**CS5800 – Advanced Software Engineering**

**Cal Poly Pomona**

**Homework 1**

**Spring 2024**

**Description:**

Inheritance

Polymorphism

Aggregation

Composition

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Github & Source code:

<https://github.com/fidelisprasetyo/CS5800/tree/hw1>

# Inheritance

Source code:

* Employee.java

package inheritance;  
  
public class Employee {  
 private String firstName;  
 private String lastName;  
 private String socialSecurity;  
  
 public Employee(String firstName, String lastName, String socialSecurity) {  
 this.firstName = firstName;  
 this.lastName = lastName;  
 this.socialSecurity = socialSecurity;  
 }  
  
 public void printEmployeeData() {  
 System.*out*.println(  
 "First name: " + getFirstName() + "\n" +  
 "Last name: " + getLastName() + "\n" +  
 "SSN: " + getSocialSecurity() + "\n");  
 }  
  
 public void setFirstName(String firstName) {  
 this.firstName = firstName;  
 }  
  
 public void setLastName(String lastName) {  
 this.lastName = lastName;  
 }  
  
 public void setSocialSecurity(String socialSecurity) {  
 this.socialSecurity = socialSecurity;  
 }  
  
 public String getFirstName() {  
 return firstName;  
 }  
  
 public String getLastName() {  
 return lastName;  
 }  
  
 public String getSocialSecurity() {  
 return socialSecurity;  
 }  
}

* SalariedEmployee.java

package inheritance;  
  
public class SalariedEmployee extends Employee {  
 private int weeklySalary;  
  
 public SalariedEmployee(String firstName, String lastName, String socialSecurity, int weeklySalary) {  
 super(firstName, lastName, socialSecurity);  
 this.weeklySalary = weeklySalary;  
 }  
  
 @Override  
 public void printEmployeeData() {  
 System.*out*.println(  
 "First name: " + getFirstName() + "\n" +  
 "Last name: " + getLastName() + "\n" +  
 "SSN: " + getSocialSecurity() + "\n" +  
 "Weekly Salary: $" + weeklySalary + "\n");  
 }  
  
 public void setWeeklySalary(int weeklySalary) {  
 this.weeklySalary = weeklySalary;  
 }  
  
 public int getWeeklySalary() {  
 return weeklySalary;  
 }  
}

* HourlyEmployee.java

package inheritance;  
  
public class HourlyEmployee extends Employee {  
 private int wage;  
 private int hoursWorked;  
  
 public HourlyEmployee(String firstName, String lastName, String socialSecurity, int wage, int hoursWorked) {  
 super(firstName, lastName, socialSecurity);  
 this.wage = wage;  
 this.hoursWorked = hoursWorked;  
 }  
  
 @Override  
 public void printEmployeeData() {  
 System.*out*.println(  
 "First name: " + getFirstName() + "\n" +  
 "Last name: " + getLastName() + "\n" +  
 "SSN: " + getSocialSecurity() + "\n" +  
 "Wage: $" + wage + "\n" +  
 "Hours worked: " + hoursWorked + "\n");  
 }  
  
 public void setWage(int wage) {  
 this.wage = wage;  
 }  
  
 public void setHoursWorked(int hoursWorked) {  
 this.hoursWorked = hoursWorked;  
 }  
  
 public int getWage() {  
 return wage;  
 }  
  
 public int getHoursWorked() {  
 return hoursWorked;  
 }  
}

* CommissionEmployee.java

package inheritance;  
  
public class CommissionEmployee extends Employee {  
 private int commissionRate;  
 private int grossSales;  
  
 public CommissionEmployee(String firstName, String lastName, String socialSecurity, int commissionRate, int grossSales) {  
 super(firstName, lastName, socialSecurity);  
 this.commissionRate = commissionRate;  
 this.grossSales = grossSales;  
 }  
  
 @Override  
 public void printEmployeeData() {  
 System.*out*.println(  
 "First name: " + getFirstName() + "\n" +  
 "Last name: " + getLastName() + "\n" +  
 "SSN: " + getSocialSecurity() + "\n" +  
 "Commission Rate: " + commissionRate + "%\n" +  
 "Gross Salary: $" + grossSales + "\n");  
 }  
  
 public void setCommissionRate(int commissionRate) {  
 this.commissionRate = commissionRate;  
 }  
  
 public void setGrossSales(int grossSales) {  
 this.grossSales = grossSales;  
 }  
  
 public int getCommissionRate() {  
 return commissionRate;  
 }  
  
 public int getGrossSales() {  
 return grossSales;  
 }  
}

* BaseEmployee.java

package inheritance;  
  
public class BaseEmployee extends Employee {  
 private int baseSalary;  
  
 public BaseEmployee(String firstName, String lastName, String socialSecurity, int baseSalary) {  
 super(firstName, lastName, socialSecurity);  
 this.baseSalary = baseSalary;  
 }  
  
