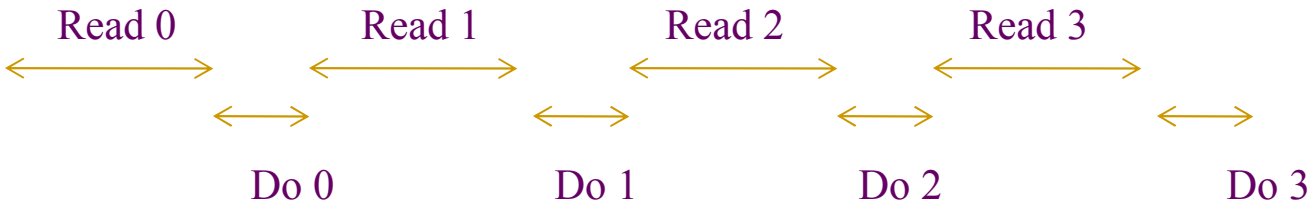
DATA STORAGE TECHNOLOGIES & NETWORKS

(CS C446, CS F446 & IS C446)

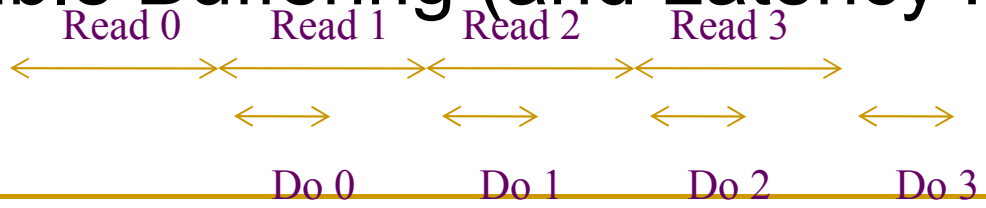
LECTURE 17– STORAGE

Device Drivers – Disk Access

- Typical access on a disk is for reading and processing a (large) file.
  - Data is read in blocks and buffered before processing can proceed.
- Model of access - Single Buffer :



- Double Buffering (and Latency Hiding):



Device Drivers – Disk Access

- A device driver maintains a queue – typically – per disk.
  - The order in which requests in queue are handled is referred to as scheduling
    - I/O scheduling or disk scheduling
  - Assumptions:
    - Preemption is not possible – a request must be serviced by the disk fully once started.

Hard Disks

- Data Sheets
  - Seagate NL-35 Specification
  - HP C3323

Disks - Performance Issues

- Capacity
- Speed of I/O Access
  - Throughput (or I/O bandwidth)
  - Response Time (or latency)
- Dependability
  - Reliability
    - Different Levels (Device Level, Data Block Level)
  - Availability
  - Security

Disks - Performance Issues

- Access Speed
  - Access Speed of a pathway =
    Minimum speed among all components in the path
- Reliability
  - Reliability of a component assembly (serial)
    - Measured as Mean Time-To-Failure (MTTF)
- Individual Disk Reliability (as claimed in manufacter's warranties) is often very high
  - E.g. Rated: 30,000 hours In Practice: 100,000 for an IBM disk in 80s

Disks - Performance Issues

- CPU and Memory Speeds vs. Disk Access Speeds
  - Issue in 80's: Recall Amdahl's Law
- Solution:
  - Multiple Disks i.e. array of disks
  - Issue: Reliability