Homework #4

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Introduction

The goal of this assignment was to create a program to process a csv dataset containing student related information and code functionality to answer the queries by performing computations on the student data with the aid of data structures and OOP concepts.

Code Explanation

- Classes and objects are used throughout the program.

- Behavior and data are encapsulated into a single unit in objects and underlying operations are abstracted with getters, setters, private attributes and public methods.

- Abstraction is used as the internal logic of the statistical computations is hidden from the external world by implementing encapsulation

- Polymorphism is used when interface types of the Collections framework are used to initialize the reference variables and when the toString() method is overridden in the StudentRecord class. The constructor in the StudentDataset class has also been overridden.

- Data structures used are HashSet, ArrayList and HashMap from the Collections framework. They have been used to organize and manipulate the provided data in an efficient manner.

class StudentRecord: Class representing a row of student information in the csv file		
Constructors		
Constructor	Description	
StudentRecord(String firstName, String lastName, String major, String degree, float gPA, float creditHours, boolean isTA, String advisor)	Constructs a StudentRecord with the provided parameters	
Methods		
Modifier and Type	Method	Description
public String	getFirstName()	Getter for firstName attribute
public void	setFirstName(String firstName)	Setter for firstName attribute
public String	getLastName()	Getter for lastName attribute
public void	setLastName(String lastName)	Setter for lastName attribute
public String	getMajor()	Getter for major attribute

public String	setMajor(String major)	Setter for major attribute
public String	getDegree()	Getter for degree attribute
public void	setDegree(String degree)	Setter for degree attribute
public float	getGPA()	Getter for GPA attribute
public void	setGPA(float gPA)	Setter for GPA attribute
public float	getCreditHours()	Getter for creditHours attribute
public void	setCreditHours(float creditHours)	Setter for creditHours attribute
public boolean	isTA()	Getter for isTA attribute
public void	setTA(boolean isTA)	Setter for isTA attribute
public String	getAdvisor()	Getter for advisor attribute
public void	setAdvisor(String advisor)	Setter for advisor atttribute
public String	toString()	Override for displaying the student record in columnar format

class StudentDataset: Class representing the data obtained from the csv file as a whole	
Constructors	
Constructor	Description
public StudentDataset(List<StudentRecord> studentDataset)	Constructs a StudentDataset with the StudentRecords provided in the form of an ArrayList
public StudentDataset(String filePath)	Constructs a StudentDataset with the StudentRecords read from the file pointed to by filePath
Methods	

Modifier and Type	Method	Description
public List<StudentRecord>	getStudentDataset()	Getter for studentDataset atttribute
public void	readStudentsFromFile()	Method which reads StudentRecords from a file and stores them in studentDataset
public void	add()	Method to add a StudentRecord to the studentDataset
public void	display()	Method to display the entire dataset in tabular format with the headings extracted from the file

class StatisticsCalculator:

Class with the methods containing the computation logic to operate on a StudentDataset	
Constructors	
Constructor	Description
public StatisticsCalculator(StudentDataset studentDataset)	Constructs a StatisticsCalculator which will use StudentDataset as its data source
Methods	

Modifier and Type	Method	Description
public void	displayAdvisors()	Method to display all advisors in the college
public void	displayStudentsWithGPALessThan(float GPA)	Method to display full information of students with GPA less than the GPA parameter
public void	displayAvgCreditHours()	Method to display the average credit hours of all the students in the college
public void	displayAvgGPAofCSDept()	Method to display the average GPA of all the students in the Computer Science department
public void	displayDeptsWithTotalAdvisors()	Method to display all the departments along with the total advisors in them

public class Driver: Driver class which launches the features of the program

Result

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We have 5 advisors. Their names are:

Bruce Wayne
John Smith
James Bond
Jean Grey
Jane Doe

We have 17 students with GPA less than (2.75). They are:

First Name    Last Name    Major               Degree        GPA      Credit Hours    TA     Advisor
Tonya         Harvey       Biology             B.S.          2.39     3.00            No     John Smith
Rosa          Flowers      Computer Science    PhD           2.03     6.00            Yes    Bruce Wayne
Lamar         Sandoval     Biology             M.S           2.34     9.00            No     James Bond
Lorene        Gutierrez    History             M.S           2.54     9.00            No     John Smith
Blanche       Fletcher     Computer Science    B.S.          2.67     6.00            Yes    Jane Doe
Hazel         Howard       History             Undeclared    2.53     6.00            No     Bruce Wayne
Isabel        Goodwin      Biology             B.S.          2.53     6.00            No     Bruce Wayne
Eric          Lloyd        Computer Science    B.S.          2.62     3.00            Yes    John Smith
Herman        Stanley      Math                B.S.          2.45     12.00           No     Jane Doe
Silvia        Scott        Computer Science    B.S.          2.16     9.00            No     Jane Doe
Earnest       Drake        Computer Science    PhD           2.01     9.00            Yes    Jean Grey
Robert        Burton       Biology             PhD           2.34     12.00           No     John Smith
Tommy         Burke        History             Undeclared    2.27     6.00            No     James Bond
Hilda         Johnston     Biology             PhD           2.00     12.00           Yes    John Smith
Charlotte     Gray         Computer Science    PhD           2.74     12.00           Yes    John Smith
Bob           Owen         Computer Science    PhD           2.29     3.00            No     John Smith
Hannah        Nguyen       Biology             B.S.          2.20     9.00            No     John Smith

The average credit hours: (7.6800)
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Hazel          Howard         History            Undeclared   2.53    6.00      No    Bruce Wayne
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The average credit hours: (7.6800)

The average GPA of the Computer Science department: (2.8325)

The list of departments with the total number of advisors:

Department          Total No. of Advisors
ECE                 3
Computer Science    5
Biology             5
Math                4
History             5
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References

- https://docs.oracle.com/en/java/javase/11/docs/api/index.html