Due Date: 12.04.2021 23:59

Homework 2
CENG431 – Building Software Systems

In this homework you are expected to implement and design a "***Product Management Application***" in Java. You should fulfill the concepts of:

- Composite Design Pattern
- State Design Pattern
- GRASP Principles

1. In this application managers can control their products' lifecycle. A manager is responsible from a product and each product consist of parts and assemblies. Managers assign an employee to a part and each employee is responsible from a part.

For example: A manager is responsible from an Engine. Manager creates parts and assemblies of the engine. For each created part, manager creates an employee. So as an example, an employee is responsible from Crankshaft.

Engine (product)

Pistons (assembly) Engine Block (assembly) Crankshaft (part)

Lifters (assembly) Camshaft (part) parts…

parts…

2. Each assembly and each part will have an id, title, and status.
   Statuses are:
   - **Not Started**
   - **In Progress**
   - **Complete**

3. There is an admin of the program and admin creates managers and their products.
   Managers create assemblies and parts. For each part, managers create an employee. Each part and each assembly are created as **Not Started**.

4. Employees can change the status of their related part. When the status of a part is changed, connected assemblies also change their statuses automatically. If one of the parts of an assembly changes its status as **In Progress** or **Complete**, assembly also changes its status as **In Progress**. If all of the parts and assemblies of an assembly are in **Complete** status, related assembly will be changed as **Complete** automatically.

5. The admin, managers and employees should be able to login to the designed system.

Admin should be able to see all the managers, employees, and related product trees.
Managers should be able to see their related employees, and related product tree.
Employees should be able to see only their part and should be able to change the status of the part.

6. Application should run continuously unless the user wants to exit (not logout). Therefore, you are expected to handle with possible errors and exceptions.

7. The data should be stored in a JSON file.

8. You are expected to follow GRASP principles and write clean, readable, and tester-friendly code (make the selections with numbers).

Assignment Rules

1. Cheating is not allowed. If any cheating has been detected, they will be graded with 0 and there will be no further discussion on this.
2. You are expected to submit your homework in groups. Therefore, only one of you will be sufficient to submit your homework.
3. Make sure you export your homework as Eclipse projects. You can use other IDEs as well, however, you must test if it supported by Eclipse.
4. If you are using an external library, make sure that ".jar" library is in your project after you exported it. Unfortunately, from our previous experiences we have encountered homework submissions that use libraries from their "**Desktop**".
5. Please submit your homework through CMS.
6. Please export your Java Project as the given format with your assigned.
   Example:

   G02_CENG431_HW2.zip (Your group IDs will be announced on CMS).

7. Please be informed that your submissions may be anonymously used in software testing and maintenance research studies. Your names and student IDs will be replaced with non-identifying strings. If you do not want your submissions to be used in research studies, please inform the instructor (Dr. Tuglular) via e-mail.