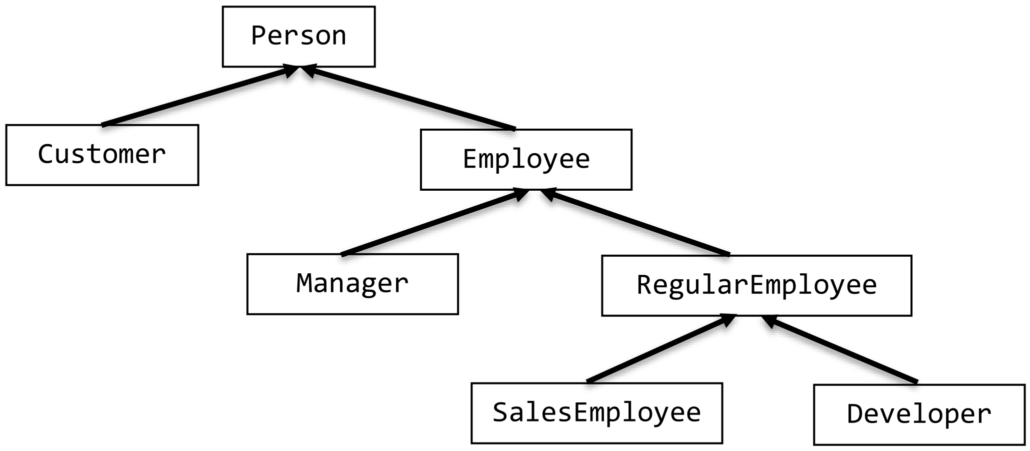
In this homework, you are expected to implement a simple company system with the following OOP class hierarchy:



Please find the class details in below.

1) Implement a **Person** class with the following UML diagram.

	Person
-	id: int
-	firstName: String
-	lastName: String
-	gender: byte
-	birthDate: java.util.Calendar
-	maritalStatus: byte
-	hasDriverLicence: boolean
+	Person(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence)
+	setGender(gender: String): void
+	getGender(): String
+	setMaritalStatus(status: String)
+	getMaritalStatus(): String
+	setHasDriverLicence(info: String): void
+	getHasDriverLicence(): String
+	toString(): String
+	getter/setter methods for other data fields

- **Person** is the superclass of **Customer** and **Employee** classes.
- **Person** class has several data fields, getter/setter and **toString** methods.
- Each person should have an **id**, a **name**, a **surname**, a **gender** (1: woman, 2: man), **birthDate** (05/05/2000), **maritalStatus** (1: single, 2: married) and **hasDriverLicense** attributes.

- Since the parameter/return value types are different for getter/setter methods of **gender**, **maritalStatus**, and **hasDriverLicence** attributes, we show them in the UML diagram. You are responsible for implementing getter/setter methods of all data fields.
- In **setGender** method, a string value (“Man” or “Woman”) is given, and the method should set the **gender** as 1 or 2.
- In **getGender** method, a string value (“Man” or “Woman”) should be returned based on the **gender** value.
- In **setMaritalStatus** method, a string value (“Single” or “Married”) is given, and the method should set the **maritalStatus** as 1 or 2.
- In **getMaritalStatus** method, a string value (“Single” or “Married”) should be returned based on the **maritalStatus** value.
- In **setHasDriverLicence** method, a string value (“Yes” or “No”) is given, and the method should set the **hasDriverLicence** as true or false.
- In **getHasDriverLicence** method, a string value (“Yes” or “No”) should be returned based on the **hasDriverLicence** value.
- There are setter/getter and toString() methods.

2) Implement a **Customer** class with the following UML diagram.

	Customer
-	`products: ArrayList<Product>`
+	`Customer(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus,String hasDriverLicence, ArrayList<Product> products)`
+	`Customer(Person person, ArrayList<Product> products)`
+	`getter/setter methods`
+	`toString(): String`

- Each **Customer** can be created with one of the given two constructors.
    - In Customer’s constructor, you are supposed to call the super class’s constructor.
- Each **Customer** has a list of **products** that he/she bought.
- There are setter/getter and toString() methods.

3) Implement an **Employee** class with the following UML diagram.

	Employee
-	`salary: double`
-	`hireDate: java.util.Calendar`
-	`department: Department`
+	`numberofEmployees: int`
+	`Employee(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence, double salary, Calendar hireDate, Department department)`
+	`Employee(Person person, double salary, Calendar hireDate, Department department)`
+	`raiseSalary(percent: double): double`
+	`raiseSalary(amount: int): double`
+	`getter/setter/toString methods`

- **Employee** is the superclass of **Manager** and **RegularEmployee** classes.
- Each **Employee** has a **salary**, a **hireDate** (the date when the employee starts to the job), a **department** and **numberofEmployees** data fields.
- Each **Empoyee** can be created with one of the given two constructors.
    - In **Employee**'s constructor, you are supposed to call the super class's constructor.
    - When a new employee is created, you should increment the value of **numberofEmployees** by 1.
- There are two overloaded implementations of **raiseSalary** method.
    - In the first one, take the increment value as a double (0 >= percent >= 1) and raise the salary value based on the percentage value. For example, if the percent value is 0.5, increment the salary of the employee by 50%.
    - In the second one, raise the salary of the employee by the given fixed amount.
- There are setter/getter and toString() methods.

