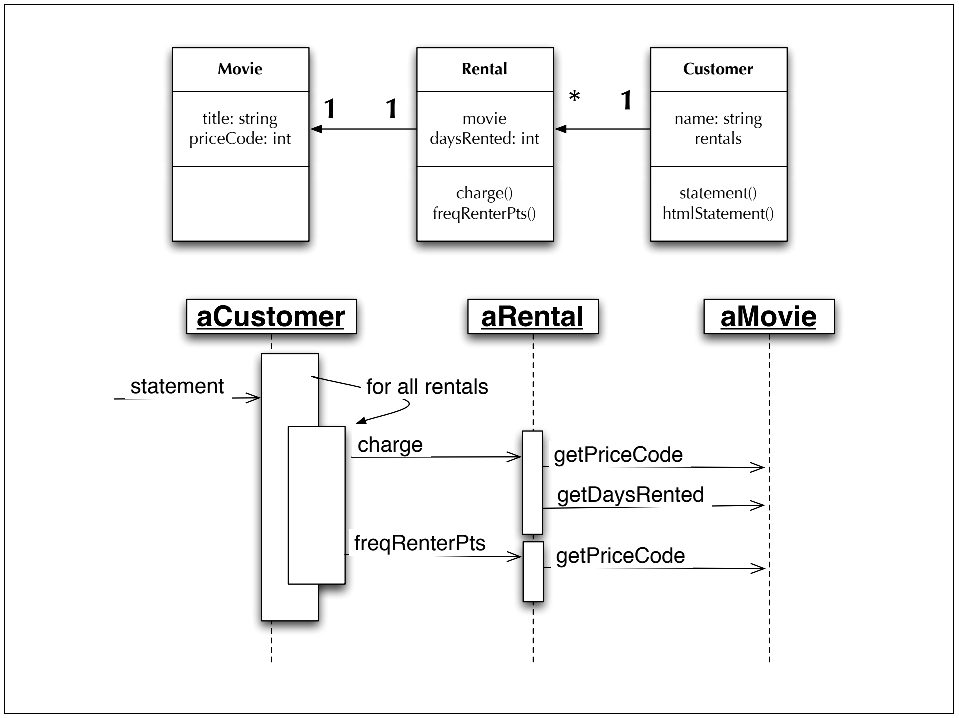
We've refactored `statement()` and added `htmlStatement()` with minimal duplication.

After class, I applied the Extract Method/Move Method refactoring pair to the calculation of frequent renter points, which is now done in the `Rental` class.



`Movie` is still a pure "data" classes -- no behavior.

`Rental` contributes useful behavior.

`Customer` uses `Rental`s to do its work.

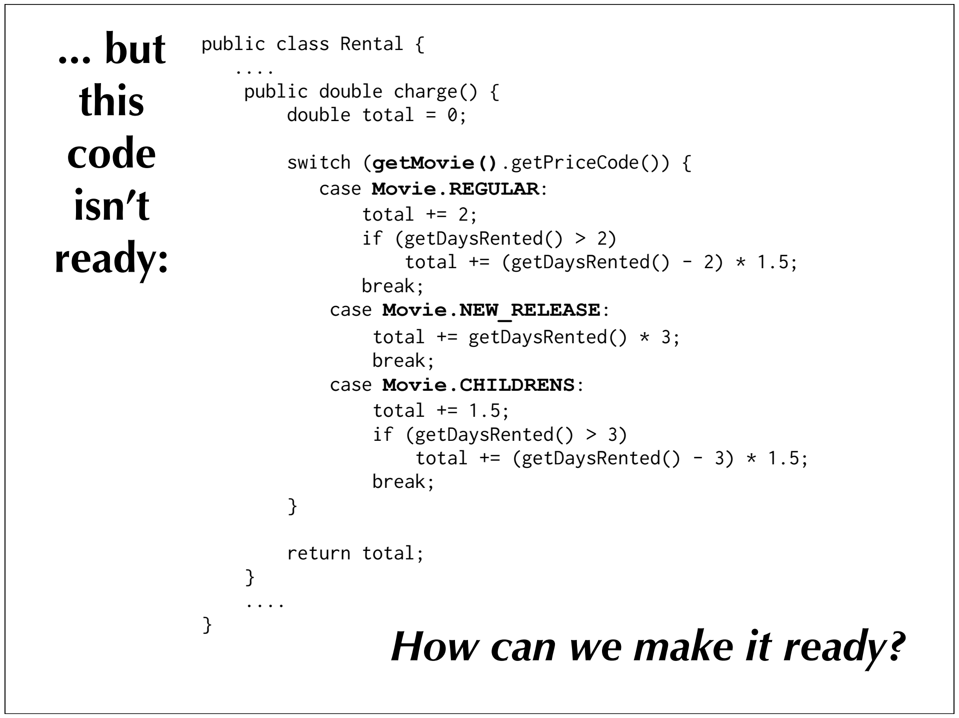
Now, the client is ready to change her pricing strategy...

