Hard Disk Drives (HDDs)

CS333 :: Storage Systems

Williams College

Unit Overview/What to Look For

- This unit gives a high-level overview of HDDs
  - Discuss the physical/mechanical components of a hard disk drive
    - names
    - roles in completing I/O requests
  - Develop a rough performance model for HDDs
    - fast operations vs. slow operations
  - Discuss strategies for ordering requests
    - optimizing throughput of system
    - optimizing fairness of system
- After this unit, we will have a mental model that we can use when designing software that uses HDDs

Strategy

- I suggest watching the video first
  - Video gives high-level descriptions and discussion
  - Textbook gives concrete examples
- The grey boxes are extra useful in this chapter
  - Dimensional analysis (converting units)
  - "Average" seek time

This unit is probably my favorite because it is one of the few places where we get to apply physical intuitions to computer science. But there are things we DON'T cover:

- Physics/material science
  - articles from Transactions on Magnetics journal are well beyond course scope
  - We will focus on the interfaces/performance implications in CS333

Terms and Jargon

- cache/buffer
  - write-back vs. write-through
- atomic operation

Helpful readings on caching and the memory hierarchy can be found in Chapter 11 of the free online Divie Into Systems textbook at:
https://diveintosystems.org/antora/diveintosystems/1.0/MemHierarchy/index.html