Programming Assignment 11

Submission Date : 09.11.2023
Due Date : 23.11.2023
Subject : Inheritance

INTRODUCTION

The object-oriented programming paradigm has various advantages such as modeling problems with less complexity and more code reuse. In this experiment, you will observe these advantages by using the inheritance mechanism that is an important property of object-oriented programming. With the help of this experiment, you will learn the concept of inheritance, relationships among classes by using object references, control of multiple instances of classes in Java. (See Appendix A. for useful information).

PROBLEM

Problem Definition

In this experiment, you are expected to develop a system to monitor payroll of Personnel in a University. You will be given two input text files as follows:

1.Information of Personnel (personnel.txt)

This text file includes information about employees in the university, which are the name **(name)**, surname **(surname)**, registration number **(registerNumber),** the position of personnel **(position)** and year of start **(yearOfStart)** as follows:

[name and surname] *tab* **[registration number]** *tab* **[position of pesonnel**] *tab* **[and year of start**] *newline*

[name and surname] *tab* **[registration number]** *tab* **[position of pesonnel]** *tab* **[and year of start]** *newline*

[name and surname] *tab* **[registration number]** *tab* **[position of pesonnel]** *tab* **[and year of start]** *newline*

….

An example of personnel.txt file

```
MEHMET YILMAZ        F5632        FACULTY_MEMBER        2003
AHMET UZUN           W8567        WORKER                2005
KERIM  KALICI        S7956        SECURITY              2007
AYSUN DERICI         O5879        OFFICER               2010
DOGAN YILMAZ         C2698        CHİEF                 2004
AHMET UZUN           P4687        PARTTIME_EMPLOYEE     2011
AYSE CAN             R4631        RESEARCH_ASISTANT     2015

…
```

2. Text for Monitoring (monitoring.txt)

This text file includes information about the working hours of personnels in the university. Each personnel is represented by its registration number **(registerNumber), which is unique.** The working hours of personnel in a month is given by each week separately as follows:

[registration number] *tab* **[1. week]** *tab* **[2. week]** *tab* **[3. week]***tab* **[4. week]** *newline*

An example of monitoring.txt file

```
F5632        49        44        48        48
W8567        46        58        65        40
S7956        45        54        50        40
O5879        40        47        45        53
C2698        46        49        60        40
P4687        20        9         9         10
R3121        40        40        40        40

…
```

3. Personnel Hierarchy and Salary Content

In the university scenario of this assignment, "Personnel"s are grouped into the following 4 categories: **Academician, Officer, Employee** and **Security. Academicians** are further grouped into **Faculty members** and **Research assistants**. Employees could work either **Part-time** or **Full-time**. In addition, a full-time employee could be assigned to one of the following roles: **Worker** or **Chief**.

Academicians have a base salary **(baseSalary)**, special service benefits **(ssBenefits)** and severance pay **(severancePay). A Faculty member** can have an additional course fee **(addCourseFee)** but they can get additional course fees up to 8 hours per week and for each working hour they are paid 20 TL. (if they teach more than 8 hours in a week, they will be paid only for 8 hours). A Faculty member might not teach a course in a term. Research assistants do not have an additional course fee **(addCourseFee)**.

Officers have a base salary **(baseSalary),** special service benefits **(ssBenefits)** and severance pay **(severancePay)**. Officers have also overwork salary **(overWorkSalary).** In order to earn an overwork salary, they can work up to 10 hours a week and for each working hour, they are paid 20 TL. (Even if they work more than 10 hours a week, they are paid up to 10 hours.)

For Security personnel, salaries are calculated based on the number of working hours **(hourOfWork)** and severance pay **(severancePay)**. In addition to working hours, they are paid 5 TL for transportation **(transMoney)** and 10 TL food **(foodMoney)** per day. Security can work a maximum of 9 hours and a minimum of 5 hours a day. They do not work one day of the week. For each working hour, they are paid 10 TL.

The salaries of Full-time Employees are calculated based on the number of working days **(dayOfWork)** and severance pay **(severancePay).** Full-time Employees do not work at weekends. Workers are paid 105 TL and Chiefs are paid 125 TL per day. Also, they have an overwork salary **(overWorkSalary).** Workers can work a maximum of 10 hours a week and are paid 11 TL per hour, while Chiefs can work a maximum of 8 hours a week and are paid 15 TL per hour to gain overwork salary. (If they work more than their maximum hours, they will not be paid additional money for these extra hours).

