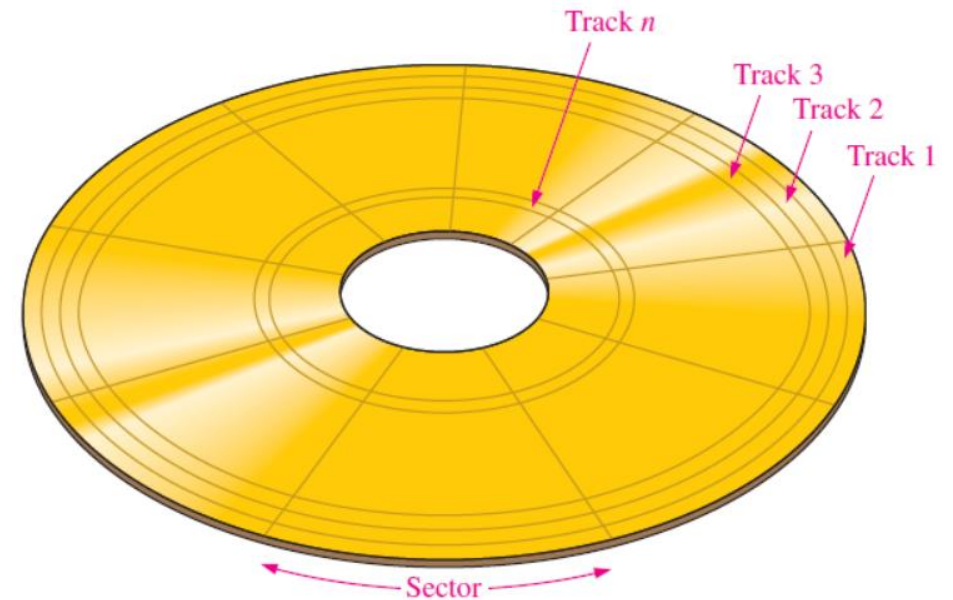


| Inductive Write MR Read



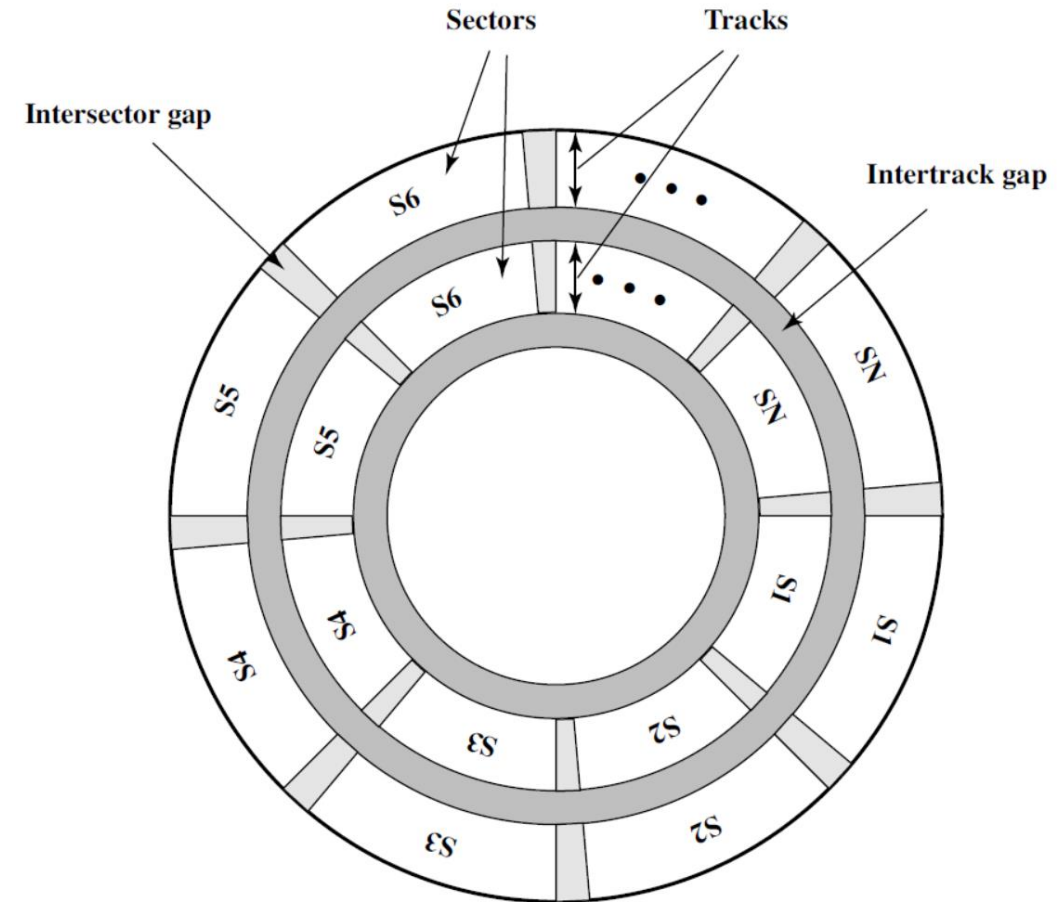
| Data Organization and Formatting

- Tracks
- Sectors
- Physical address
- **few hundred to thousands of tracks** and are available with storage capacities of up to **1 TB** or more
- **Constant number** of tracks/sector,
- **Outer sectors** using more surface area than the inner sectors.
- The arrangement of tracks and sectors on a disk is known as the **format**



| Data Organization and Formatting

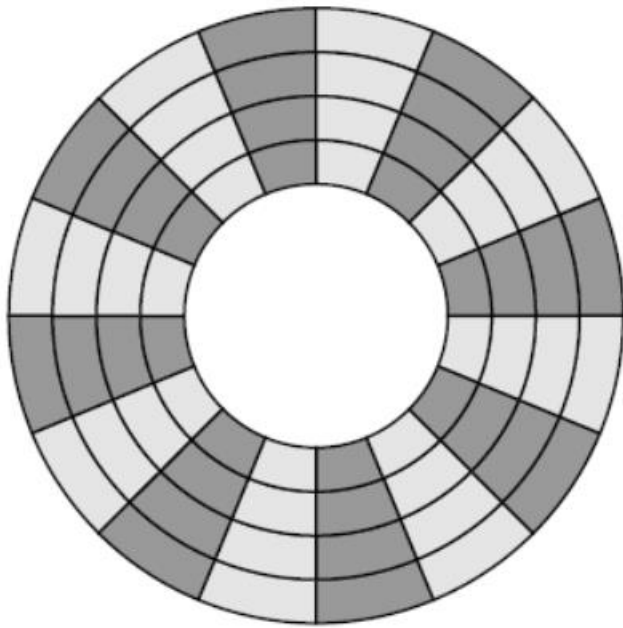
- **Adjacent tracks** are separated by **gaps**.
- Same number of bits per track (variable packing density)
