

CS101- Algorithms and Programming I

Lab 07

Lab Objectives: Classes and Objects

- For all labs in CS 101, your solutions must conform to the CS101 style guidelines (rules!)

1. Create a project, Lab07 in your Lab07 folder.
2. Create a Java class, Project, that has the following functionality:

Constant Data Members:

- `TAX`: tax rate to be applied to the project. Fixed at 13%.
- `OVERHEAD`: the project overhead, fixed at 50000TL
- `EMP_HOURS_WEEK`: standard number of hours each employee works per week (45)

Static data members:

- `projectCounter`: counts the number of projects created. Initialized to 5000.

Instance Data Members:

- `projectId`: stores the unique id number of the project (example: 2021-5000)
- `projectName`: stores the name of the project.
- `projectType`: stores the character representing the project type.
- `personHours`: stores the estimated person hours for the project.
- `ratePerHour`: stores the standard rate per person hour.
- `projectWeeks`: stores the estimated duration of the project in weeks.

Methods:

- **Constructor:**
 - Counts the project.
 - Takes `projectName`, `personHours`, `ratePerHour`, `projectWeeks` as parameters.
 - Initializes the `projectName` to the value passed as a parameter.
 - Initializes the `projectId`, `projectType`, `personHours`, `ratePerHour`, `projectWeeks` using the set methods.
- **Accessor methods for the following data members:**
 - `projectName`, `projectId`, `projectType`, `personHours`, `ratePerHour`, `projectWeeks`.
- **Mutator methods:**
 - `setProjectName`: sets the `projectName` to the value passed as a parameter.
 - `setPersonHours`: sets the `personHours` to the value passed as a parameter if it is a positive value, otherwise sets to zero.
 - `setRatePerHour`: sets the `ratePerHour` to the value passed as a parameter if it is positive, otherwise sets to zero.
 - `setProjectWeeks`: sets the `projectWeeks` to the value passed as a parameter if it is positive, otherwise sets to zero.
 - `setProjectId`: private method that sets the `projectId` using the current year plus the `projectCounter`. (ex:2021-5010 if 10 projects have been created)

- `setProjectType`: sets the type according to the calculated project cost. If the `projectCost` is over 1000000 it is a (m)ajor project, between 500000 and 1000000 it is a (l)arge-scale, between 0 and 500000, (s)tandard project. Projects with a project cost of 0 are (i)nactive.
- **Service Methods:**
 - `deactivateProject()`: sets the project to (i)nactive. Set `personHours`, `ratePerHour` to zero.
 - `activateProject()`: sets the `personHours`, `ratePerHour` to values passed as parameters. Updates `projectType` according to the calculated project cost.
 - `calculateProjectCost()`: calculates and returns the cost of the project. Cost is the sum of the human resource cost (`personHours` multiplied by `ratePerHour`), and the project overhead, increased by the tax rate. Note: if the cost before overhead is less than 20000, the `OVERHEAD` is not added.
 - `calculatePersonResources()`: calculates and returns the number of employees required for the project, using the `personHours`, `projectWeeks`. Assume each employee is contracted for `EMP_HOURS_WEEK`.
 - `compareProjects()`: instance method that takes a `Project` as a parameter, and compares the `Projects`. If the target object has a higher cost, returns 1, lower cost returns -1, same cost returns 0.
 - `toString()`: returns a `String` representation of a project. See sample output for format details. Active and inactive projects will display differently as shown below.

3. Create an application class `ProjectApp` which does the following:

- Create 3 `Projects`.
- Display the projects.
- Compare the projects using the appropriate method and display the result.
- Update the projects:
 - Change their `personWeeks` and `ratePerHour`.
 - Update the `projectType`.
 - Deactivate one of the projects.
 - Display the updated projects.

Sample Run:

```
Project Name: ArcTech Business Solution
Project ID: 2021-5001
Project Type: m
Team Size: 5
Estimated Project Cost: 2855284.0
```

```
Project Name: SunMarkets POS Implementation
Project ID: 2021-5002
Project Type: s
Team Size: 0
Estimated Project Cost: 170404.0
```

```
-----INACTIVE PROJECT-----
Project Name: HealthTech Hospital
Project ID: 2021-5003
```

```
Project with greater cost:
Project Name: ArcTech Business Solution
Project ID: 2021-5001
Project Type: m
Team Size: 5
Estimated Project Cost: 2855284.0
```