create new categories

change existing categories

others?

The next change is here, or almost. Is the code ready?



... but this code isn't ready:

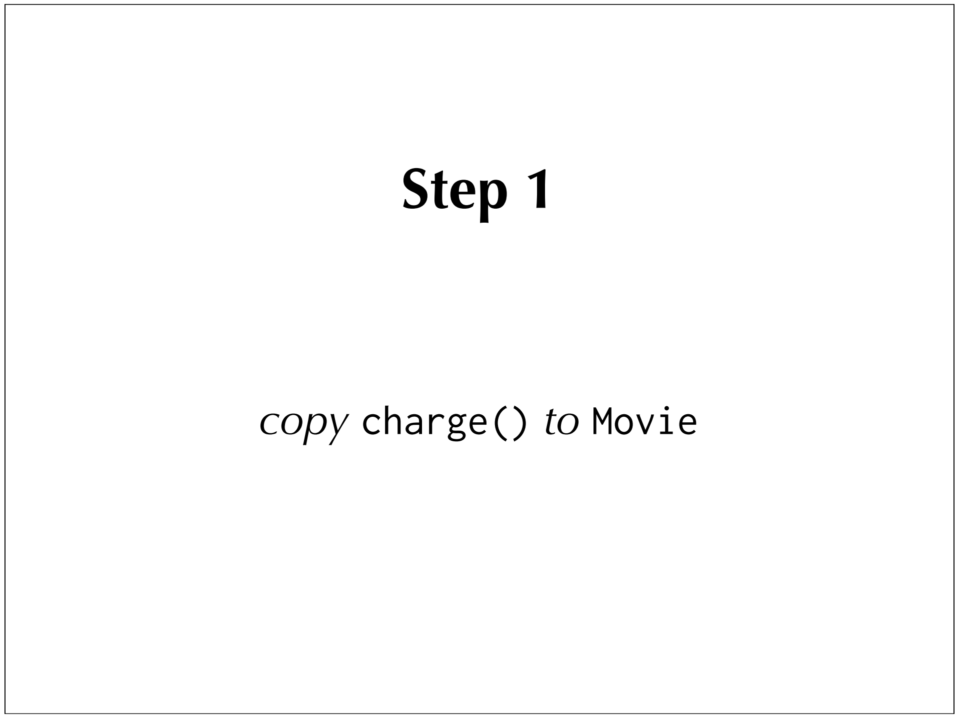
```
public class Rental {
   ....
    public double charge() {
        double total = 0;

        switch (getMovie().getPriceCode()) {
           case Movie.REGULAR:
               total += 2;
               if (getDaysRented() > 2)
                   total += (getDaysRented() - 2) * 1.5;
               break;
            case Movie.NEW_RELEASE:
                total += getDaysRented() * 3;
                break;
            case Movie.CHILDRENS:
                total += 1.5;
                if (getDaysRented() > 3)
                    total += (getDaysRented() - 3) * 1.5;
                break;
        }

        return total;
    }
    ....
}
```

How can we make it ready?

Modify the design so that we can add new categories of movie and change pricing strategies with ease.

Or at least more easily!

