CIS 350 – INFRASTRUCTURE TECHNOLOGIES
SMALL GROUP ACTIVITY #5

Names of group
members: Brooklynn Taylor, Dylan Lasley, Jonathan McCarrick, Zoe Druen

Topic: Computer Peripherals

Logistics

1. Get in touch with your group. (See Groups folder on Blackboard.)
2. Discuss and complete the assignment together via E-mail, Discussion Forum, Blackboard Collaborate Ultra, and/or MS Teams.
3. Choose a recorder to prepare the final copy (<u>one</u> per group) and submit it via the Blackboard Assignments/Small Group Activities folder to the instructor.
4. Be sure all group members' names are on final copy. Do <u>not</u> add names of your group classmates who did not participate in the assignment.

Work the following problems.

1. A hard disk contains 18 platters. The data is recorded on both surfaces of each platter. Each surface has 5,500 tracks. One track can hold 4,000,000 bytes of information.

What is the capacity (expressed in Megabytes) of <u>one cylinder</u>? Show your computations.

To convert bytes to kilobytes, divide the number of bytes by 1024.
To convert kilobytes to megabytes, divide the number of kilobytes by 1024.
To convert megabytes to gigabytes, divide the number of megabytes by 1024.

One track holds 4,000,000 bytes: 4000000bytes / 1024 = 3906.25KB = 3.815 MB

The number of surfaces: 18*2 = 36

The capacity of a cylinder: 3.815MB * 36 = 137.34 MB

What is the capacity (expressed in Gigabytes) of the <u>entire hard disk</u>? Show your computations.

137.34MB * 5500 tracks = 755370 MB

755370 MB/1024 = 737.666 GB

2. Assume that the average seek time for the hard disk from problem 1 is 8 ms (milliseconds), there are 5,000 sectors on each track, and the disk rotates with 12,000 revolutions per minute.

A. Compute the average rotational delay (latency time). Compute the transfer time for <u>1 sector</u>. Express both times in milliseconds. Then compute the total disk access time required to access 1 sector which is <u>the sum of the three times</u>: the average seek time, the average rotational delay (latency time), and the transfer time for 1 sector. Show your computations.

Average seek time: 8 ms

Rotation speed: 12000 revolutions/min = 200 revolution/sec

Average rotation delay time = ½ * 1/200 = 0.0025 s = 2.5 ms

Transfer time for 1 sector   =   1 / (5000*200 revolution/sec)= 0.000001 s = 0.001 ms

The total disk access time for 1 sector: 8ms + 2.5ms + 0.001ms = 10.501ms

B. Compute the transfer time for <u>4000 sectors</u>. Express this time in milliseconds. Then compute the total hard disk access time required to read 4000 sectors which is <u>the sum of the three times</u>: the average seek time, the average rotational delay (which you have already computed in step 2A above), and the transfer time for 4000 sectors. Show your computations.

Average seek time: 8 ms

Rotation speed: 12000 revolutions/min = 200 revolution/sec

Transfer time for 4000 sectors   =   4000 / (5000*200 revolution/sec) = 0.004 s = 4 ms

The total disk access time for 4000 sector: 8ms + 2.5ms + 4ms = 14.5 ms

Notes:
- The average seek time is constant = 8 ms
- The average rotational delay is the same for 2A and 2B above
- The transfer time for problem 2B should be greater than for problem 2A because it takes more time to transfer 4000 sectors than 1 sector
- <u>Distinguish between the time units: minutes, seconds, and milliseconds</u>
  - 1 minute = 60 seconds
  - 1 second = 1,000 milliseconds