

## CMPE 202 Code Refactoring

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### a. Identify a code smell in the following Java code (2 points)

The Java code contains a code smell related to duplicate code, where certain attributes such as bookTitle/movieTitle, rentDate, dueDate, and rentalFee, along with methods like isOverdue() and lateFee(), have been repeated in multiple places. This redundancy in the code may cause maintenance issues and could be improved by refactoring.

### b. Explain how you will refactor the code to get rid of the code smell (4 points)

- Duplicated attributes and methods can be extracted out and abstracted into a class Rental. Both BookRental and MovieRental can extend Rental class.
- Since bookTitle and movieTitle signify same meaning, it can be renamed to a generic attribute title. rentDate and dueDate, rentalFee can be moved to parent Rental class.
- However, attributes author and classification are retained in its own classes as they are not duplicates.
- Similarly, rentalFee() method is also duplicated, can be moved to parent Rental class. But lateFee() method is not exactly same but similar apart from late fee factor(0.25/0.5).
- An attribute lateFeeFactor can be introduced whose value is different in both classes. Which can be initialized upon object creation or can be initialized with a default value in its own sub classes. Alternatively, lateFee() method can also be overridden in subclasses.

### c. Write the re-factored code (14 points)

Rental.java

```
public class Rental {  
  
    private String title;  
    private Date rentDate;  
    private Date dueDate;  
    private double rentalFee;  
    private double lateFeeFactor;  
  
    Rental(double lateFeeFactor) {  
        this.lateFeeFactor = lateFeeFactor;  
    }  
  
    private boolean isOverdue() {  
        Date now = new Date();  
        return dueDate.before(now);  
    }  
}
```

```
    }

    public double lateFee() {
        if (isOverdue()) { return rentalFee * lateFeeFactor;}
        else return 0;
    }
}
```

## BookRental.java

```
public class BookRental extends Rental {

    private String author;

    BookRental() {
        super(0.25);
    }

}
```

## MovieRental.java

```
public class MovieRental extends Rental {

    private int classification;

    MovieRental() {
        super(0.5);
    }

}
```