Lab 05 Interface

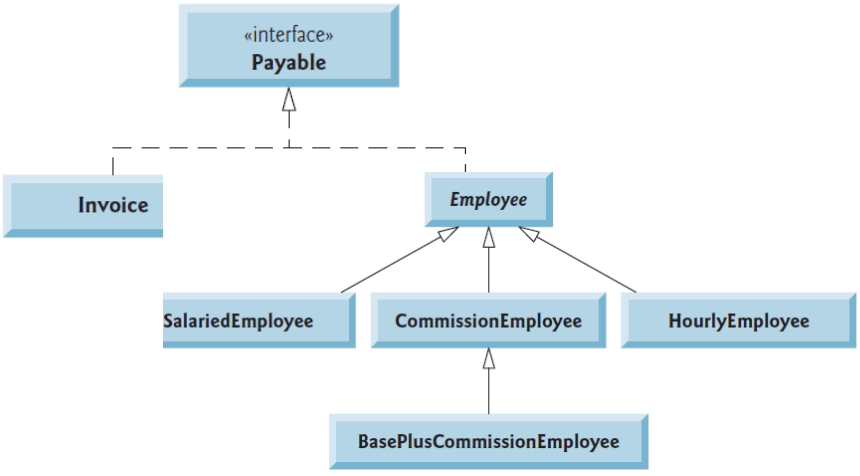
- You should submit **ONLY solutions of Homework**. Submit **whole java project file in zipped format** and named project file as ***studentNo_NameSurname_Assignment5***.
- Do your homework in **ECLIPSE IDE**.
- Do not use Turkish Characters(ç,ğ,ı,ö,ş,ü) for naming project, methods, classes.
- Late submissions are not allowed.
- You should do homework **YOURSELF**. Group working is not allowed.
- Copy homework will be evaluated as 0.
- Use Google Classroom for your questions.

NOTE: Use true encapsulation (design all data fields as private and reach them just using get/set methods) and inheritance practice in your implementation. Your project have to consist of 8 classes: Payable, Invoice, Employee, SalariedEmployee, HourlyEmployee, CommisionEmployee, BasePlusCommisionEmployee, PayableInterfaceTest
NOTE: Do not use **earnings()** method for this homework instead, **getPaymentAmount()** of **Payable interface** will be implemented.
NOTE: Do not take input from user!!

HOMEWORK

- CEO of Factory X make a request to your software company about design a program that calculates Factory X's payment amount which will be made for employees and invoices. Create **Invoice**, **Payable** (interface), **Employee**, **SalariedEmployee**, **HourlyEmployee**, **CommissionEmployee**, **BasePlusCommissionEmployee,** and **Test (main)** class according to requirements given below.

Hierarchy between classes:



- **Invoice** implements **Payable**

```
public class Invoice implements Payable
```

- **Employee** implements **Payable**
- **Employee** is abstract superclass. Each employee has a **first name**, a **last name** and a **social security number**. There is no `getPaymentAmount()` method in Employee class

```
public abstract class Employee implements Payable
```

- **Salaried Employee**, **Hourly Employee**, **Commission Employee** is an **Employee**.
- **BasePlusCommissionEmployee** is a **Commission Employee**.
- Each class has different behavior in getPaymentAmount() and toString() methods. **NOTE:** There is no getPaymentAmount() method in **Employee** class.

Factory X's payment amount which will be made for its employees on a weekly basis. The employees are of four types:

- **Salaried employees** are paid a fixed weekly salary regardless of the number of hours worked
- **Hourly employees** are paid by the hour and receive overtime pay (i.e., 1.5 times their hourly salary rate) for all hours worked in excess of 40 hours
- **Commission employees** are paid a percentage of their sales
- **Base plus commission employees** receive a base salary plus a percentage of their sales.

Factory X's payment amount which will be made for invoice:

- **Invoice** 's payment amount is calculated by multiplying quantity and price per item.

	getPaymentAmount()	toString()
Employee	Not implemented	*firstName lastName* social security number: *SSN*
Salaried-Employee	weeklySalary	salaried employee: *firstName lastName* social security number: *SSN* weekly salary: *weeklySalary*

Hourly-Employee	if (hours <= 40)
	  wage * hours
	else if (hours > 40)
	{
	  40 * wage +
	  (hours - 40) *
	  wage * 1.5
	}
		hourly employee: *firstName lastName*
		social security number: *SSN*
		hourly wage: *wage*; hours worked: *hours*

Commission-Employee	commissionRate * grossSales	commission employee: *firstName lastName* social security number: *SSN* gross sales: *grossSales*; commission rate: *commissionRate*
BasePlus-Commission-Employee	(commissionRate * grossSales) + baseSalary	base salaried commission employee: *firstName lastName* social security number: *SSN* gross sales: *grossSales*; commission rate: *commissionRate*; base salary: *baseSalary*

CLASSES

Payable

- Design an interface named **Payable** with a method: **double getPaymentAmount**().

```
public interface Payable
{
   double getPaymentAmount();
}
```

Invoice

```
public class Invoice implements Payable
```

- Create a class named **Invoice** contains billing information for only one kind of part:
- implements Payable
- private **partNumber**, **partDescription**, **quantity** and **pricePerItem** data fields
- **4 argument Constructor:**
  Validation: **quantitiy** must be >=0, price must be >0
  Make necessary assignments.
- **get/set methods for partNumber**, **partDescription**, **quantity** and **pricePerItem**
  Apply validation in set methods.
- **toString()** method returns string representation of an object.
- Implement **Payable's getPaymentAmount()** that returns multiplication of **quantity** and **pricePerItem**.

