Homework 12
Assembly Language & Architecture

1. Suppose a hard drive spins at 7200 RPM, has an average seek time of 11 ms, a maximum seek time of 33 ms, a disk-transfer rate of 34 MB/s, and a controller-transfer rate of 60 MB/s.

A. On average, how long would this disk take to read a 1-kB file and transfer it to the computer's operating system? (15.212 ms)

B. What is the minimum time to read and transfer the same file? (0.045 ms)

C. What is the maximum time to read and transfer the same file? (41.378 ms)

2. Suppose a flash drive has a drive-transfer rate of 35 MB/s, and a controller-transfer rate of 60 MB/s.

A. How much time would it take to read a 2-kB file? (0.088 ms)

B. Why isn't file access time as variable as it is with a hard drive?

3. Let us say we have two computers: one of them is a web server, while the other is used to edit video files.

A. How would implementing striping without any RAID (i.e. RAID 0) help or hurt these computers?

B. How would implementing RAID 1 help or hurt these computers, compared to RAID 0 with striping?

C. How would implementing RAID 3 help or hurt these computers, compared to RAID 1?

(For all of these you need to consider not only data redundancy, but also data access, parallelism, cost, and other bottlenecks besides disk access that could prevent RAIDs from having much effect.)