(40)

COMSATS University Islamabad, Lahore Campus
Block–C, Department of Computer Science
COMSATS University Islamabad, Lahore Campus 1.5KM Defence Road, Off Raiwind Road, Lahore

Midterm (Lab) Examination – Semester Spring 2022

Course Title:	Object Oriented Programming			Course Code:	CSC241	Credit Hours:	4(3,1)
Course Instructor/s:	Nadeem Ghafoor Chaudhry			Program Name:	BS Software Engineering		
Semester:	2nd	Batch:	FA19-BSE	Section:	A	Date:	April 28th, 2022
Time Allowed:	**90 Minutes**			**Maximum Marks:**		**25**	
Student's Name	AOUN-HAIDER			Reg. No.	FA21-BSE-133		

Important Instructions / Guidelines:

- Save your work frequently. In case of power failure loss of code will be your responsibility.
- Compile your program to make sure it at least compiles without errors. If your program does not compile that will be an automatic 0 mark.
- Check your system and make sure that the javac command works properly. Do not complain at the end about system related problems.
- Write your name and SID as a comment in the first line of your program.
- **After allocated time, i.e 90 minutes, 1 mark will be deducted for each late minute.**
- If I detect plagiarism I will make a Unfair Means Committee case.
- Save your program in a file named as your SID with .java extension, i.e FA21_BSE_XYZ.java and submit this file only, nothing else. **Do not put any space or anything else besides your SID in the file name.**
- **Submit only one file.**

Q1) **[CLO4]** Recall the **TwoDShape** hierarchy that we discussed in our class several times. At the top of this hierarchy is an abstract class called **TwoDShape** which contains two abstract methods **area** and **perimeter**. Both return a double value but take no input. Drive two subclasses from **TwoDShape** namely **Circle** and **Rectangle**. Use the above classes in a driver class called **LabExam**. In **LabExam** create :

1) an array of size 2 and of type **TwoDShape**
2) two objects, one of type **Circle** and other of type **Rectangle** save their references in the above array.
3) using enhanced for loop, traverse the above array and print the area and perimeter of the circle and rectangle you created in the above step.

All four classes should be put in one file.
Do not write setter and getter methods.
The radius of the circle will be the first command line argument while length and width of the rectagle will be second and third command line arguments respectively. A sample run of this program is as follows:

```
C:\mydata >java     FA21_BSE_XYZ    3 4 5
area = 28.274334, perimeter = 18.849556
area = 20.000000, perimeter = 18.000000
```

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Final (Lab) Examination – Semester Spring 2022

Course Title:	Object Oriented Programming				Course Code:	CSC241	Credit Hours: 4(3,1)
Course Instructor/s:	Nadeem Ghafoor Chaudhry				Program Name:	BS Software Engineering	
Semester:	2nd	Batch:	FA19-BSE	Section:	A	Date:	June 23rd, 2022
Time Allowed:	**180 Minutes**				**Maximum Marks:**	**50**	
Student's Name	AOUN-HAIDER				Reg. No.	FA21-BSE-133	

Important Instructions / Guidelines:

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- Check your system and make sure that the javac command works properly. Do not complain at the end about system related problems.
- Write your name and SID as a comment in the first line of your program.
- **After allocated time, i.e 180 minutes, 1 mark will be deducted for each late minute.**
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- Save your programs in a file named as your SID with .java extension, i.e FA21_BSE_XYZ.java and submit this file only, nothing else. **Do not put any space or anything else besides your SID in the file name.**
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Q1) **[CLO4]**

We have discussed Employee hierarchy several times in class. The super class in this hierarchy is an abstract class from which we derive two sub classes one for hourly workers and other for commssion workers. The hourly worker is payed based upon the hours he/she has worked and his/her hourly rate. Similarly the commission worker gets paid based upon the amount of sales he/she made and his/her commission rate. A data file contains data for each employee. The file contains one line for each employee. The format of the line is as follows:

First character identifies the type of employee, C for Commission Employee and H for Hourly Employee.

Second is an integer which is employee ID

Third is name of the employee.

Fourth is a double which, in case of Commission employee contains amount of sales made and for Hourly employee it contains the number of hours worked.

Fifth is also a double which, in case of Commission employee contains commission rate and for Hourly employee it contains hourly rate.

Example file is as follows:

C 1 Saleem 25000 0.06
C 6 Haleem 2000 0.07
H 15 Kaleem 45 25.5
C 4 Rashid 26000 0.08
H 65 Zaheer 35 45.0
H 76 Hamza 39.5 65.5

Note that in the above file employees are not sorted. Filename will be passed via command line.