4) Implement a **RegularEmployee** class with the following UML diagram.

	RegularEmployee
-	`performanceScore: double`
-	`bonus: double`
+	`RegularEmployee(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence, double salary, Calendar hireDate, Department department, double performanceScore)`
+	`RegularEmployee(Employee employee, double perfScore)`
+	`getter/setter and toString methods`

- **RegularEmployee** is the superclass of **SalesEmployee** and **Developer** classes.
- Each **RegularEmployee** has a **performanceScore** and an amount of **bonus**, which will be given by his/her manager based on the performance score.

- Each **RegularEmployee** can be created with one of the given two constructors.
    - In **RegularEmployee**’s constructor, you are supposed to call the super class’s constructor.
- There are setter/getter and toString() methods.

5) Implement a **Manager** class with the following UML diagram.

	Manager
-	`regularEmployees: ArrayList<RegularEmployee>`
-	`bonusBudget: double`
+	`Manager(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence, double salary, Calendar hireDate, Department department,double bonusBudget)`
+	`Manager(Employee employee, double bonusBudget)`
+	`addEmployee(e: RegularEmployee): void`
+	`removeEmployee(e: RegularEmployee): void`
+	`distributeBonusBudget(): void`
+	`getter/setter/toString methods`

- Each **Manager** has a set of **regularEmployees** working in his/her department and a **bonusBudget** to distribute to the regular employees in the department.
- Each **Manager** can be created with one of the given two constructors.
    - In **Manager**’s constructor, you are supposed to call the super class’s constructor.
- In **addEmployee** method, you should add the given **RegularEmployee e** to the list of **regularEmployees**.
- In **removeEmployee** method, you should remove the given **RegularEmployee e** from the list of **regularEmployees**.
- Each **Manager** has **bonusBudget** to distribute it to the regular employees working in his/her department. The distribution will be based on the given formula:
    - Suppose that the bonus budget of the manager is 10000 and there are 4 regular employees in the department with the following salaries and performance scores:
        - E1 → salary: 1000, performanceScore: 50
        - E2 → salary: 2000, performanceScore: 50
        - E3 → salary: 6000, performanceScore: 75
        - E4 → salary: 4000, performanceScore: 100
    - Then, the bonus value of each regular employee is:
        - **bonus** = **unit** * **salary** * **performanceScore**
        - **unit** = **bonusBudget** / $\sum(\mathbf{salary} * \mathbf{performanceScore})$
    - Based on the example above, the bonus value for each regular employee is:
        - E1 → bonus: 500
        - E2 → bonus: 1000
        - E3 → bonus: 4500
        - E4 → bonus: 4000
- There are setter/getter and toString() methods.

6) Implement a **SalesEmployee** class with the following UML diagram.

	SalesEmployee
-	`sales: ArrayList< Product>`
+	`numberOfSalesEmployees: int`
+	`SalesEmployee(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence, double salary, Calendar hireDate, Department department, double pScore, ArrayList<Product> s)`
+	`SalesEmployee(RegularEmployee re, ArrayList<Product> s)`
+	`addSale(s: Product): boolean`
+	`removeSale(s: Product ): boolean`
+	`getter/setter/toString methods`

- Each **SalesEmloyee** has a set of **sales** that contains a product list that the **SalesEmployee** sells and a **numberOfSalesEmployees** data fields.
- Each **SalesEmloyee** can be created with one of the given two constructors.
    - In **SalesEmloyee**'s constructor, you are supposed to call the super class's constructor.
    - When you create a new **SalesEmloyee**, you should increment **numberOfSalesEmployees** value by 1.
- In **addSale** method, you should add the given **Product s** to the list of **sales**.
- In **removeSale** method, you should remove the given **Product s** from the list of **sales**
- There are setter/getter and toString() methods.

7) Implement a **Developer** class with the following UML diagram.

