

## COMP 282 Project 1: Student Clubs

**Due: March 10, 23:55pm.**

**Files:** Provided files mentioned in the project specification are under the Files/Projects/Project1 in Canvas.

**Background:** There is a school that has a large number of clubs. Every student belongs to at least one club, but most belong to more than one club. You will be writing a java application to store and calculate information about the students at this school.

**Task:** You will write a number of java classes.

The first class will be called Student. It will have fields long idNumber, Sting name, and boolean[] inGroup and implement the interface DataItem (which will be provided to you).

The second class will be called GroupData which will be a data structure which implements the interface DataStructOfItemsInGroups (which will be provided). You may choose which data structure you want to use, (e.g. Linked List (written from scratch by yourself or utilizing java.util.LinkedList), Ordered Vector (either written from scratch by yourself or utilizing java.util.Vector). You will use it to hold items of type DataItem . However, it should be written to allow any item of type DataStructOfItemsInGroups.

The final class will be called Driver and will allow the user to interact with the program. This class should initially look for a file called data.txt and if the file is present then it should add all students from this file to the data structure. A sample data file and a sample interaction will be provided. The data file has one student per line with each line formatted: student id number, student name, boolean of whether in each club. EG

1073843, Danny Darko, TFTTF

what TFTTF means: T means true F means false, so the information in TFTTF is the following: that students is in groups 1, 3, 4 and is not in groups 2 and 5.

More details what needs to be done: you need to read the information from data.txt file. Each line in data.txt file contains information about a single student and the information is id (1073843), name (Danny Darko) and memeber of which groups is that student (TFTTF). Once your read the data.txt file (you can discard the file now) you need to extract that information and add it into your data structure (e.g. linked list, vector). And then you should be able to do various operations on that data structure. The operations are:

add (adds a student)

drop (drops a student)

find (outputs a student)

size (outputs the size of a group = how many students are in that group)  
members (outputs the members of a group = id,name, group\_info of the members of that group)  
largest (outputs the largest size of any group = the largest number of student that any group has)  
smallest (outputs the smallest size of any group = the smallest number of students that any group has)  
cover (outputs the minimum number of groups which cover all students = how many groups (minimum number) should I take so that if I take all the members of those groups I will have all students covered, the method for this operation is numToReachAll() from DataStructOfItemsInGroups interface)  
quit (ends the program)

Below you can see sample output

What would you like to do?

> help

Your options are:

add (adds a student)

drop (drops a student)

find (outputs a student)

size (outputs the size of a group)

members (outputs the members of a group)

largest (outputs the largest size of any group)

smallest (outputs the smallest size of any group)

cover (outputs the minimum number of groups which cover all students)

quit (ends the program)

What would you like to do?

> add

Name?

> Katya Mkrtchyan

ID Number?

> 1012211

Groups?

> TFFT

What would you like to do?

> find

ID Number?

> 1012211

1012211, Katya Mkrtchyan, TFFT

What would you like to do?

> drop

ID Number?

> 1012211

Removing: 1012211, Katya Mkrtchyan, TFFT

What would you like to do?

> size

Group?

> 0

Size of group 0: 3

What would you like to do?

> size

Group?

> 3

Size of group 3: 3

What would you like to do?

> size

Group?

> 1

Size of group 1: 1

What would you like to do?

> members

Group?

> 2

97544223, Maria Jacobin, FFFT

What would you like to do?

> members

Group?

> 4

No Members are in this group

What would you like to do?

> largest

3

What would you like to do?

> smallest

1

What would you like to do?

> cover

Minimum # of groups to cover all members: 2

As stated in class **if you want** you can change the signature of some functions that are stated in DataStructOfItemsInGroups interface.

**Your output should have the same format that see in about sample output example. No extra/fancy questions or operations are allowed.**

Clarification on Comparable interface: **Java Comparable interface** is found in **java.lang** package and contains only one method named `compareTo(Object)`. You can override `compareTo(Object)` method. You need `compareTo` method for the following scenario: for example if you want to find student X then you need to compare student X's info with all the students that you have in your dataset to answer whether you found or not. You will use `compareTo` method like this (`tmp.compareTo(item)`), where both `tmp` and `item` are of `DataItem` type).

**Note:** **You don't need change anything in the interfaces that I gave you**, you can add methods there if you need but don't change anything. (exception you can change the signatures of methods only to request id number instead of the whole student information)

**Submission:** You should submit all your files in Canvas. Be sure to read (and follow) the coding guidelines.

**Cheating :** You can discuss this project with other students. You can explain what needs to be done and give suggestions on how to do it. You cannot share source code. If two projects are submitted which show significant and troubling similarity in source code then both individuals will be punished.

### **What to Turn In**

You should turn in the following electronically into canvas:

The files that make up your program.

A file `status.txt` that contains the following:

The status of your project (e.g. compiles or not, works correctly with producing all correct answers). A brief summary of how to operate your program. You should be sure to describe how to indicate the end of the input data.

A brief summary of the data structures and algorithms you finally used. In particular, you should give a summary of the major design decisions you have made in creating your data structure, and any major changes that were needed as your design evolved to create the final program. This needs not be long, but it should describe major decisions you made and any surprises you encountered that required changes as you developed the code.

In addition, if you worked with a partner,

- 1) only one partner needs to submit the code electronically.
- 2) Be sure that all partners' names are listed in all files.
- 3) Include in your `status.txt` file a description of how you developed and tested your code. If you divided it into pieces, describe that. If you worked on everything together, describe the actual process used – how long you talked about what, how long and in what order you wrote and tested the code. Be sure to describe at least one good thing and one bad thing about the process of working together.