CPSC332 File Structures and Database Systems

Homework #4 (due April 17)

Instructor: Dr. Shawn X. Wang

Please write the last 4 digits of your campus wide ID on the front page of your homework.

Problem 1. Assume that we are using a hard disk with the following characteristics:

- Capacity 1 TB
- Average seek time 6 msec
- Spindle speed 15,000 rpm
- Bytes per sector 512
- Sectors per cluster 8
- Sectors per track 400.

Assume that we have a file of 20,000 records. Each record has 64 bytes. Answer the following questions:

1. How much is the average rotational delay?
2. How many records can be stored in one sector?
3. How many clusters are needed for the file?
4. How much is the time for reading one track, including the seek time, the average rotational delay, and the transfer time?
5. Assuming contiguous storage, namely, the records are stored in clusters from the same track as long as possible, how much is the total time for reading the whole file?
6. Assuming the minimal transfer unit is one cluster, how much is the time for reading one cluster, including the seek time, the average rotational delay, and the transfer time?
7. Assuming random storage of the records and every record is stored in a different cluster, reading a cluster will include the seek time, the average rotational delay, and the transfer time for that cluster, how much is the total time for reading the whole file?