Note that we have another violation of the Law of Demeter, as well as a switch based on type of movie.



Step 1

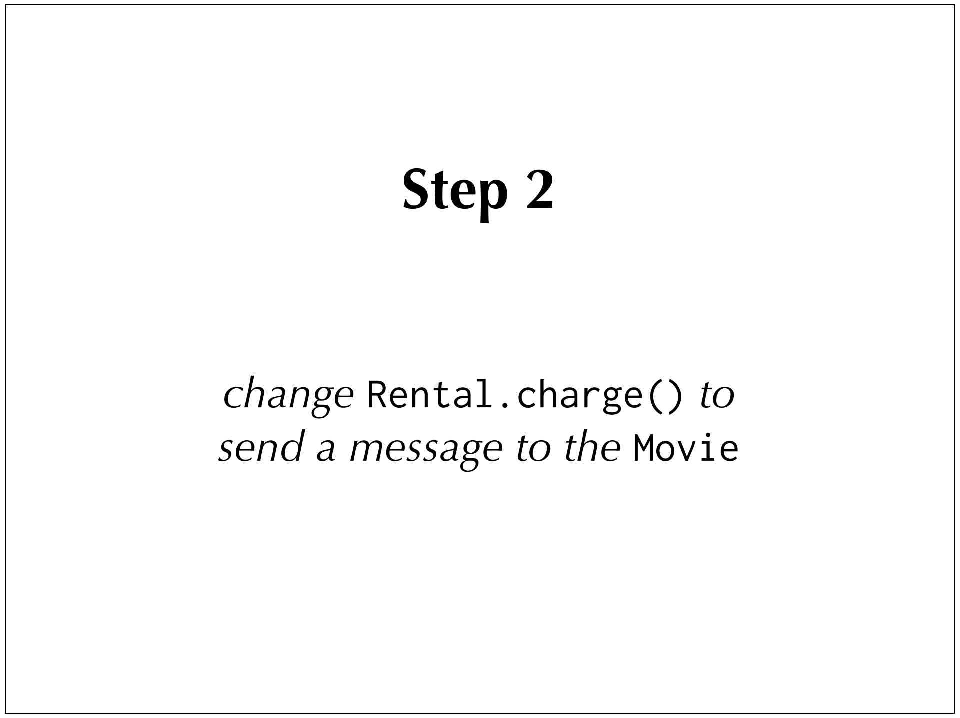
copy `charge()` *to* `Movie`

This choice involves sending `daysRented` as an argument. The code was using one piece of data from each class. Why is it better?

- One class reveals data to another.
  A change to that implementation decision is contained within the class.
  (as opposed to using another object's data)

- This creates new types.
  Types are more volatile, more likely to change
  A change to that implementation decision is contained within the class.

- A new type of object can provide other services.
  `Movie` contributes to the solution now!