 @Override  
 public void printEmployeeData() {  
 System.*out*.println(  
 "First name: " + getFirstName() + "\n" +  
 "Last name: " + getLastName() + "\n" +  
 "SSN: " + getSocialSecurity() + "\n" +  
 "Base Salary: $" + baseSalary + "\n");  
 }  
  
 public void setBaseSalary(int baseSalary) {  
 this.baseSalary = baseSalary;  
 }  
  
 public int getBaseSalary() {  
 return baseSalary;  
 }  
}

* InheritanceDriver.java

package inheritance;  
  
public class InheritanceDriver {  
  
 public static void main(String[] args) {  
  
 Employee joeJones = new SalariedEmployee("Joe", "Jones", "111-11-1111", 2500);  
 Employee stephSmith = new HourlyEmployee("Stephanie", "Smith", "222-22-2222", 25, 32);  
 Employee maryQuinn = new HourlyEmployee("Mary", "Quinn", "333-33-3333", 19, 47);  
 Employee nicoleDior = new CommissionEmployee("Nicole", "Dior", "444-44-4444", 15, 50000);  
 Employee renwaChanel = new SalariedEmployee("Renwa", "Chanel", "555-55-5555", 1700);  
 Employee mikeDavenport = new BaseEmployee("Mike", "Davenport", "666-66-6666", 95000);  
 Employee mahnazVaziri = new CommissionEmployee("Mahnaz", "Vaziri", "777-77-7777", 22, 40000);  
  
 joeJones.printEmployeeData();  
 stephSmith.printEmployeeData();  
 maryQuinn.printEmployeeData();  
 nicoleDior.printEmployeeData();  
 renwaChanel.printEmployeeData();  
 mikeDavenport.printEmployeeData();  
 mahnazVaziri.printEmployeeData();  
  
 }  
}

Output:

A screenshot of a computer screen

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# Polymorphism

Source code:

* Ship.java

package polymorphism;  
  
public class Ship {  
 private String name;  
 private String year;  
  
 public Ship(String name, String year) {  
 this.name = name;  
 this.year = year;  
 }  
  
 public void print() {  
 System.*out*.println(  
 "Ship name: " + name + "\n" +  
 "Build year: " + year + "\n");  
 }  
  
 public void setName(String name) {  
 this.name = name;  
 }  
  
 public void setYear(String year) {  
 this.year = year;  
 }  
  
 public String getName() {  
 return name;  
 }  
  
 public String getYear() {  
 return year;  
 }  
}

* CruiseShip.java

package polymorphism;  
  
public class CruiseShip extends Ship {  
 private int maxPassengers;  
  
 public CruiseShip(String name, String year, int maxPassengers) {  
 super(name, year);  
 this.maxPassengers = maxPassengers;  
 }  
  
 @Override  
 public void print() {  
 System.*out*.println(  
 "Ship name: " + getName() + "\n" +  
 "Maximum number of passengers: " + maxPassengers + "\n");  
 }  
  
 public void setMaxPassengers(int maxPassengers) {  
 this.maxPassengers = maxPassengers;  
 }  
  
 public int getMaxPassengers() {  
 return maxPassengers;  
 }  
}

* CargoShip.java

package polymorphism;  
  
public class CargoShip extends Ship {  
 private int cargoCapacity;  
  
 public CargoShip(String name, String year, int cargoCapacity) {  
 super(name, year);  
 this.cargoCapacity = cargoCapacity;  
 }  
  
 @Override  
 public void print() {  
 System.*out*.println(  
 "Ship name: " + getName() + "\n" +  
 "Cargo capacity (tons): " + cargoCapacity + "\n");  
 }  
  
 public void setCargoCapacity(int cargoCapacity) {  
 this.cargoCapacity = cargoCapacity;  
 }  
  
 public int getCargoCapacity() {  
 return cargoCapacity;  
 }  
}

* PolymorphismDriver.java

package polymorphism;  
  
public class PolymorphismDriver {  
  
 public static void main(String[] args) {  
  
 Ship[] shipArray = new Ship[3];  
  
 shipArray[0] = new Ship("Serenity", "2000");  
 shipArray[1] = new CruiseShip("Royal Caribbean", "2010", 5000);  
 shipArray[2] = new CargoShip("Evergreen", "2020", 20000);  
  
 for(Ship ship : shipArray) {  
 ship.print();  
 }  
 }  
  
}

Output:

