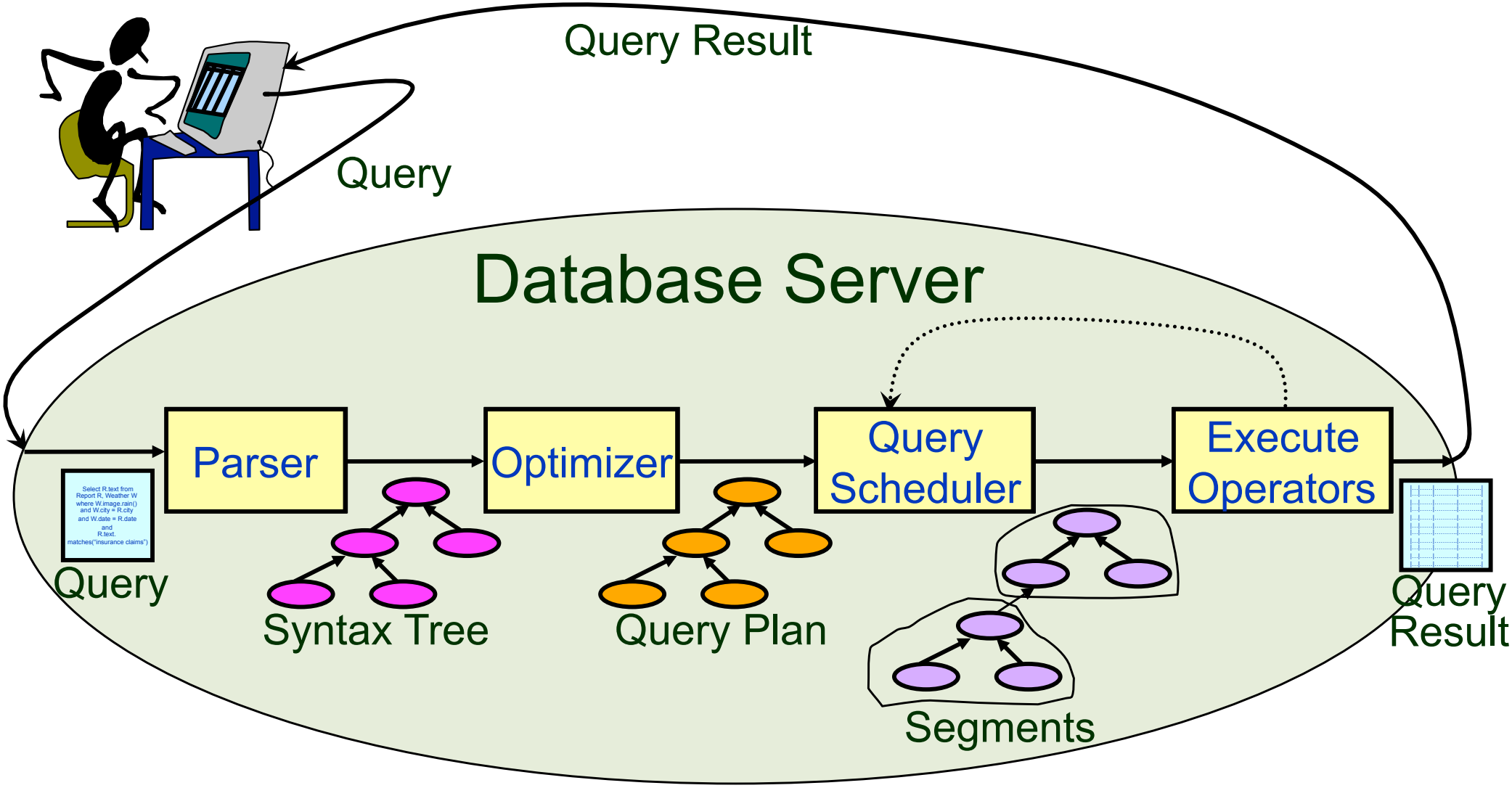
