Hard Disks

Why care about hard disks anyway?

industry is slow moving

major database products still disk-based

IBM DB2
Oracle

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still many hard disk systems in use

every database needs durability (persistence)? ACID?
↑

Why care about hard disks anyway?
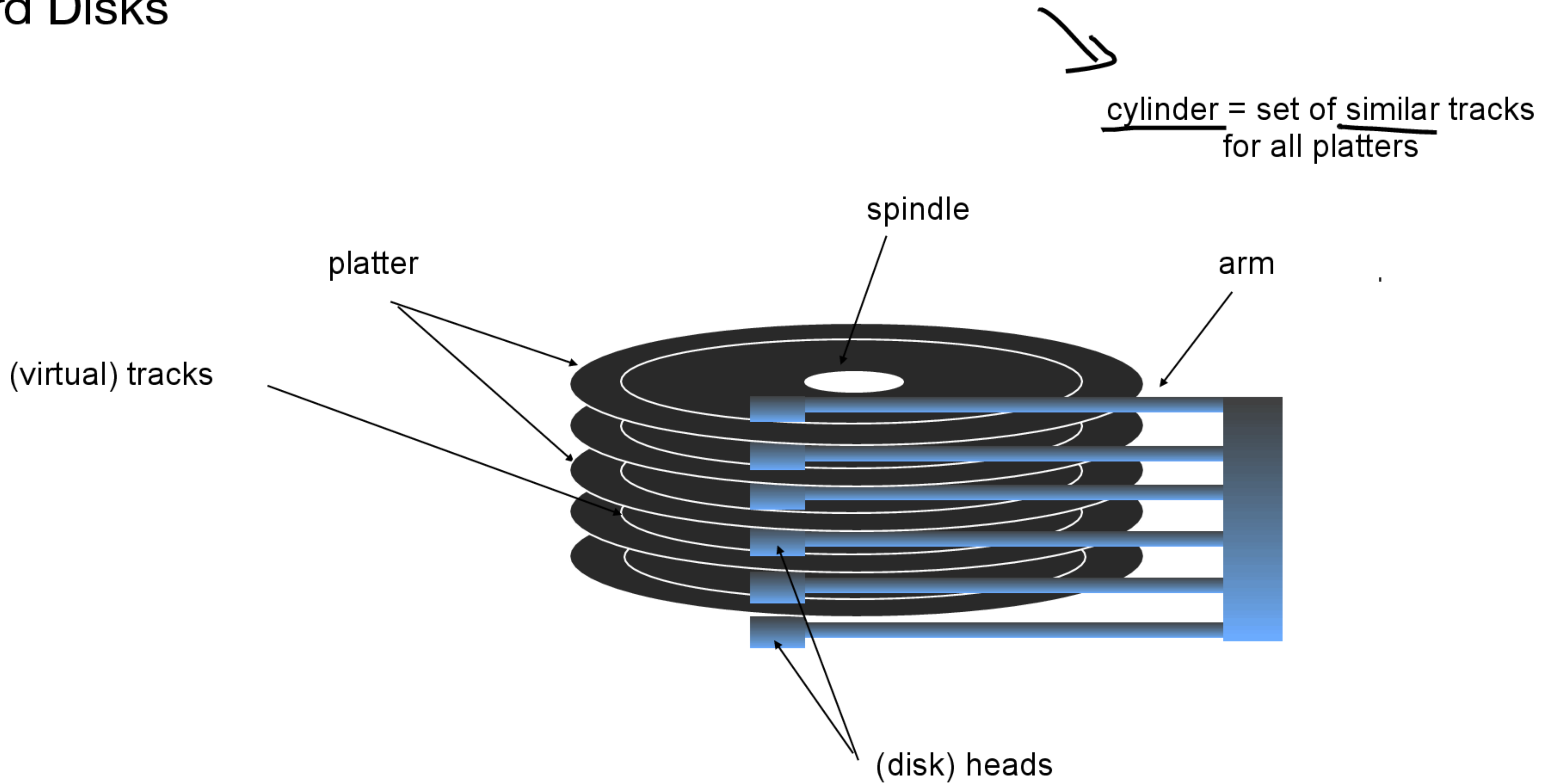
industry is slow moving

