

Systems Development: Object Oriented Programming

(H171 35)

Case Study: Payroll system using polymorphism

Overview

*A company pays it’s employees on a weekly basis. The employees are of 4 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 “time and a half” overtime pay for all hours worked in excess of 40, commission employees are paid a percentage of their sales, and salaried-commission employees receive a base salary plus a percentage of their sales. For the current pay period, the company has decided to reward salaried-commission employees by adding 10% to their base salaries. The company wants to implement an app that performs its payroll calculations polymorphically.*

SalariedEmployee

HourlyEmployee

CommissionEmployee

BasePlusCommissionEmployee

*Employee*

We use abstract class Employee (abstract class names are in italics in UML) to represent the general concept of an employee. The classes that extend Employee are SalariedEmployee, CommissionEmployee and HourlyEmployee. Class BasePlusCommissionEmployee, which extends CommissionEmployee, represents the last employee type.

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| --- | --- | --- |
|  | **Earnings** | **ToString** |
| Employee | abstract | firstName lastName  social security number: SSN |
| SalariedEmployee | weeklySalary | Salaried employee: firstName lastName  Social security number: SSN  Weekly salary: weeklySalary |
| HourlyEmployee | if hours < 40  wage \* hours  if hours > 40  40 \* wage +  (hours – 40) \* wage \* 1.5 | Hourly employee: firstName lastName  Social security number: SSN  Hourly wage: wage  Hours worked: hours |
| CommissionEmployee | commissionRate \* grossSales | Commission employee: firstName lastName  Social security number: SSN  Gross sales: grossSales  Commission rate: commissionRate |
| BasePlusCommissionEmployee | (commissionRate \* grossSales) + baseSalary | Base salaried commission employee: firstName lastName  Social security number: SSN  Gross sales: grossSales  Commission rate: commissionRate  Base salary: baseSalary |