The Curse of Areal Density

Ralph O. Weber

ENDL Texas

Cylinder   **Head**   **Sector**

Side 1

Side 2

Side 3

Side 4

Side 5

...

...
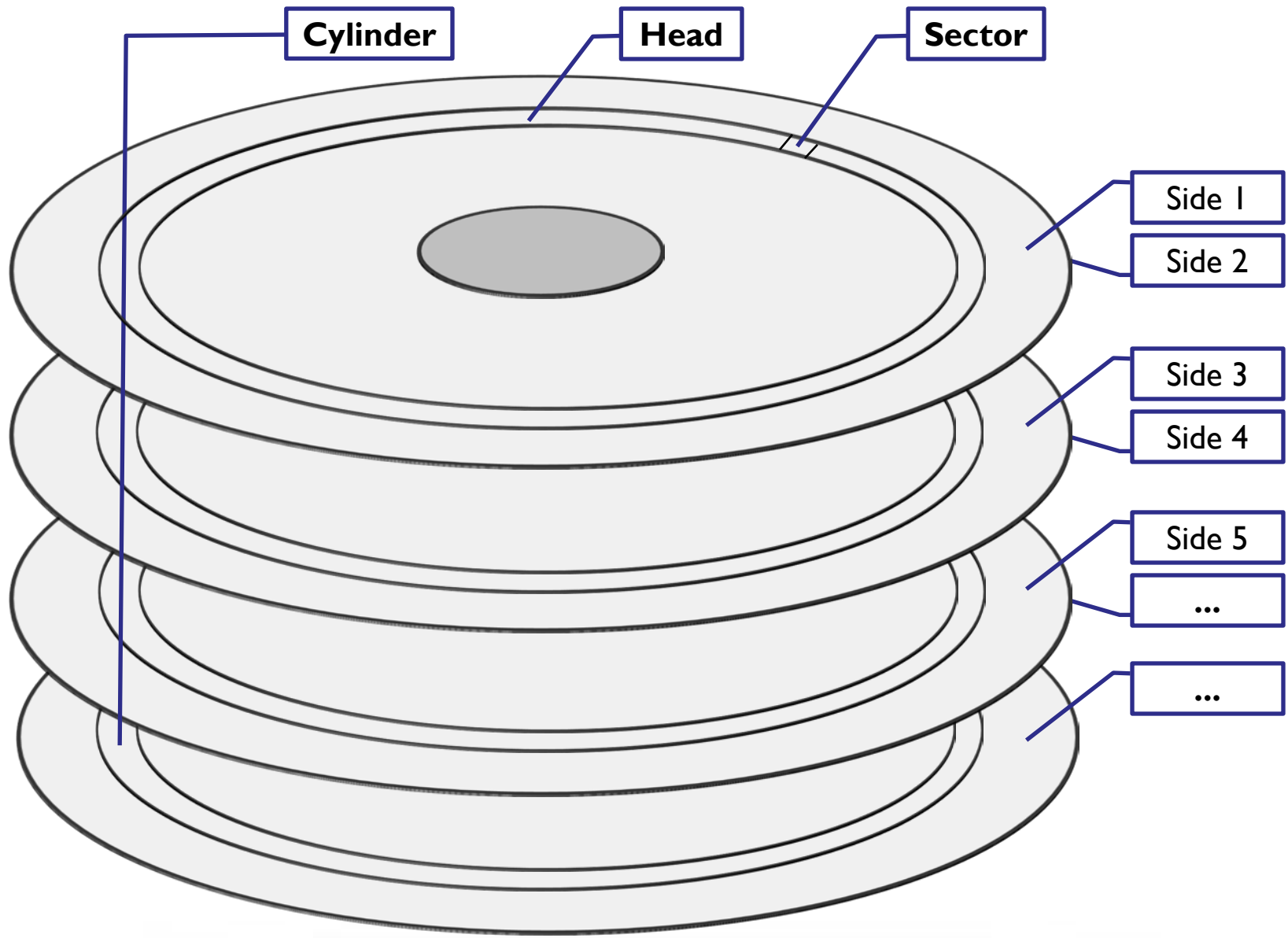
All Logical Blocks Created Equal

Nothing Special About LBA Numbers

More LBAs → More Data

Decade ... After Decade ... After Decade

News Flash

Writing a Block Takes More Energy than Reading a Block

and

No Random Access Technology is Immune

Energy Hungry Writes

- Shingled Magnetic Recording (SMR)

- Heat Assisted Magnetic Recording (HAMR)

- Solid-State Storage Block Erase

History - placeholder

Sweeping Enough Dirt Under the Carpet ...

❑ Tricks of the Trade

Sweeping Enough Dirt Under the Carpet Makes a Mound in the Center of the Room

❑ What the Host and End User See

Three Standardized *Fixes*
That Didn't Work (*Yet*)

- ❑ Object Based Storage Devices

- ❑ Logical Block Markups

- ❑ Zoned Block Devices

The Ugly Truth

❑ Forgotten issue {8/3}
   ❑ Industry floundering?
   ❑ Right players missing from table?
❑ This may be about the one-sided nature of the previous work {8/5}

The Standards Crucible

For Writes

☐ Logical Block Address
   is not enough

☐ Hosts Must Tell Disks More

Thanks For Your Time

Questions ... Custard Pies ... Brickbats