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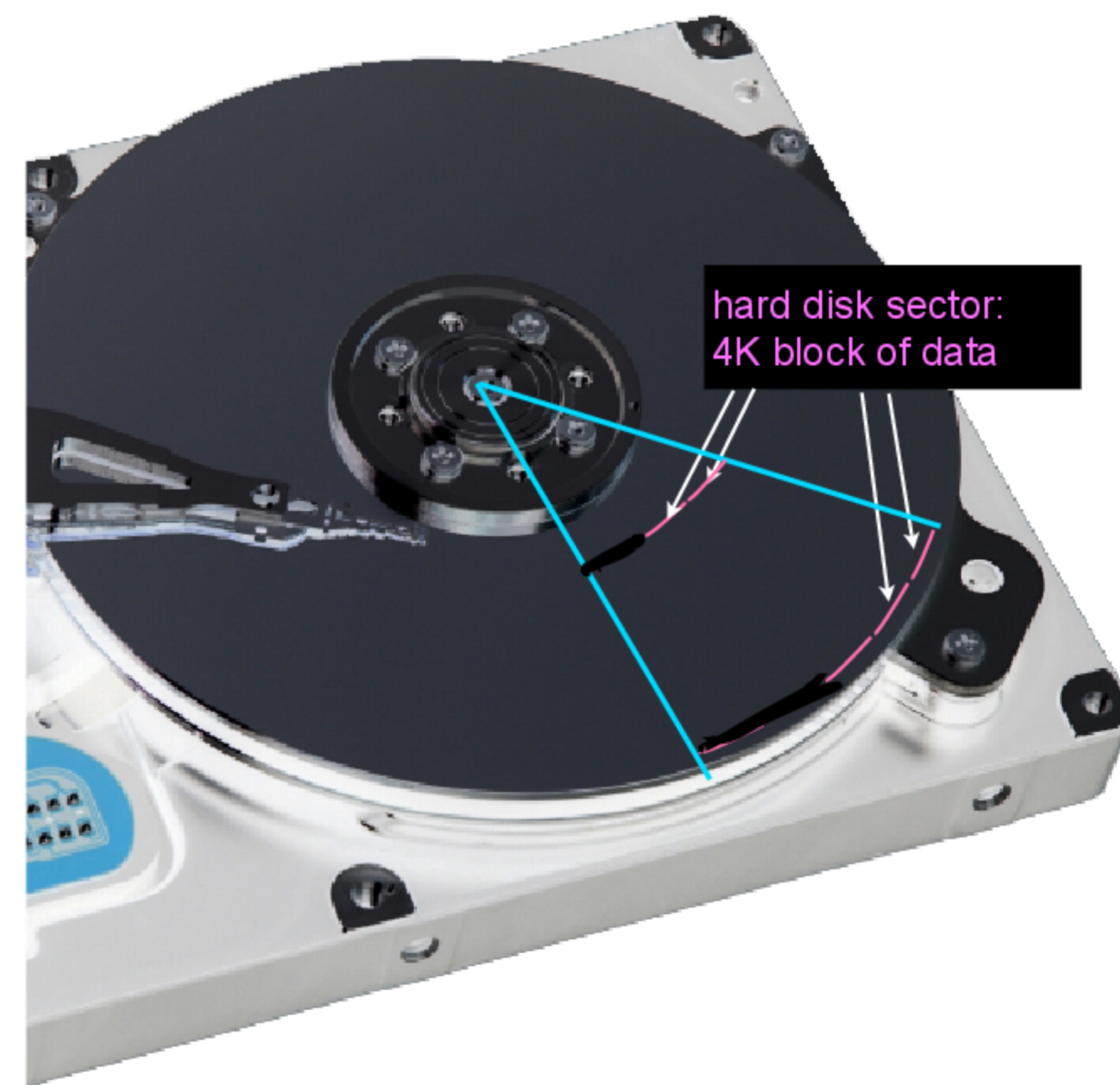