Employee

- **Employee** is abstract superclass.
- implements Payable
- private **firstName**, **lastName** and **social security number (SSN)** data fields.
- 3 **argument Constructor**
- **get/set methods for firstName**, **lastName** and **social security number (SSN)**
- **toString()** method returns string representation of an object.
- **getPaymentAmount()** method of **Payable interface** should not be coded in Employee class. The method content changes employee to employee so, **it should be coded in all subclasses of Employee** and **Invoice**
- **Employee** class must be declared **Abstract** to avoid compilation error because **getPaymentAmount()** is not implemented in the class.

SalariedEmployee

- Subclass of **Employee**
- private **weeklySalary** data field
- **4 argument Constructor:** Use super keyword when invoking superclass constructor, **Validation:** weeklySalary must be >= 0
  Make necessary assignments.
- **get/set methods for weeklySalary**
  Apply validation in set method.

- Implement **getPaymentAmount()** and override **toString()** methods according to table above. Use **super** if necessary

HourlyEmployee

- Subclass of **Employee**
- private **wage**, **hours** data fields
- **5 argument Constructor:** Use super keyword when invoking superclass constructor, **Validation:** wage must be >= 0, hours must be >=0 and <168
  Make necessary assignments.
- **get/set methods for wage, hours**
  Apply validation in set methods.
- Implement **getPaymentAmount()** and override **toString()** methods according to table above. Use **super** if necessary

CommissionEmployee

- Subclass of **Employee**
- private **grossSales**, **commissionRate** data fields
- **5 argument Constructor:** Use super keyword when invoking superclass constructor, **Validation:** grossSales must be >=0, commissionRate>0 and <1
  Make necessary assignments.
- **get/set methods for grossSales, commissionRate**
  Apply validation in set methods.
- Implement **getPaymentAmount()** and override **toString()** methods according to table above. Use **super** if necessary

BasePlusCommissionEmployee

- Subclass of **CommissionEmployee**
- private **baseSalary** data field
- **6 argument Constructor:** Use super keyword when invoking superclass constructor, **Validation:** baseSalary must be >=0
  Make necessary assignments.
- **get/set methods for baseSalary**
  Apply validation in set methods.
- Implement **getPaymentAmount()** and override **toString()** methods according to table above. Use **super** if necessary

Test (Main class)

- You may use your own preferred data field values while creating objects.
- Create Payable type array which contains 6 elements.

```
Payable payableObjects[] = new Payable[ 6 ];
```

- Initialize array with references of 2 **Invoice** object, a reference of **SalariedEmployee, HourlyEmployee, CommissionEmployee, BasePlusCommissionEmployee** repectively.

```
payableObjects[ 0 ] = new Invoice(....);
payableObjects[ 1 ] = new Invoice(....);
payableObjects[ 2 ] = new SalariedEmployee(....);
payableObjects[ 3 ] = new HourlyEmployee(....);
payableObjects[ 4 ] = new CommissionEmployee(....);
payableObjects[ 5 ] = new BasePlusCommissionEmployee(....);
```

Polymorphic Usage of Interface:

- For each element in the array;
  - Print the element
  - Decide if element is a BasePlusCommissionEmployee or not
    `if ( payableObjects[i] instanceof BasePlusCommissionEmployee )`
    - If so, increase baseSalary of employee by adding %10 of current baseSalary and print new baseSalary
  - Print getPaymentAmount()
- Print the class name of each object in the array using default superclass Object's related method.
  `payableObjects[j].getClass().getName()`

Sample run :

```
------ Invoices and Employees processed polymorphically:------

invoice:
part number: 01234 (seat)
quantity: 2
price per item: $375,00
payment amount: $750,00

invoice:
part number: 56789 (tire)
quantity: 4
price per item: $79,95
payment amount: $319,80

salaried employee: John Smith
social security number: 111-11-1111
weekly salary: $800,00
payment amount: $800,00

hourly employee: Karen Price
social security number: 222-22-2222
hourly wage: $16,75; hours worked: 40,00
payment amount: $670,00

commission employee: Sue Jones
social security number: 333-33-3333
gross sales: $10.000,00; commission rate: 0,06
payment amount: $600,00

base-salaried commission employee: Bob Lewis
social security number: 444-44-4444
gross sales: $5.000,00; commission rate: 0,04; base salary: $300,00
new base salary with 10% increase is: $330,00
payment amount: $530,00

Payable object 0 is a Invoice
Payable object 1 is a Invoice
Payable object 2 is a SalariedEmployee
Payable object 3 is a HourlyEmployee
Payable object 4 is a CommissionEmployee
Payable object 5 is a BasePlusCommissionEmployee
```