CS245: Database Management Systems

Assignment # 01 (4 Questions, 10 Points)
Date of Assignment # 01 : 16-May-2020 @12:00 noon
Date of Submission of Assignment # 01 : 17-May-2020 @12:00 noon
16-May-2020 (Sat) IIT Guwahati

Note: The following are the exercise problems in the text book `https://bit.ly/2UTjzMU`. Any details given in this assignment differs with that in the text book problem, you should refer to text book problem as the final version for evaluation.

Question 1: (1 point)

The *Megatron 777* disk has the following characteristics

1. There are ten surfaces, with 10,000 tracks each.
2. Tracks hold an average of 1000 sectors of 512 bytes each.
3. 20% of each track is used for gaps.
4. The disk rotates at 10,000 RPM
5. The time it takes the head to move $n$tracks is 1 + 0.001n milliseconds

Given the above data, What is the capacity of the disk? Show the detailed computations. This problem is exercise 11.3.1 (a) of the text book.

Question 2: (3 points)

Using two-phase multiway merge-sort how long would it take to sort the relation of example 11.7 if Megatron 747 disk were replaced by Megatron 777 disk given above and all other characteristics of the machine and data remained the same? This problem is exercise 11.4.1 of the text book.

Question 3: (2 points)

Suppose a record has the following fields in this order: A character string of length 15, an integer of 2 bytes, an SQL2 date, and and SQL2 time (no decimal point). How many bytes does the record take if:

1. (1 Mark) Fields can start at any byte.
2. (1 Mark) Fields must start at a byte that is multiple of 4.

This problem is exercise 12.2.1 of the text book.

Question 4: ()

This question contains two parts

(a) (2 points) Continue the changes to figure 13.13, if we next delete the record with keys 60, 70 and 80, then insert records with keys 21, 22 and so on up to 29. Assume that extra space is obtained by adding overflow blocks to either the data file or index file This problem is exercise 13.1.7 (a) of the text book.

(b) (2 points) Execute the following operations on Figure 13.23. Describe the changes for operations that modify the tree

1. Insert a record with key 1.
2. Delete the record with key 23.

This problem is exercise 13.3.5 of the text book.

Solution Submission The table below shows which student should submit the assignment to which TA.

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