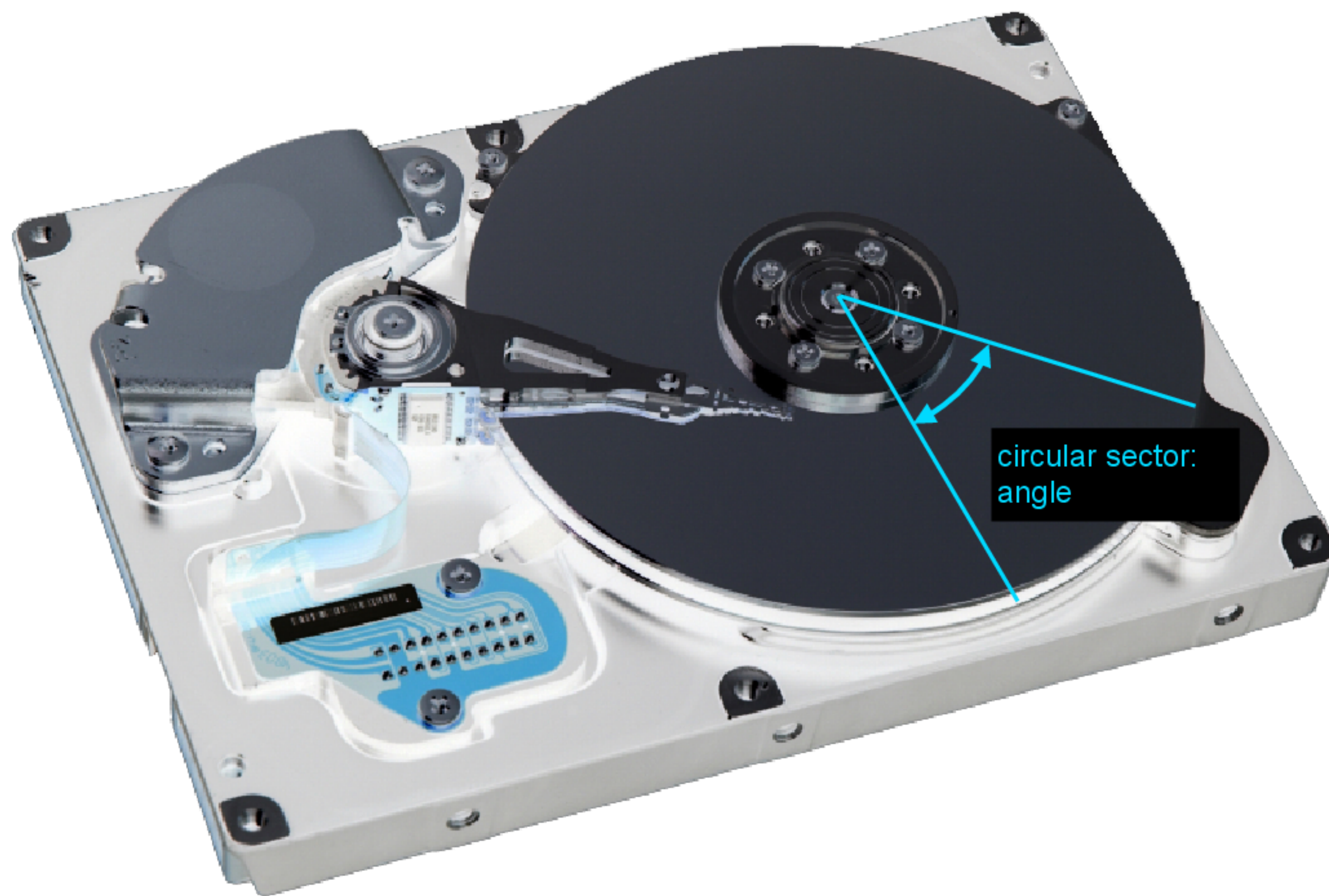
still many hard disk systems in use