 - # **blocks** is the **same** (near center – or edge)
- **Constant angular velocity**
- Data are transferred in **sectors**
- Typically, **hundreds of sectors per track**, and
 - 512 bytes fixed-length -contemporary



| Data Organization and Formatting

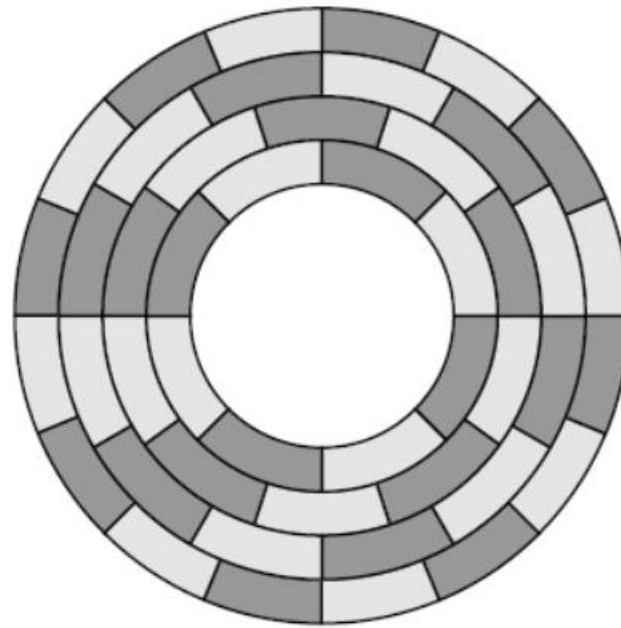
- **Increase spacing** between bits in different tracks
- Rotate disk at constant angular velocity (CAV)
- Move **head** to given track and **wait** for given **sector**
- Waste of space on outer tracks
 - Lower data density
- Can use **zones** to increase capacity
 - Each zone has fixed bits per track
 - More complex circuitry