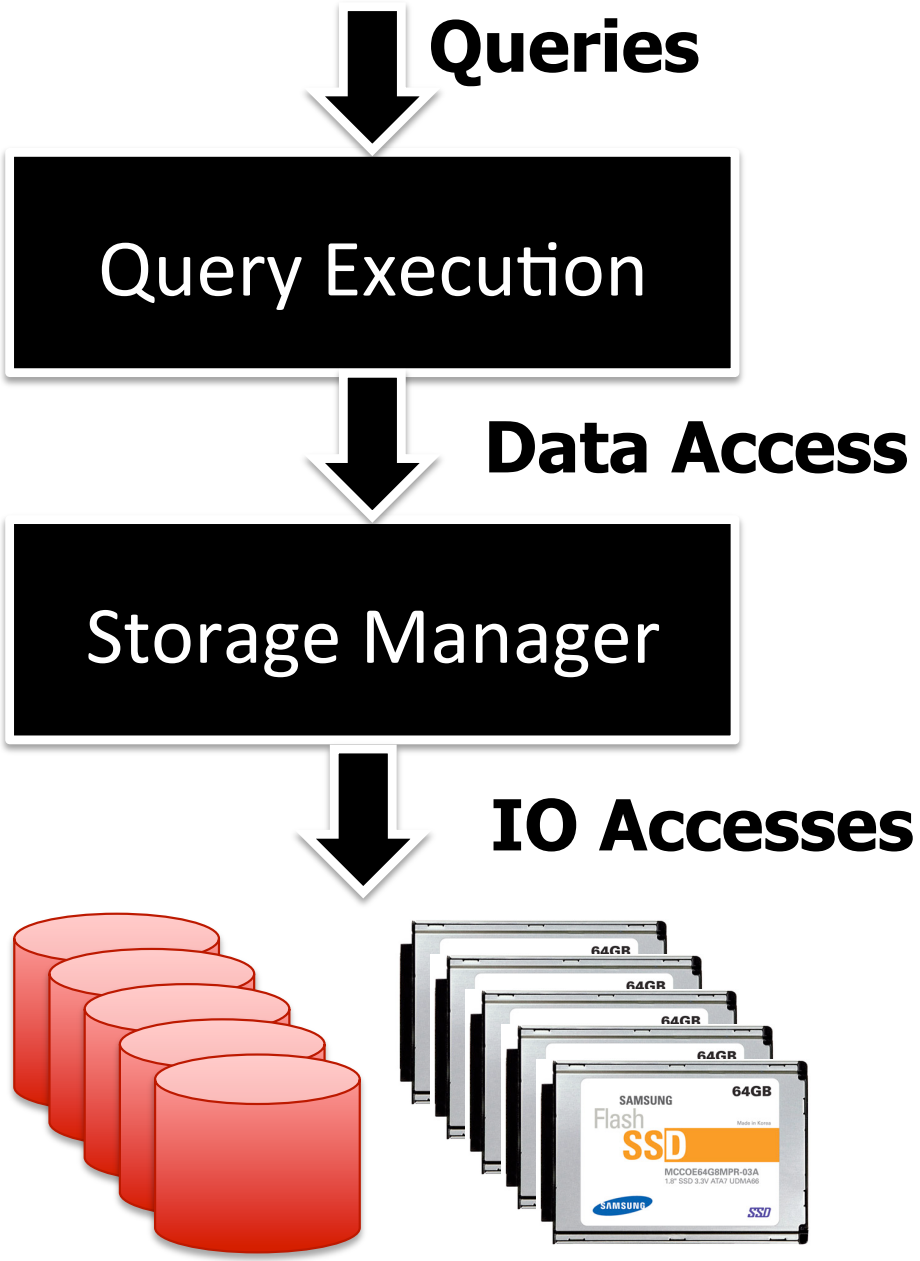
Fall 2013