every database needs durability (persistence)? ACID?

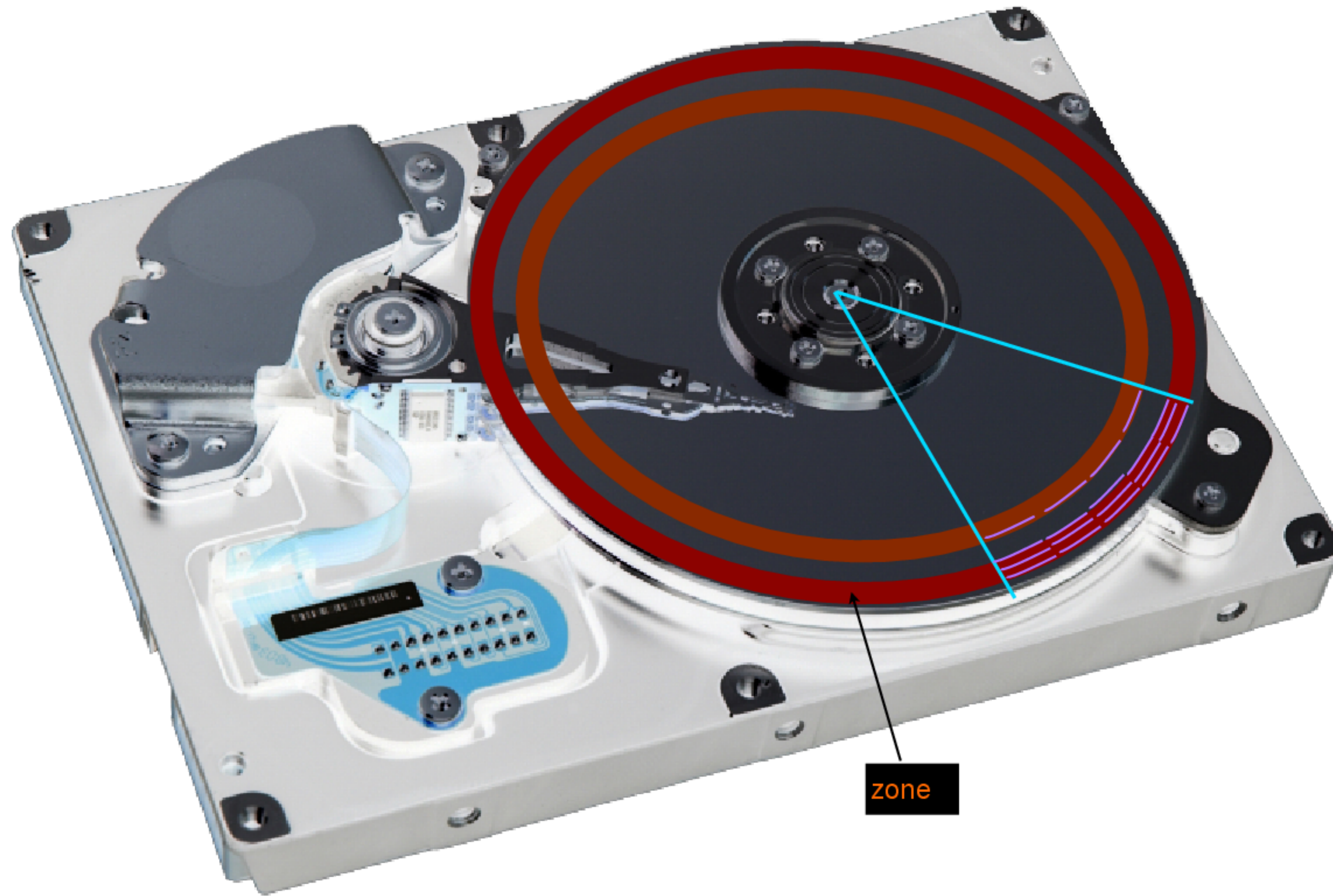very large datasets, Google, Yahoo! et.al

