

More Parking Systems

Software Design & Programming

Object-Oriented Mthd &Pgm I

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Introduction

The university parking system design has changed with the addition of the parking office, parking charge, and money classes. Functionality that was previously located in separate classes has now been consolidated into the central parking office class. The core functionality remains the same. Methods have been created to let the university register customers and their cars, scan permits of registered cars, and bill customers monthly for their parking fees.

Class Design Changes

The parking office is responsible for maintaining lists of all customers, cars, parking lots, and charges for the university. This provided an opportunity to consolidate code functionality from the existing classes of parking lot, customer, and car. The parking fee class was removed and instead replaced with parking charge. This necessitated a rework of the existing charge system to utilize the new money class. The addition of the money class allows for a better display of billing information by converting cents to dollars. New methods were created to allow customers to register with the parking office and then use their customer information to register cars for a permit.



Figure 1. Customer Registration Followed by Car Permit Registration

The addition of these new methods did complicate matters to a degree as the initial class designs utilized a different payment structure, however, the payoff was worth it. Centralizing all that functionality in the parking office class allows for easier maintenance. New helper methods were also created to cut down on code repetition and search for specific objects within the main parking office lists. These changes did entail a significant revision of the test classes and the addition of new ones to increase test coverage.

```
[INFO] -----
[INFO]  T E S T S
[INFO] -----
[INFO] Running classes.AddressTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.055 s - in classes.AddressTest
[INFO] Running classes.CarTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.07 s - in classes.CarTest
[INFO] Running classes.CarTypeTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.002 s - in classes.CarTypeTest
[INFO] Running classes.CustomerTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.021 s - in classes.CustomerTest
[INFO] Running classes.MoneyTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.013 s - in classes.MoneyTest
[INFO] Running classes.ParkingLotTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.012 s - in classes.ParkingLotTest
[INFO] Running classes.ParkingOfficeTest
Failed to validate entry: Permit required to enter parking lot.
Failed to validate entry: Car already parked in the lot.
Customer Monthly Bill for: Greg
Bill Amount: $100.0
Successfully Sent to: $123 Main St null, Springfield, IL 62701
Failed to validate entry: Parking Lot Full.
Failed to validate entry: Permit expired. Please contact Parking Office.
[INFO] Tests run: 22, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.051 s - in classes.ParkingOfficeTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 63, Failures: 0, Errors: 0, Skipped: 0
[INFO]
```

Figure 2. Test Case Results

Dependencies and Assumptions

Dependencies and assumptions remain largely the same. All errors thrown are not caught with the assumption that the greater system will be handling them instead of at the class level. A good example of this is the addition of a finally clause to our exit method. Errors thrown while validating permits on exit could cause serious issues with parking lot capacity tracking.

Now the parking lot will still update its parked cars list while our parking office can investigate the permit error. Our parking system is growing ever larger, but we are still tightly linked with the overall greater university network for support.

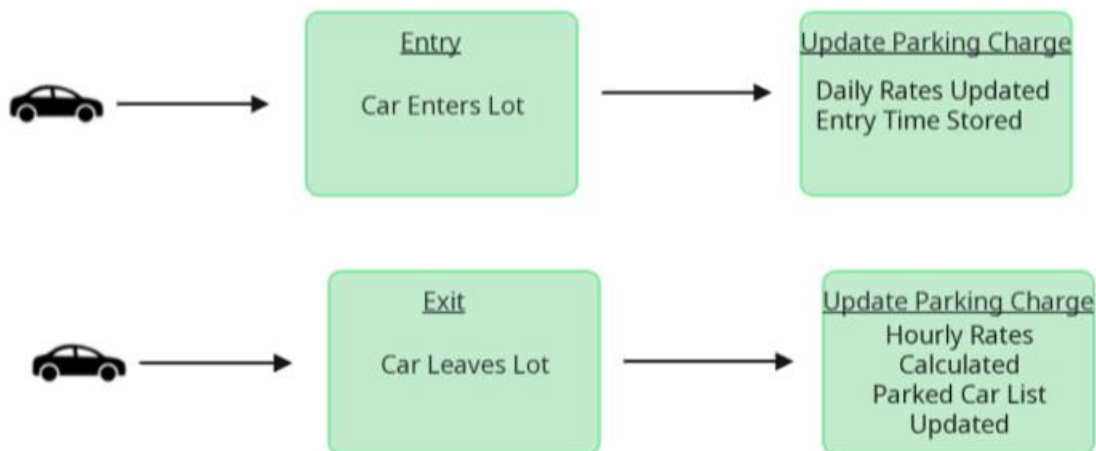


Figure 3. Car Entry and Exit Process

Summary

The creation of the central parking office class has been an excellent boon in organizing the required methods. Our parking system is still confined to a simple class structure; later development plans involve the addition of a service layer to further consolidate our method logic. While there was some wasted development time due to code rework, our parking system is now growing ever larger and handling more tasks for the university.

References

Microsoft Copilot. 2025. "Microsoft Copilot." Microsoft Copilot. Microsoft. 2025.
<https://copilot.microsoft.com/>.