General guidelines

At Sahaj, we strive to build high-quality software that has strong aesthetics (is readable and maintainable), has extensive safety nets to safeguard quality, handles errors gracefully and works as expected, without breaking down, with varying input.

We are looking for people who can write code that has flexibility built-in, by adhering to the principles of clean coding and Object-Oriented Development, and have the ability to deal with the real-life constraints/trade-offs while designing a system.

It is important to note that we are not looking for a GUI and we are not assessing you on the capabilities around code required to do the I/O. ***The focus is on the overall design.*** *So, while building a solution, it would be nicer if the input to the code is provided either via unit tests or a file. Using the command line (for input/output) can be tedious and difficult to test, so it is best avoided.*

Following is a list of things to keep in mind, before you submit your code, to ensure that your code focuses on attributes, we are looking for -

- Is the behavior of an object distinguished from its state and is the state encapsulated?
- Have you applied SOLID principles to your code?
- Have you applied the principles of YAGNI and KISS (additional info here)?
- Have your unit tested your code or did TDD? If you have not, we strongly recommend you read about it and attempt it with your solution. Having tests is a must and we do appreciate if there is ample test coverage for the given solution, it is a definite plus if you write them.
- Have you looked at basic refactoring to improve the design of your code? Here are some guidelines for the same.
- Finally, and foremost, are the principles applied in a pragmatic way. Simplicity is the strongest of the traits of a piece of code. However, easily written code may not necessarily be simple code.
- Use of any frameworks like REST APIs, Spring Boot, Django, databases, etc is unnecessary and will complicate the solution. It will also extend the time taken to solve the problem.

Description

A parking lot is a dedicated area that is intended for parking vehicles. Parking lots are present in every city and suburban area. Shopping malls, stadiums, airports, train stations, and similar venues often feature a parking lot with a large capacity. A parking lot can spread across multiple buildings with multiple floors or can be in a large open area.

- The parking lot will allow different types of vehicles to be parked:
    - Motorcycles/Scooters
    - Cars/SUVs
    - Buses/Trucks
- Each vehicle will occupy a single spot and the spot size will be different for different vehicles.
- The number of spots per vehicle type will be different for different parking lots. For example
    - Motorcycles/scooters: 100 spots
    - Cars/SUVs: 80 spots
    - Buses/Trucks: 40 spots
- When a vehicle is parked, a parking ticket should be generated with the spot number and the entry date-time.
- When a vehicle is unparked, a receipt should be generated with the entry date-time, exit date-time, and the applicable fees to be paid.

Fee Models

Different locations have different fee models. Below are a few possible models:

Mall

Per-hour flat fees

Vehicle	Fee
Motorcycle	10
Car/SUV	20
Bus/Truck	50

Stadium

Flat rate up to a few hours and then per-hour rate. The total fee is the sum of all the previous interval fees. No parking spots for buses/trucks at the stadium.

Vehicle	Interval	Fee
Motorcycle	[0, 4) hours	30
	[4, 12) hours	60
	[12, Infinity) hours	100 per hour
Car/SUV	[0, 4) hours	60
	[4, 12) hours	120
	[12, Infinity) hours	200 per hour

As stated by the notation, the start times are inclusive and the end times are exclusive.

Airport

Flat rate up to one day. Then per-day rate. There is no summing up of the previous interval fees. No parking spots for buses/trucks at the airport.

Vehicle	Interval	Fee
Motorcycle	[0, 1) hours	Free
	[1, 8) hours	40
	[8, 24) hours	60
	Each day	80
Car/SUV	[0, 12) hours	60
	[12, 24) hours	80
	Each day	100

As stated by the notations, the start times are inclusive and end times are exclusive.

Problem Statement

Given a parking lot with details about the vehicle types that can be parked, the number of spots, and the fee model for the parking lot; compute the fees to be paid for the parked vehicles when the vehicle is unparked.

Example 1: Small motorcycle/scooter parking lot

Spots:

- Motorcycles/scooters: 2 spots
- Cars/SUVs/Buses/Trucks: NA

Fee Model: Please refer to the **Mall fee model**, mentioned in the '**Fee Models**' section

Scenarios:

Sr No	Action	Result
1	Park motorcycle	Parking Ticket: Ticket Number: 001 Spot Number: 1 Entry Date-time: 29-May-2022 14:04:07
2	Park scooter	Parking Ticket: Ticket Number: 002 Spot Number: 2 Entry Date-time: 29-May-2022 14:44:07
3	Park scooter	No space available
4	Unpark scooter, ticket number 002	Parking Receipt: Receipt Number: R-001 Entry Date-time: 29-May-2022 14:44:07 Exit Date-time: 29-May-2022 15:40:07 Fees: 10
5	Park motorcycle	Parking Ticket: Ticket Number: 003 Spot Number: 2 Entry Date-time: 29-May-2022 15:59:07
6	Unpark motorcycle, ticket number 001	Parking Receipt: Receipt Number: R-002 Entry Date-time: 29-May-2022 14:04:07 Exit Date-time: 29-May-2022 17:44:07 Fees: 40

Example 2: Mall parking lot

Spots:

- Motorcycles/scooters: 100 spots
- Cars/SUVs: 80 spots
- Buses/Trucks: 10 spots

Fee Model: Please refer to the **Mall fee model** and its examples, mentioned in the '**Fee Models**' section

Scenarios: The park and unpark steps shown in the previous example have been skipped to reduce the text in the problem statement.

- Motorcycle parked for 3 hours and 30 mins. Fees: 40
- Car parked for 6 hours and 1 min. Fees: 140
- Truck parked for 1 hour and 59 mins. Fees: 100

Example 3: Stadium Parking Lot

Spots:

- Motorcycles/scooters: 1000 spots
- Cars/SUVs: 1500 spots

Fee Model: Please refer to the **Stadium fee model** mentioned in the '**Fee Models**' section

Scenarios: The park and unpark steps shown in the previous example have been skipped to reduce the text in the problem statement.

- Motorcycle parked for 3 hours and 40 mins. Fees: 30
- Motorcycle parked for 14 hours and 59 mins. Fees: 390.
    - 30 for the first 4 hours. 60 for the next 8 hours. And then 300 for the remaining duration.
- Electric SUV parked for 11 hours and 30 mins. Fees: 180.
    - 60 for the first 4 hours and then 120 for the remaining duration.
- SUV parked for 13 hours and 5 mins. Fees: 580.
    - 60 for the first 4 hours and then 120 for the next 8 hours. 400 for the remaining duration.

Example 4: Airport Parking Lot

Spots:

- Motorcycles/scooters: 200 spots
- Cars/SUVs: 500 spots
- Buses/Trucks: 100 spots

Fee Model: Please refer to the **Airport fee model** mentioned in the 'Fee Models' section

Scenarios: The park and unpark steps shown in the previous example have been skipped to reduce the text in the problem statement.

- Motorcycle parked for 55 mins. Fees: 0
- Motorcycle parked for 14 hours and 59 mins. Fees: 60
- Motorcycle parked for 1 day and 12 hours. Fees: 160
- Car parked for 50 mins. Fees: 60
- SUV parked for 23 hours and 59 mins. Fees: 80
- Car parked for 3 days and 1 hour. Fees: 400