Hard Disks

cylinder = set of similar tracks
for all platters

spindle

platter

arm

(virtual) tracks

(disk) heads

Circular Sectors vs. HD Sectors

circular sector:
angle

hard disk sector:
4K block of data

Zone Bit Recording

zone

HD Sector

unit for read/write-access

fixed size subunit of a track

typically 0.5 to 4 KB
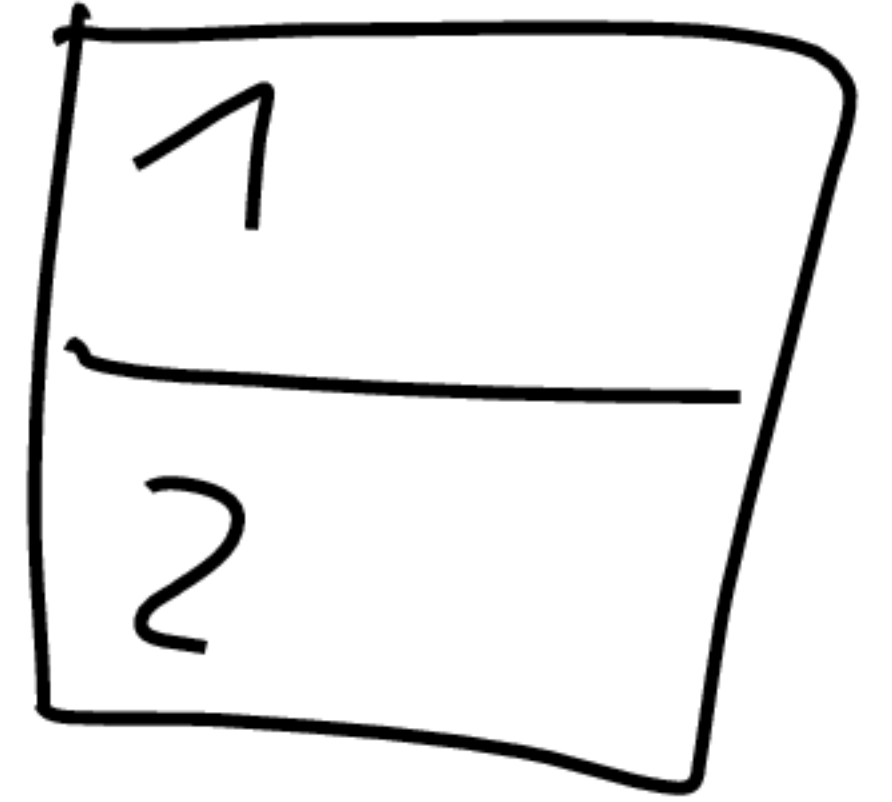
stored with self-correcting error codes

① Detect error

② Recover data

☐ ⟶ HD
___

HD Sector vs. OS Blocks

hard disk sector:
4K block of data
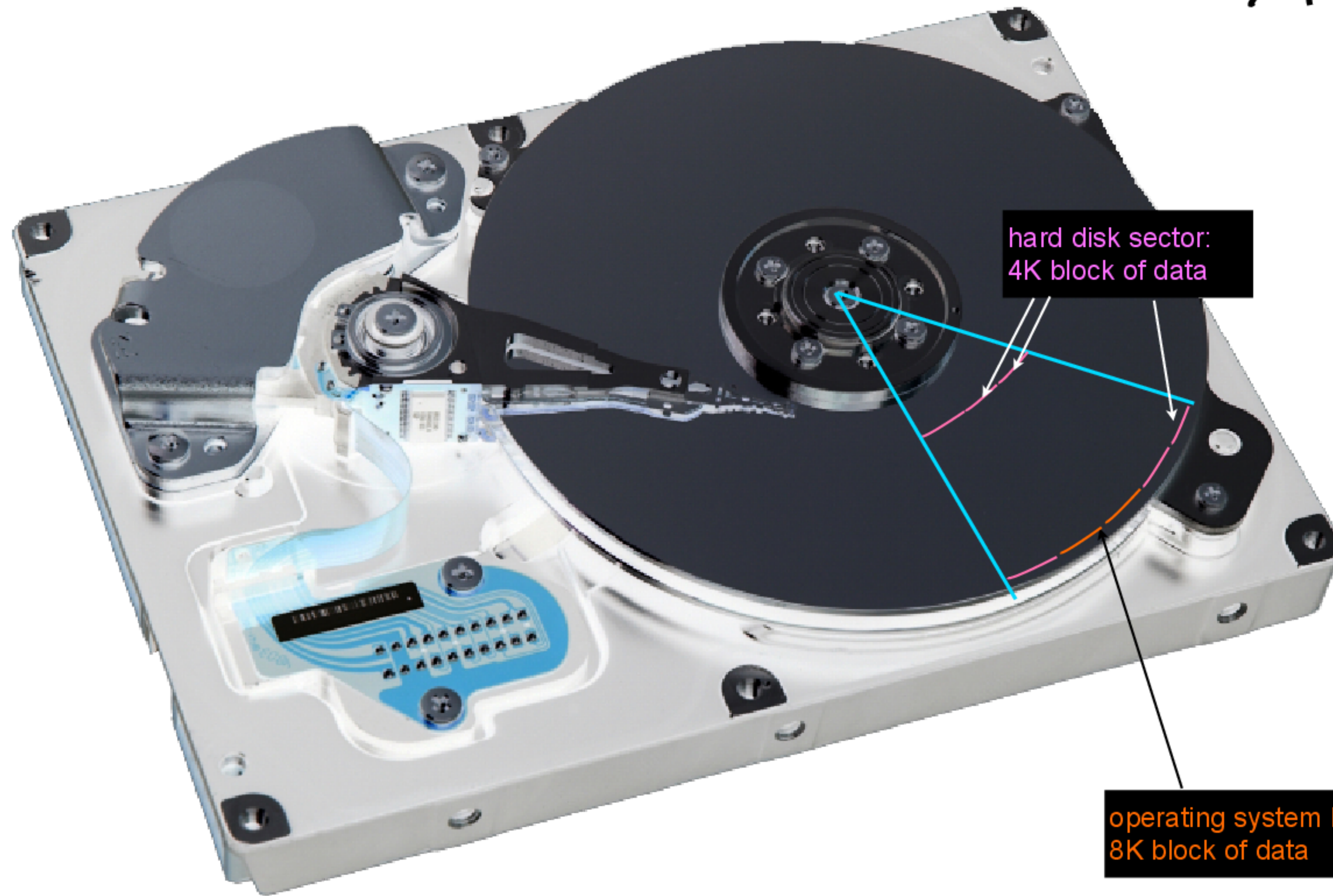
operating system block:
8K block of data

