Week 2 Review - TEams (Project Management Software)

You've been tasked with building an internal project management system for teams to track their projects. You don't need to build a UI for this application; your job is to build the foundational classes that drive the application's functionality.

Classes

The core of this application consists of three classes, which you'll create in the main package `com.techelevator`. Make sure to read through the requirements for each class before writing any code.

> Note: All dates in this application are strings using the format mm/dd/yyyy.

Step One: Create the `Department` class

Create a new class called `Department.java` with the following requirements.

Instance variables

Name	Type	Getter	Setter
departmentId	int	x	x
name	String	x	x

Constructors

`Department` must have one constructor that accepts two parameters: `departmentID` and `name`.

Step Two: Create the `Employee` class

Create a new class called `Employee.java` with the following requirements.

Instance variables

Name	Type	Getter	Setter
employeeId	long	x	x
firstName	String	x	x
lastName	String	x	x
email	String	x	x
salary	double	x	x
department	Department	x	x

Name	Type	Getter	Setter
hireDate	String	x	x

Static constants

The default starting salary for all employees is $60,000 and is stored in a static constant variable of type `double`.

Constructors

`Employee` needs two constructors.

The first one accepts all the arguments needed to create a new `Employee`: `employeeID`, `firstName`, `lastName`, `email`, `department`, and `hireDate`.

> Note: The first constructor doesn't include a `double` argument for the salary. Make sure to initialize each employees' salary to the static constant you created.

The second constructor is a no-argument constructor. This constructor allows you to create your `Employee` objects in multiple ways.

Methods

Method Name	Description
`getFullName()`	A derived property that returns the employee's full name in the following format: "Last, First"
`raiseSalary(double percent)`	A method that raises the employee's salary by x percent

Step Three: Create the `Project` class

Create a new class called `Project.java` with the following requirements.

Instance variables

Name	Type	Getter	Setter
name	String	x	x
description	String	x	x
startDate	String	x	x
dueDate	String	x	x
teamMembers	List<Employee>	x	x

> Note: Make sure to set `teamMembers` to an empty list in your implementation.

Constructors

`Project` must have one constructor that accepts four parameters: `name`, `description`, `startDate` and `dueDate`.

Application

Now that you've created the core classes for this application, you'll write some code to test them. The logic for this application is in `/src/main/java/com/techelevator/Application.java`.

Step One: Create and print departments

Create an instance variable in the `Application` class called `departments` to hold a `List<Department>`.

Next, in `createDepartments()`, create these three departments and add them to the list you created:

departmentId	name
001	Marketing
002	Sales
003	Engineering

Then, in the `printDepartments()` method, iterate over each element in `departments` and print them out. The final output in the console looks like this:

```
------------- DEPARTMENTS -----------------------------
Marketing
Sales
Engineering
```

Step Two: Create and print employees

Create an instance variable in the `Application` class called `employees` to hold a `List<Employee>`.

Next, in `createEmployees()`, create three employees and add them to the list:

1. Dean Johnson: Create this employee using the no-argument constructor and call setter methods to set each instance variable.
2. Angie Smith: Create this employee using the all-argument constructor.
3. Margaret Thompson: Create this employee using the all-argument constructor.

> Tip: use the `Department`s from the `departments` list to assign each employee's department. Retrieve the two departments you need by using the `get()` method.

employeeId	firstName	lastName	email	salary	department	hireDate
001	Dean	Johnson	djohnson@teams.com	60000	Engineering	08/21/2020

employeeId	firstName	lastName	email	salary	department	hireDate
002	Angie	Smith	asmith@teams.com	60000	Engineering	08/21/2020
003	Margaret	Thompson	mthompson@teams.com	60000	Marketing	08/21/2020

Before printing the list of `Employees`, give Angie a 10% raise.

