Data structures 2019

Let us consider two sets of integer values A={1,1,2,3,4,4,5} and B={1,11,4}. Union of (OR) is AUB= {1,2,3,4,5,11} and intersection is (AND) A∩B={1,4}. Union is a set that contains values that are in A or B or both A and B. Intersection is a set that contain values that are in both sets A and B. Exclusive of (XOR) A⊕B={5,11} is a set that contains values that are in A or B, but not in A and B. Note that resulting sets contain each value only once.

In this exercise the students implement a Java program that uses hash table in the implementation of set operations OR, AND and XOR. Hash table that comes with Java is not allowed, but a student should make his/her own implementation. A common way is an application of linked list. A program reads in two files *setA.txt* and *setB.txt* and provides three output files *or.txt*, *and.txt*, and *xor.txt*. Each text file contains two columns. First column of any file contain the values of integers. Second column depends on operation. In OR operation second column contains the information how many time an integer appears in input files. In AND operation second column contain the row number of setA.txt where an integer appears first time. In XOR operation second column contain number 1 or 2 according to which of the files setA.txt or setB.txt contain the integer in question. The program prints on screen the amount of values per set. The program allows removing a value, or values, from the hash table *before* writing the output files.

Submit your work

Pack all source files into one zip file. Attach your work in an email message and send it to address Name your message as “Tira2019”. The latest date to submit your work is 31.1.2020.

Grading

A program that does all tasks mentioned above and has the same amount of storing places that there are integers to put in the table is worth of ten points. In this case a value to be stored in the hash table can be as big as possible. A program that uses "sparse" table is worth of 8 points. With sparse we mean that we have at most 10 000 storing places and the biggest value that can be put in the hash table is 9999. Program should inform the user whether it could deal with large integers or only those from 0 to 9999.

Coding

Please, comment your code, and use expressive function and variable names.