Cairo University
Faculty of Computers and Artificial Intelligence

Software Design and Architecture
Project Description
Summer 2022/2023

Introduction

- In this project you will design and implement a non-trivial software system. You will practice the concepts you learned during the course.
- Project will be of one phase (All requirements must be designed and implemented in one submission.

Project Deliverables

- You are required to deliver the following deliverables **through the form link, posted within the Google classroom as one zip file**, named with your student IDs as follows: **Project_StudentID1_StudentID2_StudentID3_StudentID4**. Following such naming is a MUST. If you don't follow that naming convention, your submission will NOT be graded.
- The project must be developed **in the Java programming language using "Eclipse IDE for Java" specifically.**
- **<u>The zip file contents are:</u>**
    1. Proposed class diagram, in addition to written explanation for how the design pattern(s) were applied within the diagram and why such pattern(s) were selected specifically.
    2. sequence diagrams for the **most complex** scenarios. The submitted sequence diagrams should be **2 x the size of the team**, where each team member would be responsible **for submitting two sequence diagrams**.

3. Zipped copy of the source code project. Note that your submitted source code project should work properly on any TA's machine that has Eclipse IDE.

Project Logistics

1 Students will be divided into groups; each group consists of **3-4members**.
2 If a team is formed out of more than 4 members, their submission will be rejected, and they would get a zero for the phase.
3 Academic honesty is assumed. All work submitted must be original and written by your team (Not copied from students, the net, online/outside sources). Plagiarism will be penalized.
- Soon, you will be our colleague and we will be proud of you.
- Professional conduct and practice is essential in your career.

Project Deadline

Friday 11th of August 11:59 PM

This date is final and late submission is not allowed.

Project overview

Description

Apply the Object-Oriented concepts that you've learned (Abstraction, Encapsulation, SOLID principles, and Design Patterns, …etc.) to design a **Car Care Application** and implement it using java programming language. This application mainly manages providing various services including car-cleaning as an obligatory service, plus the ability to maintain cars, change car oil, or change tires.

- Each vehicle shall be identified by a model name, unique identification number, car dimensions (width and length), Model year and passenger types (could be regular-only, include-kids, include-elderly).
- Clean-in function that marks the arrival time of a vehicle if there is an available worker to provide the needed services. The application shall capture such time automatically from the system.
- During the Clean-in function the application shall pick a worker to work on that car. There are two configurations for allocating workers to cars (i) first come first served i.e., the clean-in function will allocate workers to cars based on the car's arrival time if the car includes only regular passengers. (ii) Special-passengers-fit, i.e., the clean-in function will allocate workers to cars that include kids/eldery passengers first before cars that regular passengers, if various cars are in a waiting line.
- Clean-out function that would mark the end of the cleaning process.
- Calculate the cleaning fees during the clean-out function based on the car dimensions, where the car's area in meters squared is multiplied by 20 EGP for each meter-squared
- The admin can add services to the car care center, and can add offers for doing specific services together as well (See the admin section below).
- Enrich your application with the capability to handle a set of exceptions that can happen during user interaction and through any other calculations. The displayed error message for exceptional behavior should be descriptive.
- The application has two main users; User and Admin.

Requirements

User

1. The user can clean-in or clean-out his vehicle.
2. If all the workers are occupied, the user will be asked if he wants to subscribe to a waiting list. The system shall notify the user when a worker is available. This means that the system can handle multiple client requests at the same time.
3. The user can ask for any other service in the system. The available services will be discussed in the admin section.
4. The user can pay for any service in the system. The system should prompt the user to the payment form when the user asks to pay for any service. The default way is to pay via credit card. But the system should allow the user to pay cash.
5. When the user requests additional services, the payment calculation will differ based on the application as follows:
    - If the user asks to change oil, the calculation will be based on the selected oil type.
    - If the user asks to maintain the car, the calculation will be based on the accumulative prices of the service(s) applied to the car.
    - If the user asks to change tires, the calculation will be based on the number of changed tires, and their sizes.
6. The user should be able to check any discount for any service in the system. Discounts could be added by the admin (this will be discussed later).

Admin

1. Calculate the total income as well as the total number of vehicles that used the Car Care application at any given point in time.
2. The admin should be able to enforce service packages. For example, if the user is maintaining his car, changing oil, and changing tires, he can take the package of Hyundai-maintenance, along with Shell-oil with Bridgestone tires specifically. Other packages can be added by the admin including three services within the service package.
3. The admin should be able to add discounts to the system. There are two types of discounts.
    a. Membership discounts. For example, the user should have 10% discount if they are subscribed members of that Car care application.
    b. Promocode discount. For example, the admin can apply 15% discount for customers who have valid promocodes.
    c. Combined discounts from both membership and promocodes can be applied on the overall fees that the user can pay.

    For any given service. All overall discounts and specific discounts for this service should apply.
4. The admin should be able to list all user used services. The used services types are
    a. Car Cleaning Service.
    b. Changing oil.
    c. Changing tires.
    d. Car Maintenance Service.

Evaluation Criteria

1. Properly working functionality as per the project requirements.
2. Quality of project configuration (i.e. actual realistic usage of **Git** throughout the phase development by all team members)
3. **Consistency** between the various submitted system models.
4. Consistency between the submitted system models, and the working product.
5. Quality of the design in terms of its **usage of appropriate design patterns.**

Policy Regarding Plagiarism:

Students have collective ownership and responsibility of their project. Any violation of academic honesty will have severe consequences and punishment for ALL team members.

- ✓ تشجع الكلية على مناقشة الأفكار و تبادل المعلومات و مناقشات الطلاب حيث يعتبر هذا جوهريا لعملية تعليمية سليمة
- ✓ تساعد زملاءك على قدر ما تستطيع و حل لهم مشاكلهم فى الكود و لكن تبادل الحلول غير مقبول و يعتبر غشا.
- ✓ أى حل يتشابه مع أى حل آخر بدرجة تقطع بأنهما منقولان من نفس المصدر سيعتبر أن صاحبيهما قد قاما بالغش.
- ✓ قد توجد على النت برامج مشابهة لما نكتبه هنا أى نسخ من على النت يعتبر غشا يحاسب عليه صاحبه.
- ✓ إذا لم تكن متأكدا أن فعلا ما يعد غشا فلتسأل المعيد أو أستاذ المادة.
- ✓ فى حالة ثبوت الغش سيأخذ الطالب سالب درجة المسألة ، و فى حالة تكرار الغش سيرسب الطالب فى المقرر.