DISKS

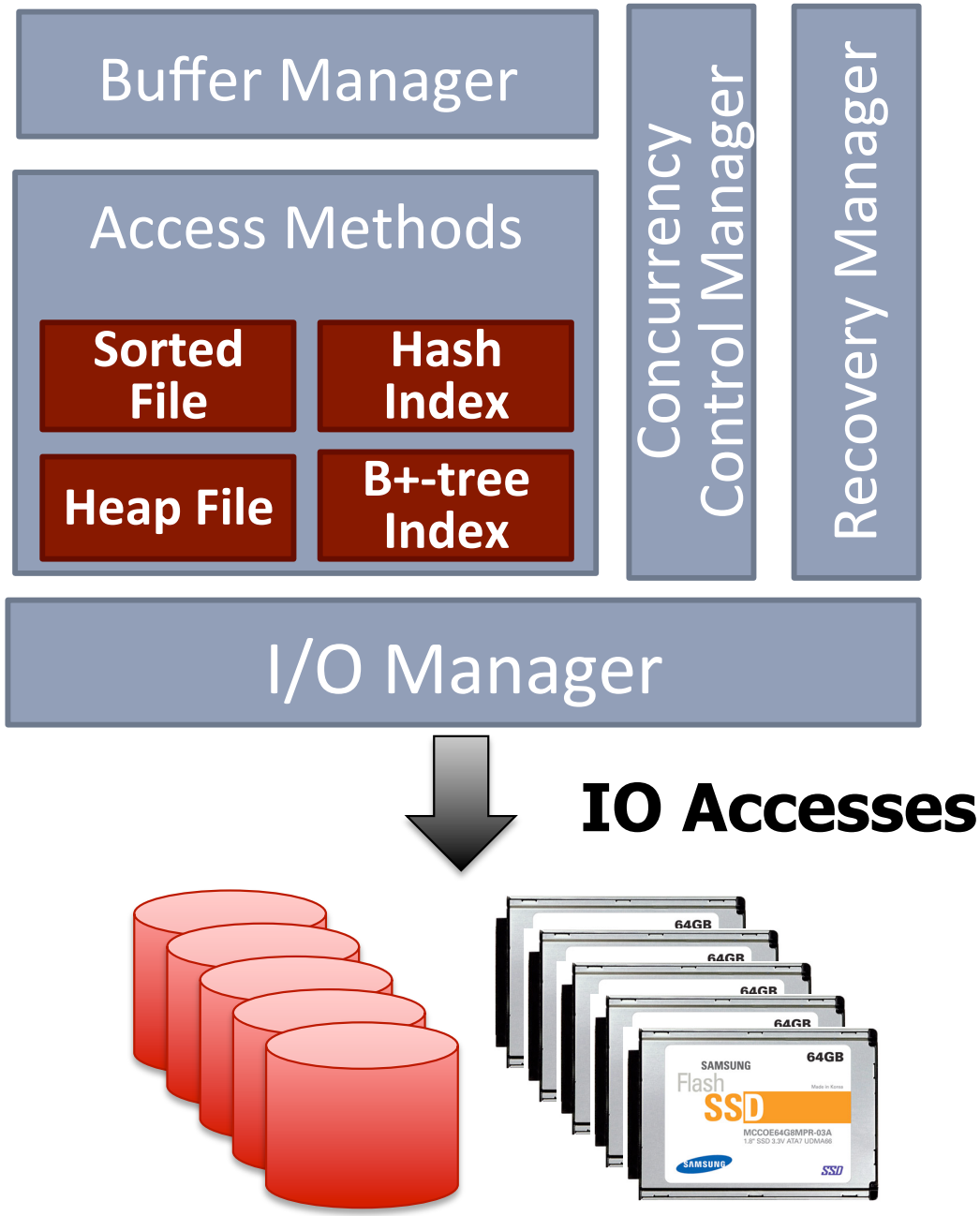
Life Cycle of a Query



