WEEK 3

THE MAGNETIC DISK – THE HARD DRIVE

STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - Describe the parts of a hard disk drive.
  - Distinguish between the seek time and the latency time
  - Determine if a record is fixed length or variable length
  - Determine if a record is spanned or unspanned
  - Describe a block of bytes and how a block size is determined

PARTS OF A D

block size: the chunk of data that is able to bring to the primary storage.

• H

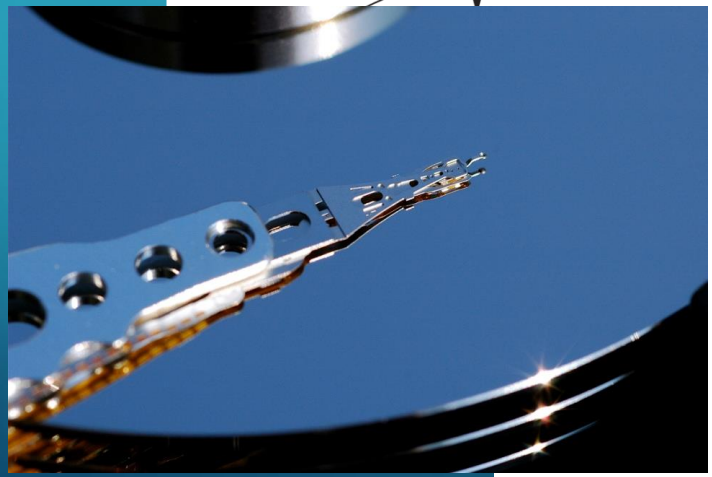
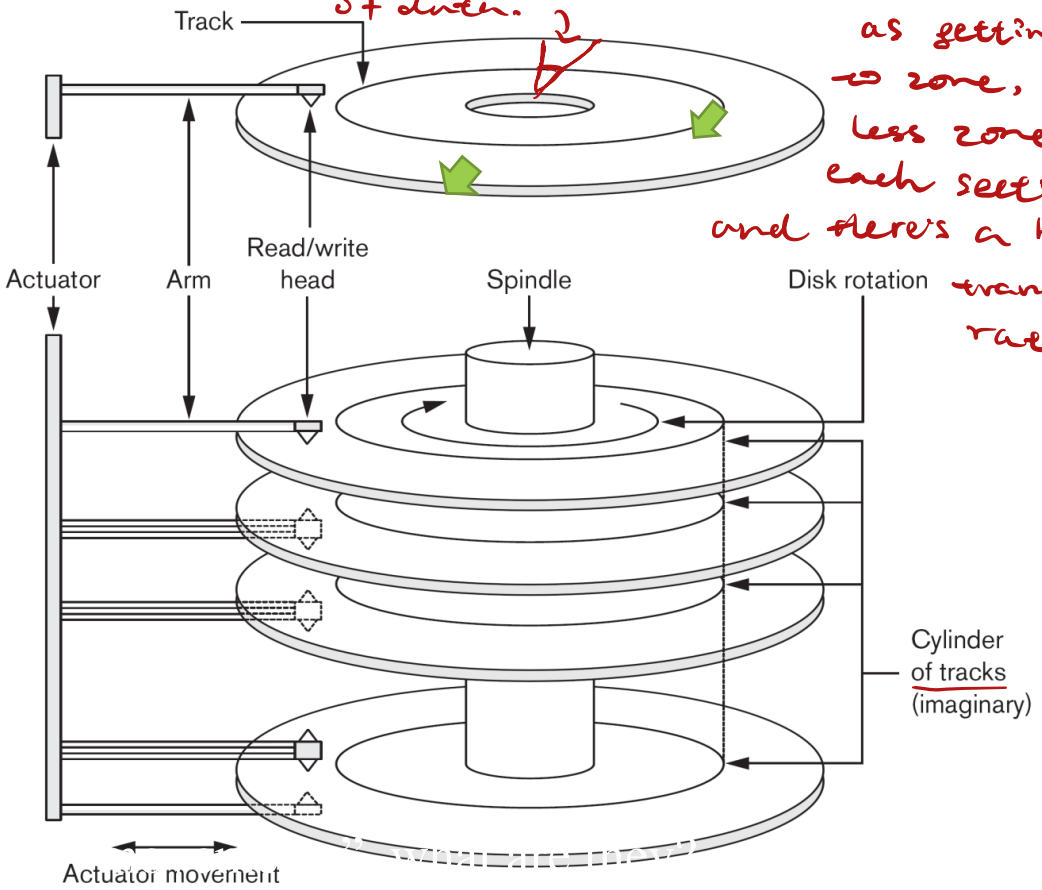