| Disk Layout Methods Diagram



(a) Constant angular velocity

- Waste of space on outer tracks - Lower data density



(b) Multiple zoned recording

- Can use **zones** to increase capacity
 - Each zone has fixed bits per track
 - More complex circuitry

| Finding Sectors

- Must be able to identify **start of track and sector**
- Format disk
 - Additional information not available to user
 - Marks tracks and sectors

Finding Sectors

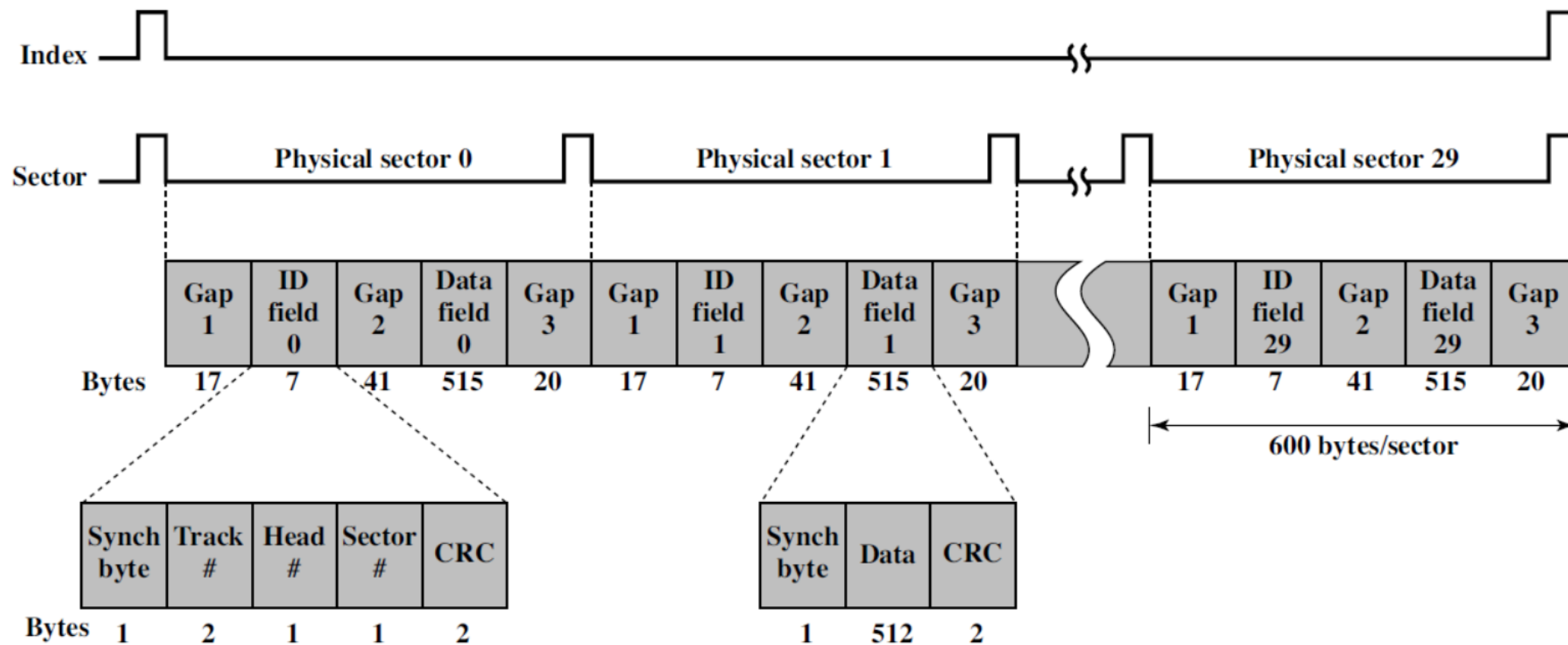


Figure 6.4 Winchester Disk Format (Seagate ST506)