A screenshot of a computer program

Description automatically generated

# Aggregation

Source code:

* Course.java

package aggregation;  
  
import java.util.ArrayList;  
import java.util.List;  
  
public class Course {  
 private String courseName;  
 private List<Instructor> instructorList = new ArrayList<>();  
 private List<Textbook> textbookList = new ArrayList<>();  
  
 public Course(String courseName) {  
 this.courseName = courseName;  
 }  
  
 public void print() {  
 System.*out*.println("Course name: " + courseName);  
 printInstructors();  
 printTextbooks();  
 }  
  
 private void printInstructors() {  
 System.*out*.println("Instructor(s): ");  
 for(Instructor instructor : instructorList) {  
 System.*out*.println("\t" + instructor.getFirstName() + " " + instructor.getLastName());  
 }  
 }  
  
 private void printTextbooks() {  
 System.*out*.println("Textbook(s): ");  
 for(Textbook textbook : textbookList) {  
 System.*out*.println("\t" + "Title: " + textbook.getBookTitle());  
 System.*out*.println("\t" + "Author: " + textbook.getAuthor());  
 }  
 }  
  
 public void addInstructor(Instructor instructor) {  
 instructorList.add(instructor);  
 }  
  
 public void addTextbook(Textbook textbook) {  
 textbookList.add(textbook);  
 }  
  
 public void setCourseName(String courseName) {  
 this.courseName = courseName;  
 }  
  
 public String getCourseName() {  
 return courseName;  
 }  
}

* Instructor.java

package aggregation;  
  
public class Instructor {  
 private String firstName;  
 private String lastName;  
 private String officeNumber;  
  
 public Instructor(String firstName, String lastName, String officeNumber) {  
 this.firstName = firstName;  
 this.lastName = lastName;  
 this.officeNumber = officeNumber;  
 }  
  
 public void setFirstName(String firstName) {  
 this.firstName = firstName;  
 }  
  
 public void setLastName(String lastName) {  
 this.lastName = lastName;  
 }  
  
 public void setOfficeNumber(String officeNumber) {  
 this.officeNumber = officeNumber;  
 }  
  
 public String getFirstName() {  
 return firstName;  
 }  
  
 public String getLastName() {  
 return lastName;  
 }  
  
 public String getOfficeNumber() {  
 return officeNumber;  
 }  
}

* Textbook.java

package aggregation;  
  
public class Textbook {  
 private String bookTitle;  
 private String author;  
 private String publisher;  
  
 public Textbook(String bookTitle, String author, String publisher) {  
 this.bookTitle = bookTitle;  
 this.author = author;  
 this.publisher = publisher;  
 }  
  
 public void setBookTitle(String bookTitle) {  
 this.bookTitle = bookTitle;  
 }  
  
 public void setAuthor(String author) {  
 this.author = author;  
 }  
  
 public void setPublisher(String publisher) {  
 this.publisher = publisher;  
 }  
  
 public String getBookTitle() {  
 return bookTitle;  
 }  
  
 public String getAuthor() {  
 return author;  
 }  
  
 public String getPublisher() {  
 return publisher;  
 }  
}

* AggregationDriver.java

package aggregation;  
  
public class AggregationDriver {  
  
 public static void main(String[] args) {  
 Instructor nimaDavarpanah = new Instructor("Nima", "Davarpanah", "3-2636");  
 Instructor daveJohannsen = new Instructor("Dave", "Johannsen", "1-2345");  
  
 Textbook cleanCode = new Textbook("Clean Code", "Robert C. Martin", "Pearson");  
 Textbook comArchitecture = new Textbook("Computer Architecture, A Quantitative Approach", "John L. Hennessy", "Morgan Kaufmann");  
  
 // First course with 1 instructor and 1 textbook  
 Course advancedSwe = new Course("Advanced Software Engineering");  
 advancedSwe.addInstructor(nimaDavarpanah);  
 advancedSwe.addTextbook(cleanCode);  
  
 // Second course with 2 instructors and 2 textbooks  
 Course advancedSweCompArc = new Course("Advanced Software Engineering and Computer Architecture");  
 advancedSweCompArc.addInstructor(nimaDavarpanah);  
 advancedSweCompArc.addInstructor(daveJohannsen);  
 advancedSweCompArc.addTextbook(cleanCode);  
 advancedSweCompArc.addTextbook(comArchitecture);  
  
 advancedSwe.print();  
 System.*out*.println("\n");  
 advancedSweCompArc.print();  
  
