Assignments - File Operations (Set 1)

1. Write a command line program (***CreateDB***) that takes number of students as a command line argument and generates a database of student records. Each student record contains the following fields:

   a. `Student Id`
   b. `Name`
   c. `Date of Birth`
   d. `Score` (in 5 subjects)

   When the program is executed as below, a text file (db.txt) with 20000 records should be generated (the option /C can be used to change the number of records):

   CreateDB */C20000 db.txt*

   The program should do the following:

   a. Define an appropriate structure for the above fields

   b. Implement a function called *GetNextRecord* with appropriate parameters that shall generate the next record as per the below rules:

      - The Student Id should be a number between 1 to 20000 (value given in /C parameter)
      - The `Name` field shall be a concatenation of `Student Id` and the string "Name". Eg. The first student's name will be "`Name00001`". (Notice the leading zeros. The leading zeros should be based on the number of digits in the number given along with the parameter /C.)
      - For the date of birth, use the date related functions provided by the C library, and also make use of the `rand` function so that the DOB should be a date between 1 Jan 1995 and 31 Dec 1996.
      - The scores in each of the 5 subjects should be a random number between **0** and **100**. Use C library related functions to generate random numbers.

2. Using the db.txt file generated in the above question, write a command line program that shall take the file db.txt as the input file and shall generate an outpfile file (*dbanalysis.txt*).

   The program shall do the following for each record.

   a. The following 2 fields shall be added:

      i. `Overall Percentage`
      ii. `Analysis`

   b. Implement the following functions

      i. *ReadNextRecord* – Reads the next record from db.txt
      ii. *AnalyzeRecord* – Assigns the correct value for Percentage and Analysis.
      iii. *WriteRecord* – Writes the entire record into the output file (*dbanalysis.txt)*

   c. The field "`Analysis`" should have the following values

i. `FAIL` (if the person has failed (less than 50) in any one of the subjects)

ii. `ABSENT` (if the person has a Zero in any of the subjects)

iii. "`PASS - Below Average`" (if the total percentage is >50 but <65

iv. "`PASS - Average`" (if Percentage is >65 and <70)

v. "`PASS - Excellent`" (Percentage is >70 and <80)

vi. "`PASS - Exceptional`" (Percentage is >80)

d. The program should also give a final summary (on stdout) with the Analysis as below:

```
----------------------------------------
Particulars           | Count| Percentage
----------------------------------------
FAIL                  |   200| 1%
PASS -Below Average   |  1550| 7.75%
..                    |      |
----------------------------------------
TOTAL                 | 20000|
----------------------------------------
```

3. Write a command line program that takes a file as input (dbanalysis.txt or db.txt) and generates an index file (dbanalysis.idx or db.idx) for the input file. The index file should have the following 2 filed:

   a. Student Id

   b. FilePos – the start position in the input file, where the record for the student starts.

4. Write a command line program that takes an input file and its idx file and generates a summary as below for 10 random students:

```
-----------------------------------------------
Record Id  | Seq. Access time| Random Access Time
-----------------------------------------------
 10000     |     10 Sec      | 3 Sec
 45305     |                 |
 10000     |                 |
 45305     |                 |
 10000     |                 |
 45305     |                 |
-----------------------------------------------
```

Note:

Seq. Access time is the time taken to read from the start of the file to the position in which the given record of the student starts.

Random Access Time is the time taken for seeking to the position of the record, using the information in the idx file.

-- End of Assignment --