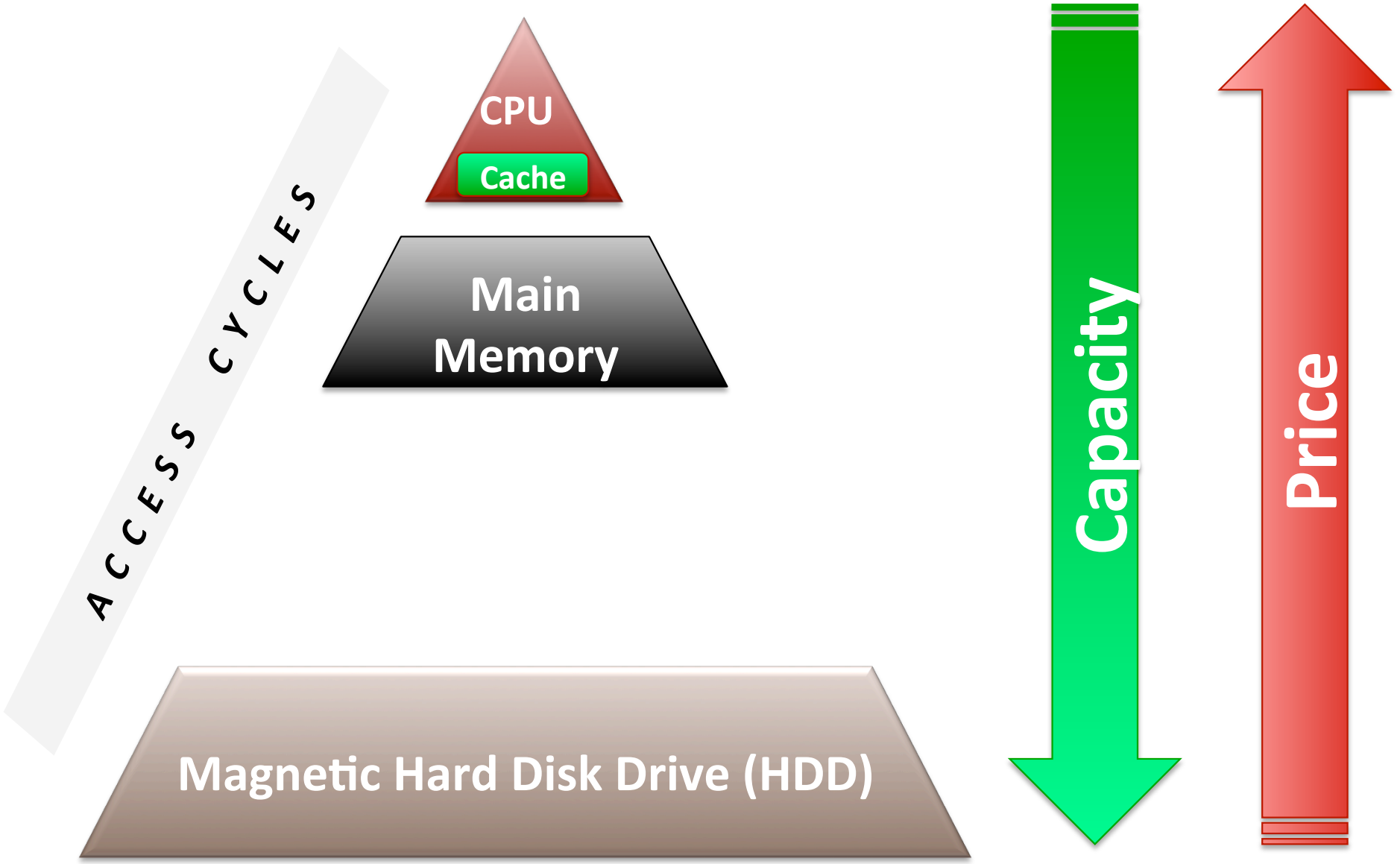
Internal Architecture of a Data Processing System