 }  
  
}

Output:

A screenshot of a computer program

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# Composition

Source code:

* Folder.java

package composition;  
  
import java.util.ArrayList;  
import java.util.List;  
  
public class Folder {  
 private String folderName;  
 private List<Folder> folderList;  
 private List<File> fileList;  
  
 public Folder(String folderName) {  
 this.folderName = folderName;  
 this.folderList = new ArrayList<>();  
 this.fileList = new ArrayList<>();  
 }  
  
 public void deleteFolder(Folder folder) {  
 folderList.remove(folder);  
 }  
  
 public void deleteFile(File file) {  
 fileList.remove(file);  
 }  
  
 public void print() {  
 printHelper(0);  
 }  
  
 private void printHelper(int recurCount) {  
 StringBuilder indentation = new StringBuilder();  
 for(int i = 0; i < recurCount; i++) {  
 indentation.append("\t");  
 }  
  
 System.*out*.println(indentation.toString() + "Folder : " + folderName);  
  
 for(Folder folder : folderList) {  
 folder.printHelper(recurCount + 1);  
 }  
  
 for(File file : fileList) {  
 System.*out*.println(indentation.toString() + "\tFile: " + file.getFileName());  
 }  
 }  
  
 public void addFolder(Folder folder) {  
 folderList.add(folder);  
 }  
  
 public void addFile(File file) {  
 fileList.add(file);  
 }  
  
 public void setFolderList(List<Folder> folderList) {  
 this.folderList = folderList;  
 }  
  
 public void setFileList(List<File> fileList) {  
 this.fileList = fileList;  
 }  
  
 public void setFolderName(String folderName) {  
 this.folderName = folderName;  
 }  
  
 public List<Folder> getFolderList() {  
 return folderList;  
 }  
  
 public List<File> getFileList() {  
 return fileList;  
 }  
  
 public String getFolderName() {  
 return folderName;  
 }  
}

* File.java

package composition;  
  
public class File {  
 private String fileName;  
  
 public File(String fileName) {  
 this.fileName = fileName;  
 }  
  
 public void setFileName(String fileName) {  
 this.fileName = fileName;  
 }  
  
 public String getFileName() {  
 return fileName;  
 }  
  
 public void print() {  
 System.*out*.println("File: " + fileName);  
 }  
}

* CompositionDriver.java

package composition;  
  
public class CompositionDriver {  
  
 public static void main(String[] args) {  
  
 Folder demo = new Folder("demo1");  
  
 Folder sourceFiles = new Folder("Source Files");  
 Folder includePath = new Folder("Include Path");  
 Folder remoteFiles = new Folder("Remote Files");  
  
 Folder phalcon = new Folder(".phalcon");  
 Folder app = new Folder("app");  
  
 Folder config = new Folder("config");  
 Folder controllers = new Folder("controllers");  
 Folder library = new Folder("library");  
 Folder migrations = new Folder("migrations");  
 Folder models = new Folder("models");  
 Folder views = new Folder("views");  
  
 Folder cache = new Folder("cache");  
 Folder publicFolder = new Folder("public");  
  
 File htaccess = new File(".htaccess");  
 File htrouter = new File(".htrouter.php");  
 File index = new File("index.html");  
  
 demo.addFolder(sourceFiles);  
 demo.addFolder(includePath);  
 demo.addFolder(remoteFiles);  
  
 sourceFiles.addFolder(phalcon);  
 sourceFiles.addFolder(app);  
 sourceFiles.addFolder(cache);  
 sourceFiles.addFolder(publicFolder);  
 sourceFiles.addFile(htaccess);  
 sourceFiles.addFile(htrouter);  
 sourceFiles.addFile(index);  
  
 app.addFolder(config);  
 app.addFolder(controllers);  
 app.addFolder(library);  
 app.addFolder(migrations);  
 app.addFolder(models);  
 app.addFolder(views);  
  
 System.*out*.println(">> Full structure:");  
 demo.print();  
  
 // delete app folder  
 System.*out*.println("\n>> Full structure after app folder deletion:");  
 sourceFiles.deleteFolder(app);  
 demo.print();  
  
 // delete public folder  
 System.*out*.println("\n>> Full structure after app & public folder deletion:");  
 sourceFiles.deleteFolder(publicFolder);  
 demo.print();  
  
 }  
}

Output:

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# Source Code & Supporting Files

The entire source code and other supporting documents/ files can be obtained from this GitHub repository:

https://github.com/fidelisprasetyo/CS5800/tree/hw1