Your program is supposed to do the following:

a. read the data from the file
b. create appropriate objects and store those in an ArrayList
c. sort the ArrayList based upon employee ID and print data of each employee.
d. increase the commission rate of each commission employee by 1%
e. sort the ArrayList based upon pay and print data of each employee.
f. sort the ArrayList based upon name and print data of each employee.

Sample run of program is shown below.

```
C:\school\SP22\OOP\exams>java FinalExamSecA EmpData.txt
Commission Employee Name: Saleem, ID: 1 Pay 1500.000000
Commission Employee Name: Rashid, ID: 4 Pay 2080.000000
Commission Employee Name: Haleem, ID: 6 Pay 140.000000
Hourly Employee Name: Kaleem, ID: 15 Pay 1147.500000
Hourly Employee Name: Zaheer, ID: 65 Pay 1575.000000
Hourly Employee Name: Hamza, ID: 76 Pay 2587.250000

List sorted by pay after increasing commission rate

Commission Employee Name: Haleem, ID: 6 Pay 160.000000
Hourly Employee Name: Kaleem, ID: 15 Pay 1147.500000
Hourly Employee Name: Zaheer, ID: 65 Pay 1575.000000
Commission Employee Name: Saleem, ID: 1 Pay 1750.000000
Commission Employee Name: Rashid, ID: 4 Pay 2340.000000
Hourly Employee Name: Hamza, ID: 76 Pay 2587.250000

List sorted by name

Commission Employee Name: Haleem, ID: 6 Pay 160.000000
Hourly Employee Name: Hamza, ID: 76 Pay 2587.250000
Hourly Employee Name: Kaleem, ID: 15 Pay 1147.500000
Commission Employee Name: Rashid, ID: 4 Pay 2340.000000
Commission Employee Name: Saleem, ID: 1 Pay 1750.000000
Hourly Employee Name: Zaheer, ID: 65 Pay 1575.000000
```

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Q1) **[CLO4]**

A bank allows citizens to open accounts, each account must have an id, opening balance, account holder name, and age. Bank offers 2 types of accounts i.e. current account and saving account. Bank gives no profit on current accounts but does to saving.

All saving accounts have a category that is fixed and do not change i.e. young saver, adult saver, and senior citizen saver. Category shall be auto assigned to each saving account at the time of account opening (means at the time of object instantiation) depending on the age of account holder i.e. young, adult, and senior citizen for age below 35, from 35 to 50 age, and above 50, respectively. Bank gives 6% annual profit to young savers, 7% profit to adult savers and 8% to senior citizen savers.

Bank has saved data in a text file which contains one line for each account. The format of the line is as follows:
First character identifies the type of account C for Current and S for Savings.
Second is an integer which identifies account ID
Third is name of the account holder.
Fourth is balance which is a double
Fifth is integer which is the age of the account holder.
Example file is as follows:

C 1 Saleem 25000 23
C 6 Haleem 2000 33
S 15 Kaleem 35000 25
C 4 Rashid 26000 42
S 65 Zaheer 45000 45
S 76 Hamza 65000 65

Note that in the above file accounts are not sorted. Filename will be passed via command line.

Your program is supposed to do the following:

a. read the data from the file
b. create appropriate objects and store those in an ArrayList
c. sort the ArrayList based upon Account ID.
d. print data of each account
e. imagine a year has gone by so give profit to all saving account holders
f. print data of each account showing that the balance of saving account holders has gone up while that of current accounts has remained same.

Sample run of program is shown below.

```
C:\school\SP22\OOP\exams\FinalLab>java FinalExam Account.txt
Current Account: ID: 1  Name: Saleem   Balance: 25000.0   Age: 23
Current Account: ID: 4  Name: Rashid   Balance: 26000.0   Age: 42
Current Account: ID: 6  Name: Haleem   Balance: 2000.0    Age: 33
Saving Account: ID: 15  Name: Kaleem   Balance: 35000.0   Age: 25  ProfRate: 6%
Saving Account: ID: 65  Name: Zaheer   Balance: 45000.0   Age: 45  ProfRate: 7%
Saving Account: ID: 76  Name: Hamza    Balance: 65000.0   Age: 65  ProfRate: 8%

After one year:
Current Account: ID: 1  Name: Saleem   Balance: 25000.0   Age: 23
Current Account: ID: 4  Name: Rashid   Balance: 26000.0   Age: 42
Current Account: ID: 6  Name: Haleem   Balance: 2000.0    Age: 33
Saving Account: ID: 15  Name: Kaleem   Balance: 37100.0   Age: 25  ProfRate: 6%
Saving Account: ID: 65  Name: Zaheer   Balance: 48150.0   Age: 45  ProfRate: 7%
Saving Account: ID: 76  Name: Hamza    Balance: 70200.0   Age: 65  ProfRate: 8%
```