In the `printEmployees()` method, iterate over each element in `employees` and print out their name, salary, and department. Use the derived property `getFullName` for the employee's name. The final output in the console looks like this:

```
------------- EMPLOYEES ------------------------------
Johnson, Dean (60000.0) Engineering
Smith, Angie (66000.0) Engineering
Thompson, Margaret (60000.0) Marketing
```

Step Three: Create and print projects

Create an instance variable in the `Application` class called `projects` to hold a collection of projects. The variable must be of type `Map<String,Project>` where the key is the name of the project.

In `createTeamsProject()`, create the following project:

- name: TEams
- description: Project Management Software
- startDate: 10/10/2020
- dueDate: 11/10/2020

After you create the project, follow these steps:

1. Add all the employees from the engineering department to this project.
2. Add the project to the `projects` map.

Then, in `createLandingPageProject()`, create the following project:

- name: Marketing Landing Page
- description: Lead Capture Landing Page for Marketing
- startDate: 10/10/2020
- dueDate: 10/17/2020

After you create this project, follow these steps:

1. Add all the employees from the marketing department to this project.
2. Add the project to the `projects` map.

Finally, in `printProjectsReport()`, print out the project's name with the total number of employees on the project. The final output in the console looks like this:

```
------------ PROJECTS ------------------------------
TEams: 2
Marketing Landing Page: 1
```

Final output

```
------------ DEPARTMENTS ------------------------------
Marketing
Sales
Engineering

------------ EMPLOYEES ------------------------------
Johnson, Dean (60000.0) Engineering
Smith, Angie (66000.0) Engineering
Thompson, Margaret (60000.0) Marketing

------------ PROJECTS ------------------------------
TEams: 2
Marketing Landing Page: 1
```

Bonus challenges

If you finish early, here are three challenge projects you can work on.

Employee salary formatting

Right now, an employee's salary is of type `double`. When it prints to the console, it looks like this: `60000.0`. It'd be better to display this number in currency format, so it looks like this: `$60,000.00`.

In the Java Standard Library, there's a class called NumberFormat. The `NumberFormat` class has a static method called `getCurrencyInstance()` that formats currency given your Locale:

```
NumberFormat currency = NumberFormat.getCurrencyInstance();
currency.format(number)
```

Given this information, you can refactor the `printEmployees()` method to display this output:

```
------------ EMPLOYEES ------------------------------
Johnson, Dean ($60,000.00) Engineering
Smith, Angie ($66,000.00) Engineering
Thompson, Margaret ($60,000.00) Marketing
```

Dates

In the `Project` and `Employee` classes, you used the type `String` for the dates. In a real-world application, if you needed to perform calculations on dates, you wouldn't use a `String`.

In the Java Standard Library, there's a class called LocalDate that you can use with dates.

Project

Right now, you create a new project by hard-coding a start date. You can use the `LocalDate` API to get today's date and set that as the start date instead.

There's also a way to set the end date to `x` amount of days after the start date. Update both `startDate` and `dueDate` to type `LocalDate` using the following requirements:

- Project TEams
  - start date: today
  - due date 30 days after today
- Marketing Landing Page
  - start date: today + 31 days
  - due date: start date + 7 days

Employee

Update the `hireDate` to use the `LocalDate` type. In the `createEmployees()` method, create a variable called `today` and use the `LocalDate` API to get today's date. You can now use that variable when creating each of your employees.

Find department by name

Earlier, you wrote code to retrieve a specific department from the `departments` list by its index, but what if you didn't know its index, or if it was an unordered collection? You could instead loop through the collection, test for a particular value, and return the item that matches. This is a common technique to use when a language or library doesn't provide a built-in method, or you're managing complex data or conditions.

Create another `private static` method in the `Application` class. Have the method accept a `String` and return a `Department`. Give the method a descriptive name for what it does—for example, `getDepartmentByName`.

In the method, iterate through `departments`, and test if each department's `name` matches the `String` passed into the method. If it matches, return that `Department`. If there's no match, return `null`.

Now, go back to the `createEmployees()` method. Locate the code you wrote for getting the Engineering and Marketing departments. Instead of retrieving it from `departments` by index, use the new method you wrote, passing in the department name.

You'll know your new method was successful if you still have the same output from the `printEmployees()` and `printProjectsReport()` methods.