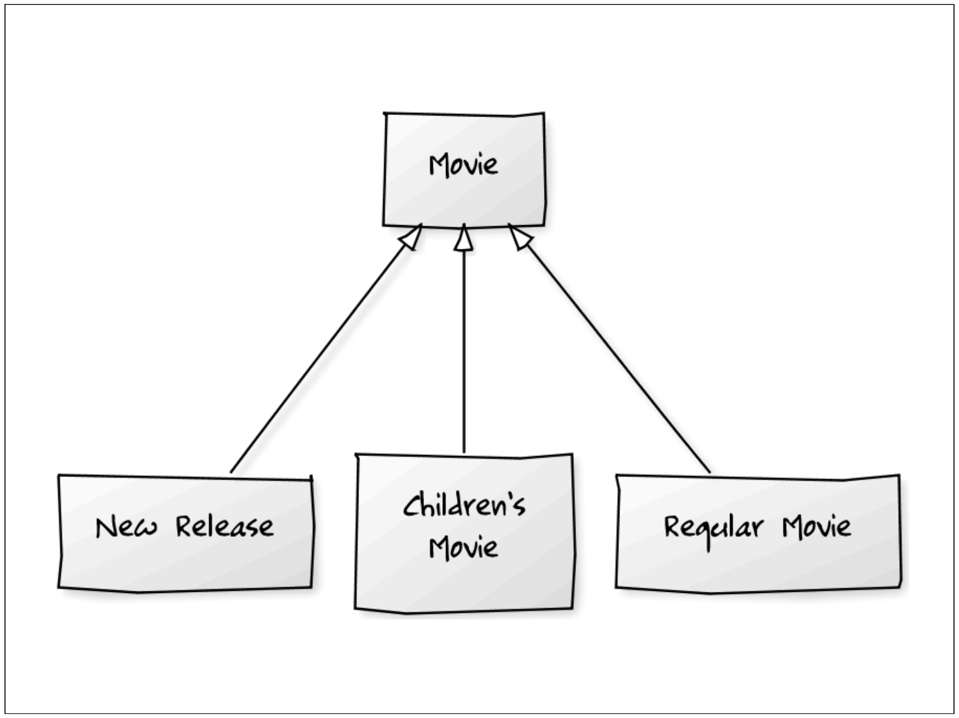


Step 2

change `Rental.charge()` *to*
send a message to the `Movie`

Now, we have several kinds of movie answering different ways based on their type, implemented with a flag variable and a `switch` statement.

This sounds like a job for subclasses!

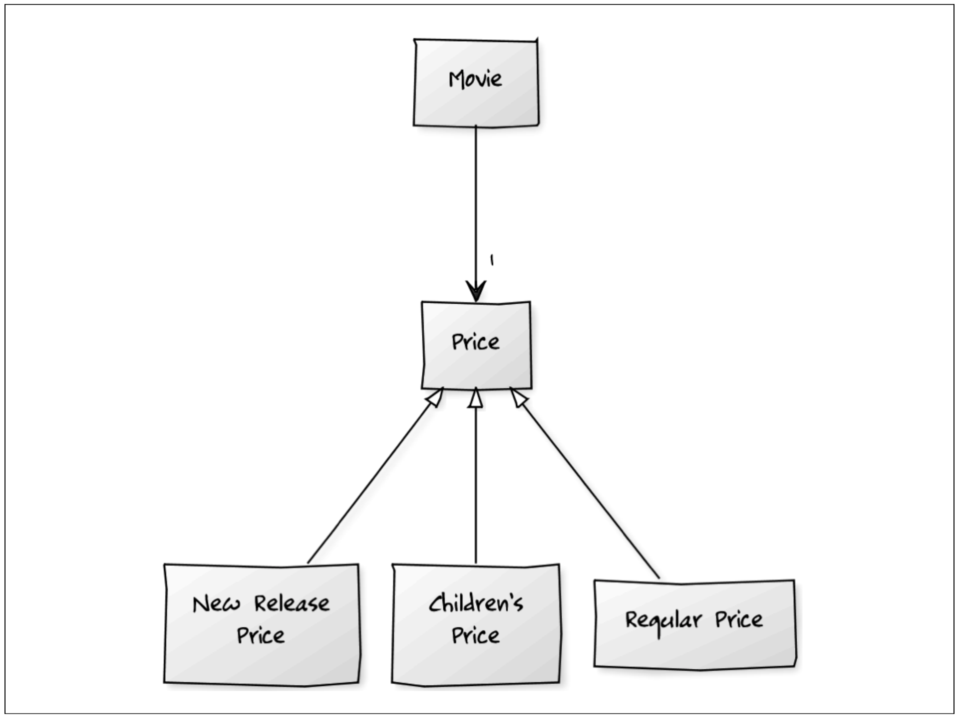


But that won't work. Why??

A movie can change its type during execution. A new release will become a regular release, or a regular children's movie.

An object cannot change its class during its lifetime.