Architecture of a Storage Manager



Memory Hierarchy



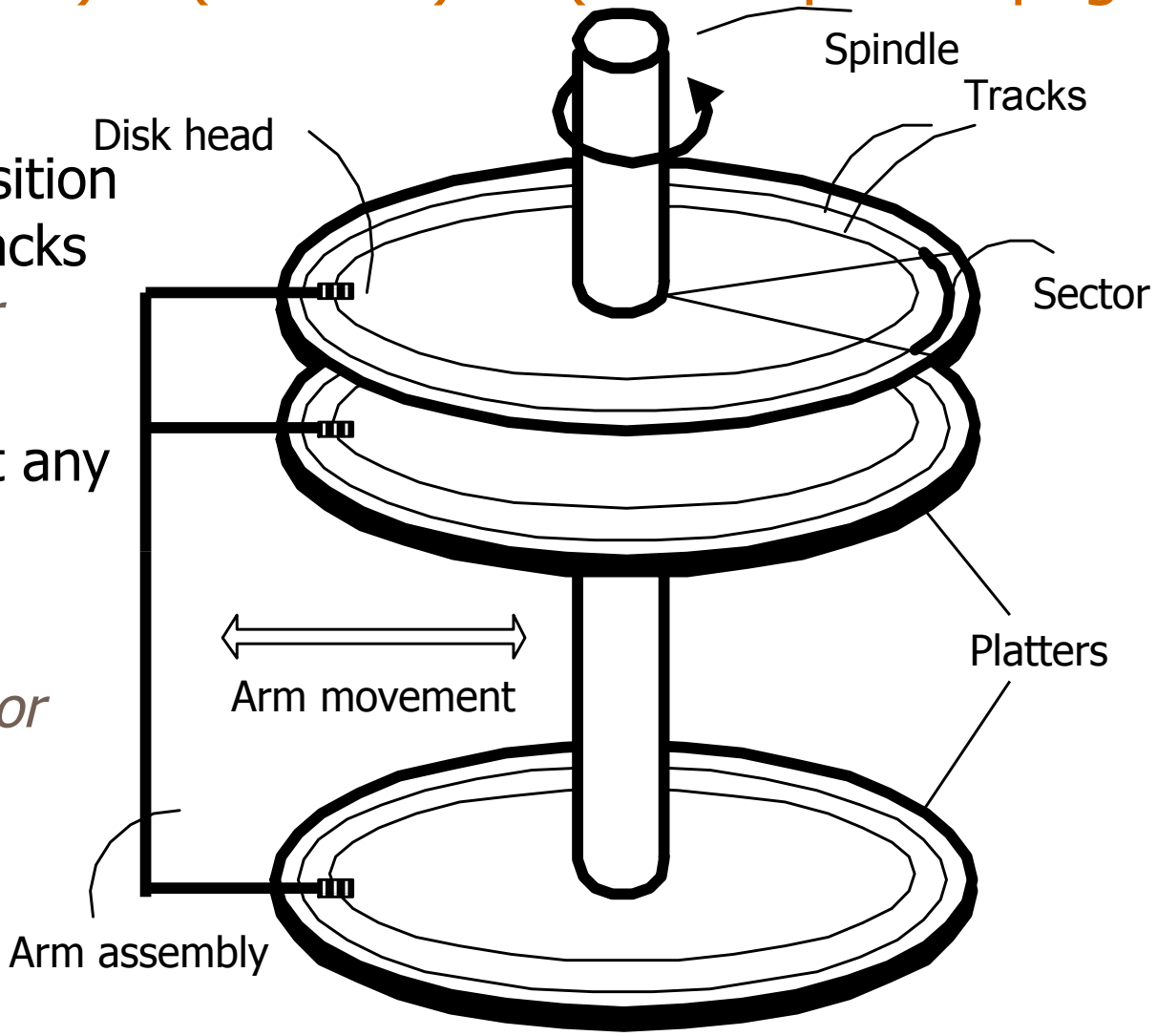
Disks

- Secondary storage device of choice.
- Data is stored and retrieved in units called *disk blocks* or *pages*.
- Unlike RAM, time to retrieve a disk page varies depending upon location on disk.
  - Therefore, relative placement of pages on disk has major impact on DBMS performance!

Disks

Access time = seek time + rotational delay + transfer time
(1-20 ms) (0-10ms) (~1 ms per 8k page)

- Platters spin @ ~ 7200rpm
- Arm assembly moves to position a head on a desired track. Tracks under heads make a *cylinder* (imaginary!)
- Only 1 head reads/writes at any time
- *Block size* : multiple of *sector size* (which is fixed).



