

Physical File Organization (The Organization of Hard Disk) ≡Part 3≡

Contents of Lecture:

- ❖ Organizing Tracks by sectors
- ❖ Organizing Tracks by Blocks
 - ✓ Sub-blocks
- ❖ Non-data overhead

Organizing Tracks by sectors:

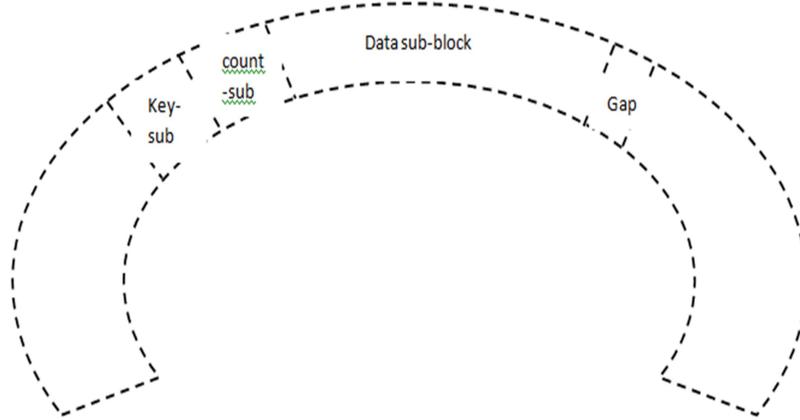
- ❖ Organizing Tracks by sectors is used by OS.
- ❖ Slow access or **fragmentation** when handling file of records.
 - ✓ **Fragmentation** is loss of space within a sector. This Due to records not fitting exactly in a sector.
 - ✓ **E.g.** Sector size is 512 and record size is 300 bytes.
- ❖ Some OS allow the system administrator to use clusters.

Organizing Tracks by Blocks:

- ❖ Organizing Tracks by blocks used by DBMS.
- ❖ Disk tracks may be divided into user-defined Block (page) rather than sectors.
- ❖ A block is usually organized to contain an integral number of logical records.
- ❖ Blocking Factor = number of records stored in each block in a file
- ❖ No internal fragmentation, no record spanning two blocks
- ❖ In block-addressing scheme each block of data is accompanied by one or more sub-blocks containing extra information about the block.

Sub-blocks:

- ❖ A block typically contains sub-blocks:
 - ✓ **Count sub-block:** the number of bytes in a block
 - ✓ **Key sub-block (optional):** contains the key for the last record in the data sub-block (disk controller can search for key without loading it in main memory)
 - ✓ **Data sub-block:** contains the Data records



Non-data overhead:

- ❖ Amount of space used for extra stuff other than data
- ❖ **Sector-Organized Disks:**
 - ✓ at the beginning of each sector some info is stored, such as sector address, track address, condition (if sector is defective);
 - ✓ there is some gap between sectors
- ❖ **Block-Organized Disks:**
 - ✓ Sub-blocks and inter-block gaps is part of the extra stuff; more non-data overhead than with sector-addressing.

The Cost of a Disk Access:

- ❖ The time to access a sector in a track on a surface is divided into 3 components:

Time Component	Action
Seek Time	Time to move the read/write arm to the correct cylinder (sector).
Rotational delay (or latency)	Time it takes for the disk to rotate so that the desired sector is under the read/write head.
Transfer time	Once the read/write head is positioned over the data, this is the time it takes for transferring data.