Physical CHS Addressing

Cylinder

Head

Sector

1024/16/256

Logical CHS Addressing

logical CHS number

HD controller maps it to physical CHS!

Cylinder

Head

Sector

1024/16/256 -> 512/12/256

Notice that standards such as EIDE and ATA-2 constrain the address space that may be used for (C,H,S), e.g. if 28 Bits may be used for the address, C may use 16 bits, H may use 4 bits, and S may use 8 bits. Obviously, if the drive has less net storage space available, not all of these sectors are actually addressable.
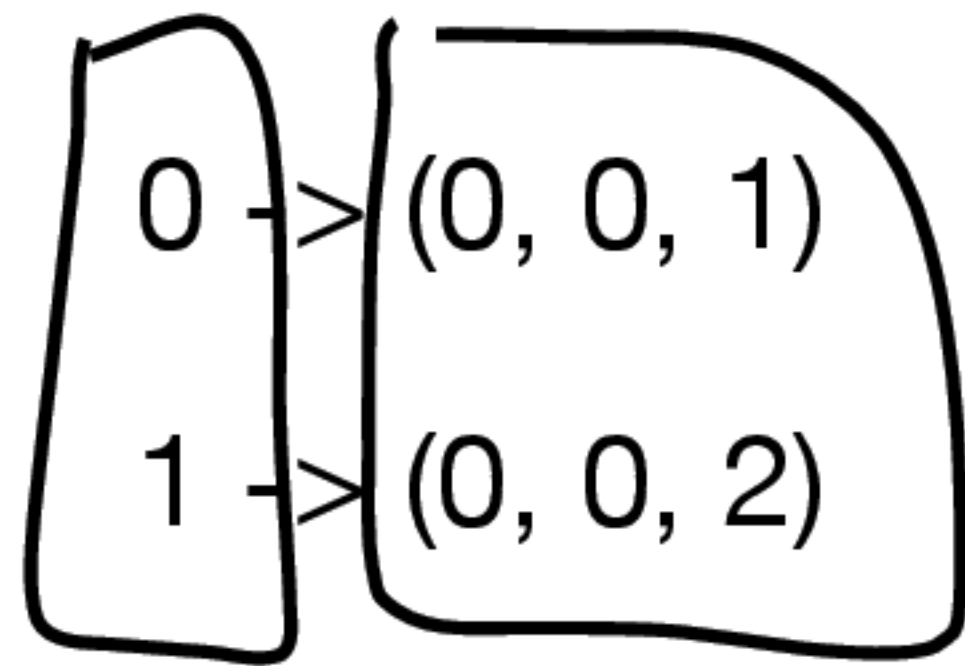
Logical Block Addressing (LBA)

logical block number

$$0, 1, \ldots, n$$

Logical Block Addressing (LBA)

logical block number

HD controller maps it to physical CHS!

0 -> (0, 0, 1)

1 -> (0, 0, 2)

and so forth

-> low-level file system!

Sparing

replacement block

erroneous block

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