Figure 17.1
(a) A single-sided disk with read/write hardware.
(b) A disk pack with read/write hardware.

the angle here is a circular sector and a hard disk sector is 4k block of data.

as getting closer to zone, there's less zone for each sector. and there's a higher transfer rate.

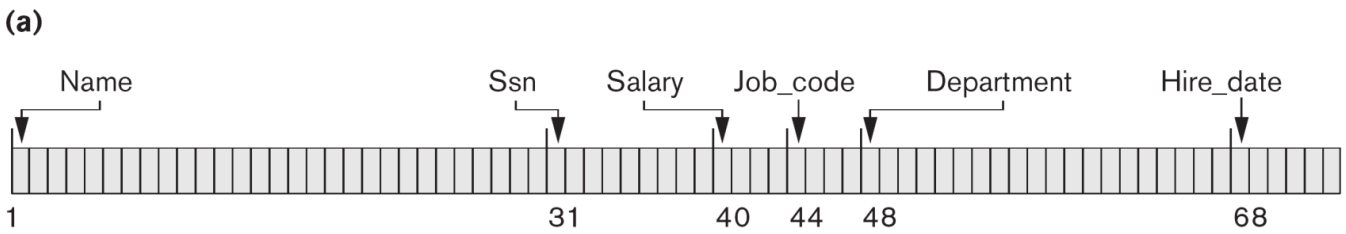


ISSUES

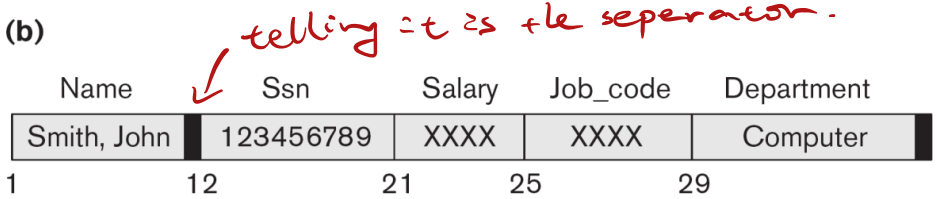
- Another explanation → https://www.youtube.com/watch?v=NtPc0jl21i0&t=1m29s
- Hard disks are slower than main memory, need to move data from HD into main memory
- Slower because of:
  - Seek time – find the track (move the arm to the correct circle)
  - Latency (rotational delay) – find the sector (spin the disk to the correct pie area)
  - Block Transfer Time – move the data (Seek and Latency take much more time)

PLACING DATA ON THE DISK

- Data usually stored in the form of ***Records*** (similar to a tuple or row)
  - Fixed Length
  - Variable Length
- Collection of related data values where each value is a byte (or bytes)
- ***File*** is a sequence of records (similar to a table)
  - A ***file descriptor (or file header)*** includes information that describes the file, such as the field names and their data types, and the addresses of the file blocks on disk.



