Assignment-X (Linked List)

Submit your program in the Moodle System 15 minutes before the end of the laboratory session. Provide the result in a separate output file (named, result_<assgn><no>.txt). Use standard output redirection feature to generate the output file.

Consider a data file named *CountryStat.txt*, which contains population records of a list of countries in the following order:
1. World Rank in Population: An integer
2. Name of the country: A string
3. Population (in Millions): An integer
4. Yearly change (in %): A real number
5. Net change (in Thousands): An integer
6. Population Density (Person / sq. km): An integer

All the fields are stored in each line of the file. Between records of each country, there is an empty line.

Write a program to perform the following operations:
- (i) Write a function *hash*(.) which takes a string in its argument and returns an integer between 0 to 6 by computing the remainder of integer division of sum of the ASCII values of the characters of the string and 7.
  e.g. if the string is "India", it would compute (73+110+100+105+97) / 7 and return the remainder 2 (For your understanding, you may check the ASCII table).
- (ii) The program maintains an array of seven linked lists of population records, where the record of a country is stored in the *i* th ($0 \le i \le 6$) linked list, if the *hash* function given the country name returns the value *i*.
- (iii) The program reads the data file "*CountryStat.txt*" and store the data in the array of linked list as described above (see (ii)).
- (iv) It prints the sequence of records in each list after the storage and also it prints the average length of the lists.
- (v) In a loop, it performs the following operations by taking necessary input from a user.
  a. Insert a record with all necessary information except the ranking. If the record is already there, it prints the existing data. For a new record, it readjusts ranking.
  b. Search a record given the country name and prints the statistics. If it is not found it prints a message "The record is not found".
  c. Given a country name it prints its rank in the world according to population. If it is not found it prints "Record not found".
  d. Prints the country with lowest population density.
  e. Prints the country with highest yearly change.

f. Prints the list of countries in descending order of their population.
g. Prints the list of countries in descending order of their yearly changes.
h. Prints the list of countries in ascending order of their population densities.
i. Prints the list of countries in ascending order of their net changes.
j. Exits the loop and terminates the program.

Generate results with following sequence of operations.

(i) Insert following records.

Vietnam
97
0.91
876
314

Netherlands
17
0.22
37
508

Somalia
15
2.92
450
25

Burundi
11
3.12
360
463

(ii) Search statistics for following countries

India
Pakistan
Bangladesh
Sri Lanka
Bhutan
Nepal
Mongolia
Germany
South Africa
Iraq
Iran
Sudan

(iii)   Find world ranks of following countries according to population.

India
Pakistan
Algeria
Bangladesh
Sri Lanka
 Bhutan
Nepal
 Mongolia
Germany
Egypt
Iraq
Iran
Argentina
Uruguay

(iv)   Prints the country with lowest population density.
(v)   Prints the country with highest yearly change.
(vi)   Prints the list of countries in descending order of their population.
(vii)   Prints the list of countries in descending order of their yearly changes.
(viii) Prints the list of countries in ascending order of their population densities.
(ix)   Prints the list of countries in ascending order of their net changes.