Do you remember this problem from before?
(Session 17)
Do you remember its solution?
(composition on the Role Object pattern ... here, the State pattern)

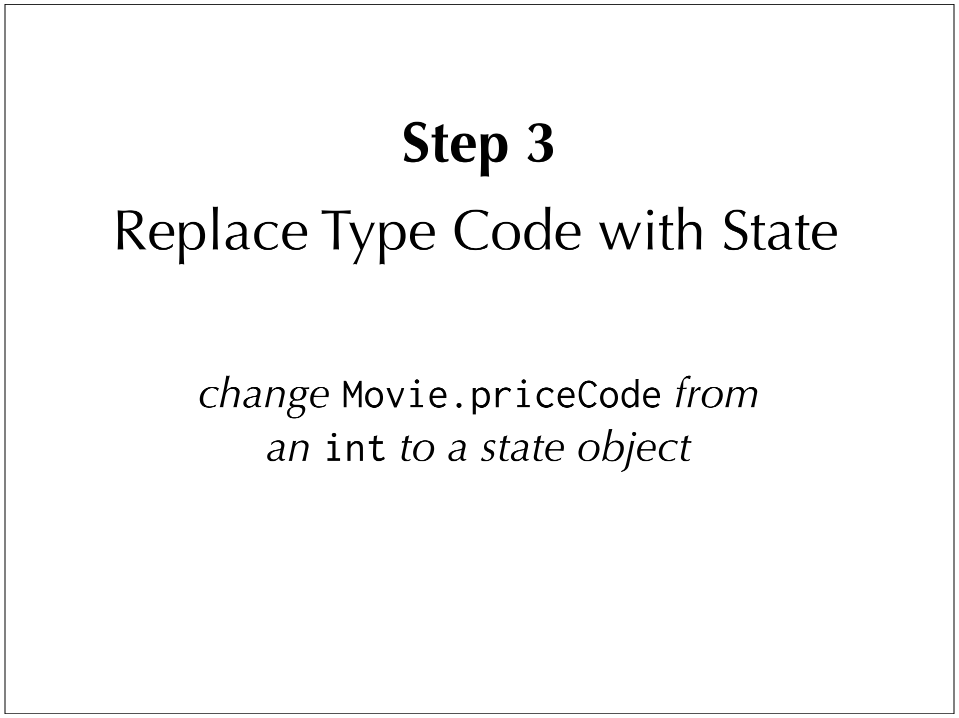


A `Movie`'s price can change but substituting a different `Price` object into its instance variable.

A `Movie`'s can calculate its price by sending a message to its `Price` object.

We can create new kinds of `Price` strategy by adding new subclasses.

We can change an existing `Price` strategy by changing a single class.



Step 3

Replace Type Code with State

change `Movie.priceCode` *from*
an `int` *to a state object*

1. Change the constructor to use the setter method for price code.

2. Create new `Price` classes.
   (copy these in -- don't type)

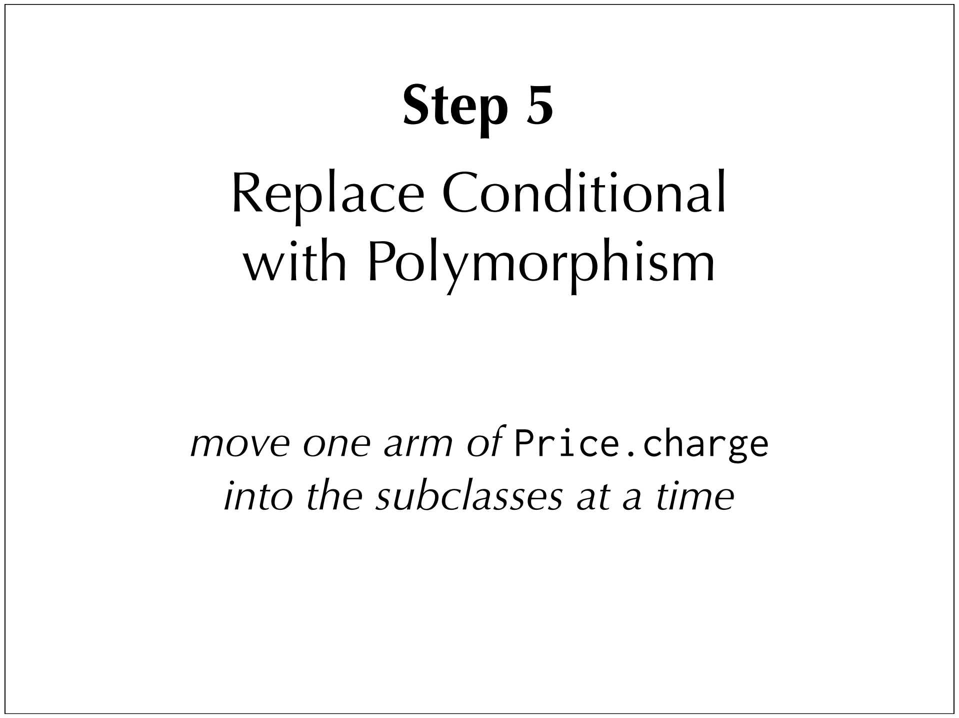
3. Change `Movie` accessors to use the `Price` classes.
   (copy these in -- don't type)
   Notice how `Movie` **encapsulates** its use of `Price` classes!