The salaries of Part-time Employees are calculated based on the number of working hours (**hourOfWork**) and severance pay **(severancePay)**. Part-time Employees can work a minimum of 10 hours and a maximum of 20 hours a week and they are paid 18 TL per hour.

4. Salary Calculation

* Academicians, Officers, Workers, and Chiefs work 40 hours per week, excluding the working hours to gain overwork salary and additional course fee.
* If a faculty member worked more than 40 hours a week, it means that he gives additional course that week. But, he/she will be paid up to 8 hours a week.
* If a research assistant works more than 40 hours in a week, they will not be paid additional money.
* One month is equal to four weeks (it means that 1 month is equal to 28 days)
* Base salary is 2600 TL and it is constant for Academician and Officer.
* Special service benefits are %135 of the base salary of a faculty member, %105 of the base salary of research assistant and %65 of the base salary of Officers.
* **Severance pay** changes according to the experience of Personnel, that is, the number of working years in the university. For each year, Personnel gains **20** points multiplied by **0,8.**

It is calculated as follows:

$$(currentyear - yearofstart) * 20 * 0{,}8 = XTL$$

5. Output

You are expected to write the output of your program to a text file named **registerNumber.txt <u>for each personnel</u>**. Example output files are shown for faculty member, officer and security, respectively, as follow:

Example output format:

registerNumber.txt

[Name]*space:space***[……]***newline*
[Surname]*space:space***[……]***newline*
[Registiration Number]*space:space***[…..]***newline*
[Position]*space:space***[…..]***newline*
[Year of Start]*space:space***[…..]***newline*
[Total Salary]*space:space***[number.00 TL]**

F5632.txt

Name : MEHMET
Surname : YILMAZ
Registiration Number : F5632
Position : FACULTY_MEMBER
Year of Start : 2003
Total Salary : 6990.00 TL

O5879.txt

Name : AYSUN
Surname : DERICI
Registiration Number : O5879
Position : OFFICER
Year of Start : 2010
Total Salary : 4938.00 TL

S7956.txt

Name : KERIM
Surname : KALICI
Registiration Number : S7956
Position : SECURITY
Year of Start : 2007
Total Salary : 2506.00 TL

Submit Format

File hierarchy must be zipped before submitted (Not .rar, only .zip files are supported by the system)

<student id>.zip
  <src>
    - Main.java, *.java
  <report>
    - Report.pdf

Execution and Test

The input files is going to be given as program arguments. Personnel file is the first argument and the monitoring file is the second one. In order to test your program, you should follow the following steps:

- Upload your java files to your server account
- Compile your code (javac Main.java or javac *.java)
- Run your program (java Main personnel.txt monitoring.txt)
- Control your output data and format.

The Late Submission Policy

You may use up to three extension days for the assignment. For each extension day, you will lose 10 points.

Grading Policy

Task	**Point**
Submitted	**1**
Compiled	**10**
Clean code	**15**
Coding standards	**5**
Output	**59**
Report	**10**
Total	**100**

Notes and Restrictions

- Save all your work until the assignment is graded.
- Regardless of the length, use UNDERSTANDABLE names to your variables, classes and Functions. The names of classes, attributes and methods should obey Java naming convention.
- You should use the inheritance mechanism.
- Source code readability is a great of importance for us. Thus, write READABLE SOURCE CODE, comments and clear MAIN function. This expectation will be graded as clean code.
- The names of input files are as given in this document (input files: personnel.txt, monitoring.txt; output files: registerNumber.txt).
- You are responsible for the correct model design. Your design should be accurate. It is important to draw a class diagram to show the whole of the system that you have created.
- In your REPORT, it is important giving an explanation about problem definition (limited to max. 3 sentences) and steps of algorithms that you followed (limited to max. 1 page). Also, you must add a class diagram of your code in the report.
- In your Report, please explain your design, data structures, and algorithms. Give necessary details without unnecessary clutter
- All assignments must be original, individual work. Duplicate or very similar assignments are both going to be considered as cheating.