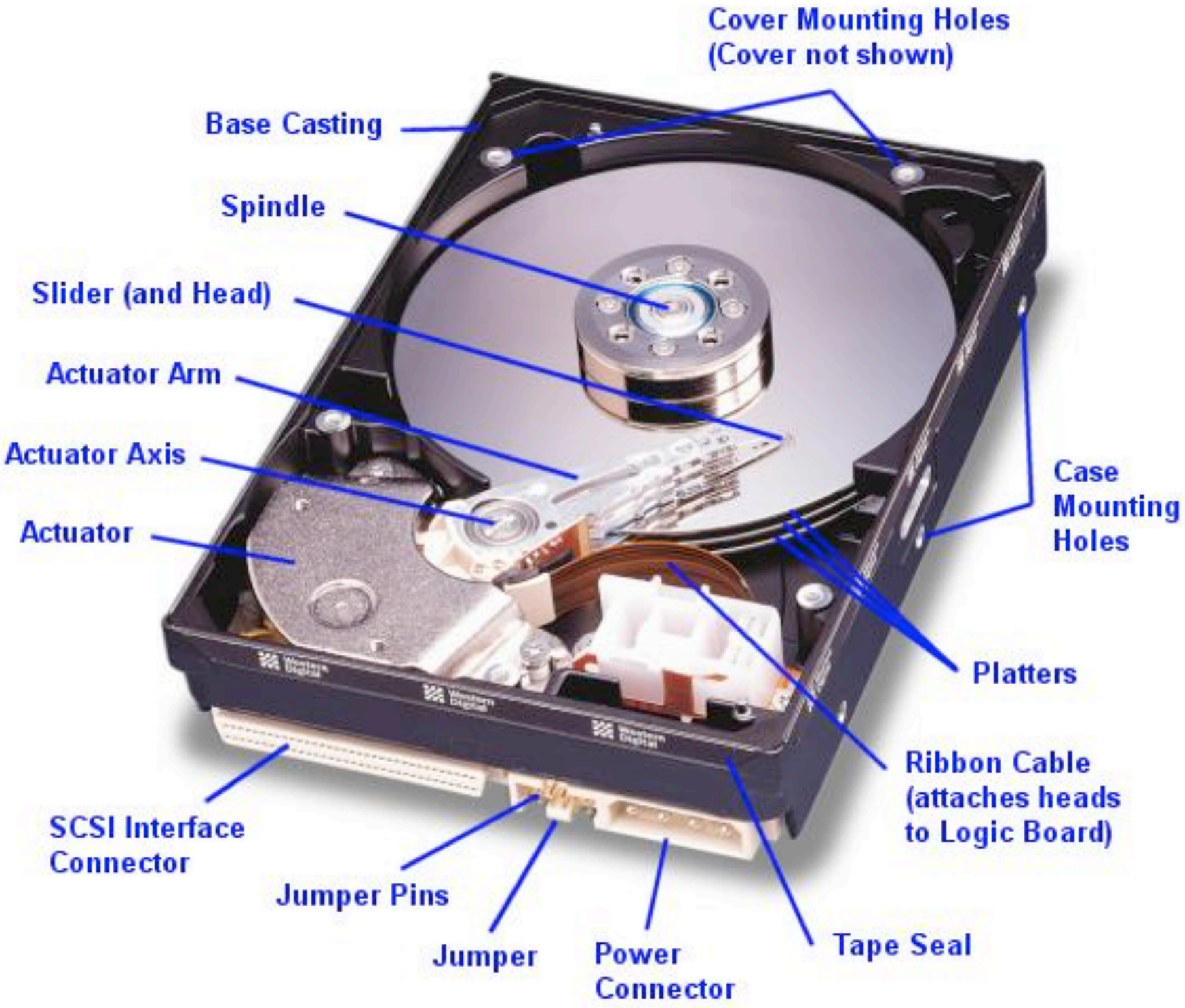
Disk Controller: OS Intf.

Arranging Pages on Disk

Access time = seek time + rotational delay + transfer time

- GOAL: Minimize seek and rotational delay
- 'Next' block concept:
  - blocks on same track, followed by
  - blocks on same cylinder, followed by
  - blocks on adjacent cylinder
- For a sequential scan, *pre-fetching* several pages at a time is a big win!

Nice overview of disk architecture and history at http://www.storagereview.com/guide/index.html


Cover Mounting Holes
(Cover not shown)
Base Casting
Spindle
Slider (and Head)
Actuator Arm
Actuator Axis
Actuator
Case
Mounting
Holes
Platters
Ribbon Cable
(attaches heads
to Logic Board)
SCSI Interface
Connector
Jumper Pins
Jumper
Power
Connector
Tape Seal