	Developer
-	`projects: ArrayList<Project>`
+	`numberOfDevelopers: int`
+	`Developer(int id, String firstName, String lastName, String gender, Calendar birthDate, String maritalStatus, String hasDriverLicence, double salary, Calendar hireDate, Department department, double pScore, ArrayList<Project> p)`
+	`Developer(RegularEmployee re, ArrayList<Project> p)`
+	`addProject(s: Project): boolean`
+	`removeProject(s: Product): boolean`
+	`getter/setter/toString methods`

- Each **Developer** has a set of **projects** that the developer works on and a **numberOfDevelopers** data fields.
- Each **Developer** can be created with one of the given two constructors.
    - In **Developer**'s constructor, you are supposed to call the super class's constructor.
    - When you create a new **Developer**, you should increment **numberOfDevelopers** value by 1.
- In **addProject** method, you should add the given **Projects s** to the list of **projects**.
- In **removeProject** method, you should remove the given **Product s** from the list of **projects**.
- There are setter/getter and toString() methods.

8) Implement a **Product** class with the following UML diagram.

	Product
-	productName: String
-	saleDate: java.util.Calendar
-	price: double
+	Product(String sName, java.util.Calendar sDate, double price)
+	getter/setter/toString methods

- Each **Product** has a **name**, **saleDate** and **price** data fields.
- There are setter/getter and toString() methods.

9) Implement a **Project** class with the following UML diagram.

	Project
-	projectName: String
-	startDate: java.util.Calendar
-	state: boolean
+	public Project(String pName, Calendar startDate, String state)
+	setState(state: String): void
+	getState(): String
+	close(): void
+	getter/setter/toString methods

- Each **Project** has a **name**, **startDate** and **state** data fields. If the **Project** is open, **state** should be true; otherwise, false.
- In **setState** method, a string value (“Open” or “Close”) is given, and the method should set the **state** as true or false.
- In **getState** method, a string value (“Open” or “Close”) should be returned based on the **state** value.
- In **close** method, you should close the project if it is open.
- There are setter/getter and toString() methods.

10) Implement a **Department** class with the following UML diagram.

	Department
-	departmentId: int
-	departmentName: String
+	Department(int departmentId, String departmentName)
+	getter/setter/toString methods

- Each **Department** has an **id** and a **name** data fields.
- There are setter/getter and toString() methods.

11) Implement a test class for your program.

a) You should read input from a file and create new objects based on the line read. A set of sample lines in your input file is given below:

- **Department 1 Accounting**
    - You should create a new **Department** with an id of **1** and name of **Accounting**.
- **Project AutoCredit 01/05/2018 Open**
    - You should create a new **Project** with the name of **AutoCredit,** startDate **01/05/2018** and state **Open**.
- **Product Product1 01/01/2019 10000**
    - You should create a new **Product** with the name of **Product1,** saleDate **01/01/2019** and price of **10000**.
- **Person Ayse Caliskan 111 Woman 05/05/1986 Married Yes**
    - You should create a new **Person** with the name of **Ayse,** surname **Caliskan,** id of **111**, gender **1**, birth date **05/05/1986**, maritalStatus **2** and hasDriverLicence **true**.
- **Employee 111 5000 10/10/2017 Accounting**
    - You should create a new **Employee** by finding the **Person** with the given id (111) and invoke the overloaded constructor of **Employee** with the **Person** found, salary: **5000**, hireDate: **10/10/2017** and department: **Accounting**.
- **RegularEmployee 111 25**
    - You should create a new **RegularEmployee** by finding the **Employee** with the given id (111) and invoke the overloaded constructor of **RegularEmployee** with the **Employee** found and performanceScore **25.**
- **Developer 111 CreditCard Robotic**
    - You should create a new **Developer** by finding the **RegularEmployee** with the given id (111) and invoke the overloaded constructor of **Developer** with the **RegularEmployee** found, project list: **CreditCard** and **Robotics**. It should be noted that the number of projects may change.
- **Customer 224 Product1 Product2 Product5**
    - You should create a new **Customer** by finding the **Person** with the given id (224) and invoke the overloaded constructor of **Customer** with the **Person** found, product list: **Product1 Product2** and **Product5**. It should be noted that the number of products may change.

b) After reading the input file and constructing the objects (keep your objects in **ArrayLists** polymorphically in the test file), the following sample scenario can be given in your test class:

i) invoke **distributeBonusBudget** method for each **Manager** polymorphically.

ii) invoke **raiseSalary** method for each **Manager** polymorphically with the percent value of **0.2**.

iii) invoke **raiseSalary** method for each **RegularEmployee** polymorphically with the percent value of **0.3**.

iv) invoke **raiseSalary** method for each **Developer** polymorphically with the percent value of **0.23**.

v) invoke **raiseSalary** method for each **SalesEmployee** polymorphically with the percent value of **0.18**.

vi) invoke **raiseSalary** method for a **SalesEmployee** who has maximum value of sales (in terms of total price) polymorphically with the amount of **1000**.

c) After performing these operations, print each department, its manager, its employee list with details. A sample output file is already generated based on the given sample input file and the execution scenario mentioned in Step b.