


Database Development and Design (CPT201)

Tutorial 1

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Q1

- Given a disk with the following characteristics:
 - There are $2^{14}=16384$ tracks per surfaces
 - There are $2^7=128$ sectors per track
 - There are $2^{12}=4096$ byte per sector
 - The disk rotates at 7200rpm; i.e., it makes one rotation in 8.33 milliseconds 
 - To move the head arm between cylinders (tracks) take one milliseconds to start and stop, plus one additional millisecond for every 1000 cylinders travelled.
- Questions:
 - 1. what is the time to take one track movement?
 - 2. what is the time to move the head from innermost track to outmost track?

Q2

- Given a disk with the following characteristics:
 - There are $2^{14}=16384$ tracks per surfaces
 - There are $2^7=128$ sectors per track
 - There are $2^{12}=4096$ byte per sector
 - The disk rotates at 7200rpm; i.e., it makes one rotation in 8.33 milliseconds
 - To move the head arm between cylinders (tracks) take one milliseconds to start and stop, plus one additional millisecond for every 1000 cylinders travelled.
- Questions:
 - 1. Assume that there is no gap between sectors and each block occupies 4 sectors. what is the minimum time to read a block ?
 - 2. What is the maximum time to read a block?
 - 3. What is the average time?

Q3

- Suppose that a relation called student holds 25,000 tuples, which are stored as fixed length and fixed format records. The length of each tuple is 350 bytes. The key attribute, student_ID, occupies 10 bytes and another attribute address occupies 50 bytes. The records are sequentially ordered by student_ID and stored in a number of blocks. Each block has the size of 4,096 bytes (i.e., 4 Kilobytes). Assume that a complete record or an index entry must be stored in one block.
 - How many blocks are needed to store the relation student?
 - Consider creating a primary index on the *student_ID* attribute. Each index entry contains a search key and a 10-byte long pointer to the records. Suppose the primary index is sparse (i.e., one index entry for one block), compute the number of blocks needed to store the index.