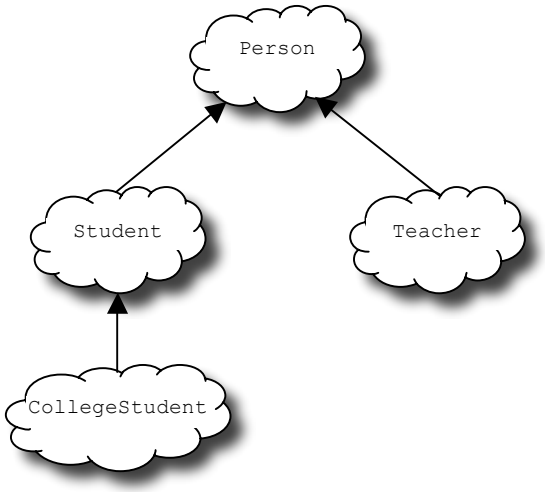
LAB ASSIGNMENT

BackToSchool

Background:

The `HighSchool` application has two classes: the `Person` superclass and the `Student` subclass. In this lab you will create two new classes, `Teacher` and `CollegeStudent`, using inheritance. A `Teacher` will be like `Person` but will have additional properties such as *salary* (the amount the teacher earns) and *subject* (e.g. "Computer Science", "Chemistry", "English", and "Other"). The `CollegeStudent` class will extend the `Student` class by adding a *year* (current level in college) and *major* (e.g. "Electrical Engineering", "Communications", and "Undeclared").

The inheritance hierarchy follows.



Here is the `Person` base class to be used as a starting point for the `Teacher` class:

```
public class Person
{
  private String myName ;   // name of the person
  private int myAge;        // person's age
  private String myGender;  // "M" for male, "F" for female

  // constructor
  public Person(String name, int age, String gender)
  {
    myName = name;
    myAge = age;
    myGender = gender;
  }

  public String getName()
  {
    return myName;
  }
```

```
  public int getAge()
  {
    return myAge;
  }

  public String getGender()
  {
    return myGender;
  }

  public void setName(String name)
  {
    myName = name;
  }

  public void setAge(int age)
  {
    myAge = age;
  }

  public void setGender(String gender)
  {
    myGender = gender;
  }

  public String toString()
  {
     return myName + ", age: " + myAge + ", gender: " +
                                    myGender;
  }
}
```

The `Student` class is derived from the `Person` class and used as a starting point for the `CollegeStudent` class:

```
public class Student extends Person
{
    private String myIdNum;    // Student Id Number
    private double myGPA;      // grade point average

    // constructor
    public Student(String name, int age, String gender,
               String idNum, double gpa)
    {
        // use the super class' constructor
        super(name, age, gender);

        // initialize what's new to Student
        myIdNum = idNum;
        myGPA = gpa;
    }

    public String getIdNum()
    {
        return myIdNum;
    }

    public double getGPA()
    {
        return myGPA;
    }
```

```
    public void setIdNum(String idNum)
    {
        myIdNum = idNum;
    }

    public void setGPA(double gpa)
    {
        myGPA = gpa;
    }

    // overrides the toString method in the parent class
    public String toString()
    {
        return super.toString() + ", student id: " + myIdNum + ", gpa: " + myGPA;
    }
}
```

Assignment:

1. You will be provided with two source files as shown above: *Person.java* for the `Person` class, *Student.java* for the `Student` class. These files should be used throughout this assignment.

2. Write a `Teacher` class that extends the parent class `Person`.

   a. Add instance variables to the class for *subject* (e.g. "Computer Science", "Chemistry", "English", "Other") and *salary* (the teacher's annual salary). *Subject* should be of type `String` and *salary* of type **`double`**. Choose appropriate names for the instance variables.

   b. Write a constructor for the `Teacher` class. The constructor will use five parameters to initialize `myName, myAge`, `myGender`, *subject*, and *salary*. Use the **`super`** reference to use the constructor in the `Person` superclass to initialize the inherited values.

   c. Write "setter" and "getter" methods for all of the class variables. For the `Teacher` class they would be: `getSubject`, `getSalary`, `setSubject`, and `setSalary`.

   d. Write the `toString()` method for the `Teacher` class. Use a **`super`** reference to do the things already done by the superclass.

3. Write a `CollegeStudent` subclass that extends the `Student` class.

   a. Add instance variables to the class for *major* (e.g. "Electrical Engineering", "Communications", "Undeclared") and *year* (e.g. FROSH = 1, SOPH = 2, …). *Major* should be of type `String` and *year* of type **`int`**. Choose appropriate names for the instance variables.

   b. Write a constructor for the `CollegeStudent` class. The constructor will use seven parameters to initialize `myName, myAge`, `myGender`, `myIdNum`, `myGPA`, *year*, and *major*. Use the **`super`** reference to use the constructor in the `Student` superclass to initialize the inherited values.

   c. Write "setter" and "getter" methods for all of the class variables. For the `CollegeStudent` class they would be: `getYear`, `getMajor`, `setYear`, and `setMajor`.

d. Write the `toString()` method for the `CollegeStudent` class. Use a **`super`** reference to do the things already done by the superclass.

4. Write a testing class with a `main()` that constructs all of the classes (`Person`, `Student`, `Teacher`, and `CollegeStudent`) and calls their `toString()` method. Sample usage would be:

```
Person bob = new Person("Coach Bob", 27, "M");
System.out.println(bob);

Student lynne = new Student("Lynne Brooke", 16, "F", "HS95129", 3.5);
System.out.println(lynne);

Teacher mrJava = new Teacher("Duke Java", 34, "M", "Computer Science", 50000);
System.out.println(mrJava);

CollegeStudent ima = new CollegeStudent("Ima Frosh", 18, "F", "UCB123",
                                        4.0, 1, "English");
System.out.println(ima);
```

A sample run of the program would give:

```
Coach Bob, age: 27, gender: M
Lynne Brooke, age: 16, gender: F, student id: HS95129, gpa: 3.5
Duke Java, age: 34, gender: M, subject: Computer Science, salary: 50000.0
Ima Frosh, age: 18, gender: F, student id: UCB123, gpa: 4.0, year: 1, major:
English
```