Fixed Length Record



Separator Characters

Variable Length Record

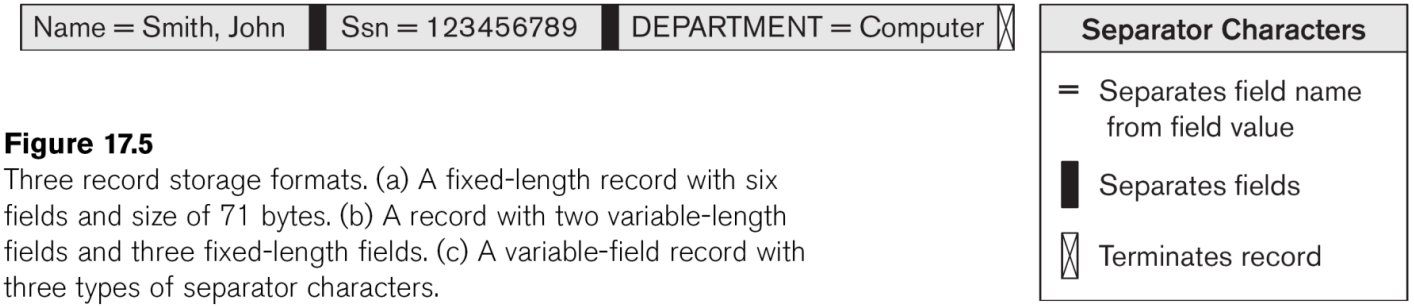


Figure 17.5
Three record storage formats. (a) A fixed-length record with six fields and size of 71 bytes. (b) A record with two variable-length fields and three fixed-length fields. (c) A variable-field record with three types of separator characters.

BLOCKS

- Unix community uses the term BLOCK to refer to a sector or group of sectors.
- Sequence of bytes
- Has a block size (maximum number of bytes it can hold)
- Normally a whole block can be brought into main memory…thus the size of a block is related to the OPERATING SYSTEM!

BLOCKING

- Blocking:
  - Refers to storing a number of records in one block on the disk.
  - **Blocking factor (bfr)** refers to the number of records per block.
  - There may be empty space in a block if the number of records that fits in one block is not an integer.
- Spanned Records:
  - Refers to records that exceed the size of one or more blocks and hence span a number of blocks.

- File records can be ***unspanned*** or ***spanned***
  - Unspanned: no record can span two blocks
  - Spanned: a record can be stored in more than one block
- The physical disk blocks that are allocated to hold the records of a file can be contiguous, linked, or indexed.
  - In a file of fixed-length records, all records have the same format. Usually, unspanned blocking is used with such files.
  - Files of variable-length records require additional information to be stored in each record, such as separator characters and field types. Usually spanned blocking is used with such files.

a good algorithm would speed up the finding process.

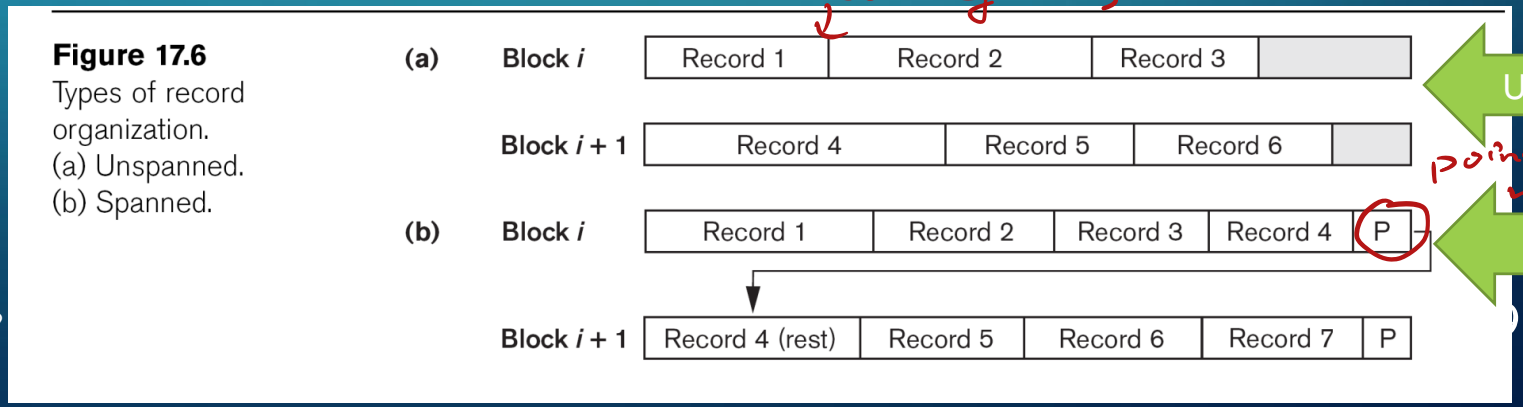


Figure 17.6
Types of record organization.
(a) Unspanned.
(b) Spanned.