Data Storage and Retrieval
2018-2019

A simple Index Assignment (5 grades)

Write a java program (**using java.io.RandomAccessFile class)** that takes a data file that contain a set of records as following:

The data record is 12 bytes long, its structure is as follows:

Product_ID(int) = 4 bytes	**Product_Price (int)= 4 bytes**	**Product_quantity (int) = 4 bytes**
4	100	1000

And produce an index file with the following structure:

Key(int)= 4 bytes	Byte offset(int) = 4 bytes
2	12

Your assignment should do the following functions:

- Read the key values from the data file.
- Sort the keys in ascending order.
- Create a new index file, that contains the key and byte offset of each record in the data file this will be done only once. (**1 grade**)
- Insert a new data record and reflect that on the index file. (**1 grade)**
- Delete a data record, put a delimiter '*' in the first byte of the record. (**1 grade**)
- Update data in the data record [change price, quantity or both]. (**0.5 grade**)
- Search for a data record, the search function should take a key and return the complete record. **(1.5 grades**)

Hints:

- You can you the "SampleDataFile.bin" as the input sample data file to test your code
- The insertion of a new record means adding of new record in the data file and a new record in the index file.
- The data file is unsorted file.
- The index file MUST always be sorted.
- The deletion of a data record should remove its record from the index file [doing any necessary shifting on the index file].
- The search function must be implemented as binary search.
- Binary Search algorithm conducted on the index file should return either the second integer of the record you are searching for (The byte offset of the record) on the sorted file or -1 if the record is not found.

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Important notes:

- The index file can be sorted in memory for the first time. (after creation)
- After that, any operation (insert, update, delete, search) MUST be applied on the file
- If you make these operations to be applied on index in memory, you will get ZERO
- **Assignment Delivery** On the week starting **16/3/2019** on your lab
- Assignment should be done **individually or group of 2 students only**.
- All the submitted code must be completely yours. Your grade depends on delivering a running code and your understanding for the code.