Step 4

Move Method

move `Movie.charge`
to the `Price` *class*

Again, copy, compile/test, call, compile/test.



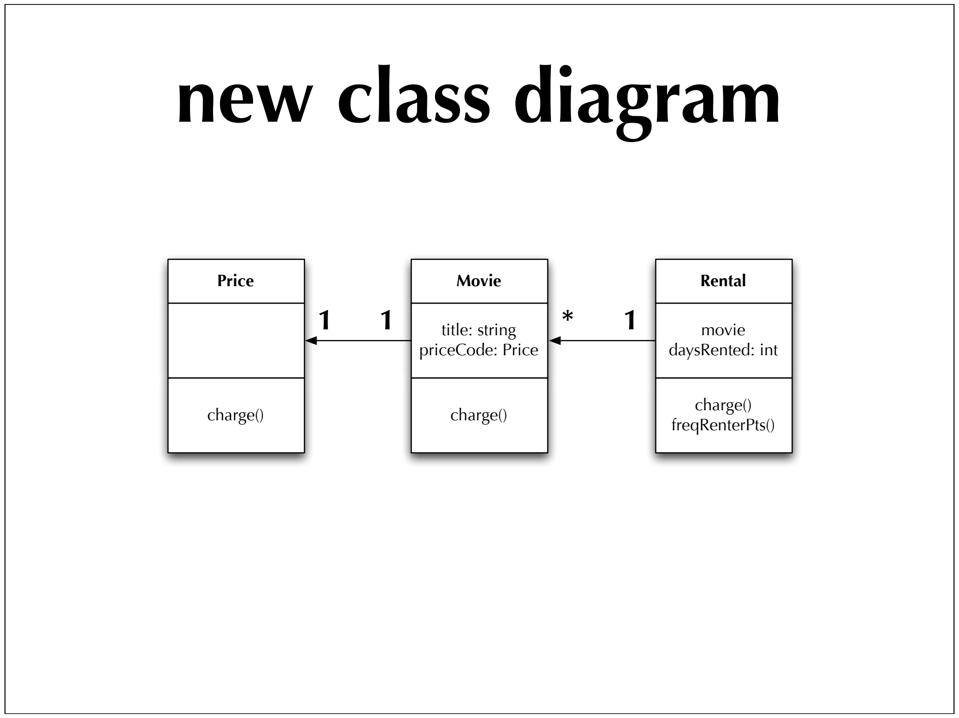
Step 5

Replace Conditional with Polymorphism

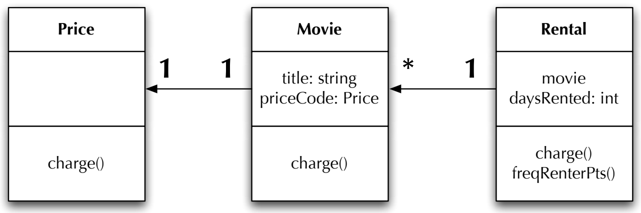
move one arm of `Price.charge` *into the subclasses at a time*

Again, copy the method.
Strip all but one arm of the switch.
Compile/test.
Remove old arm.
Compile/test.

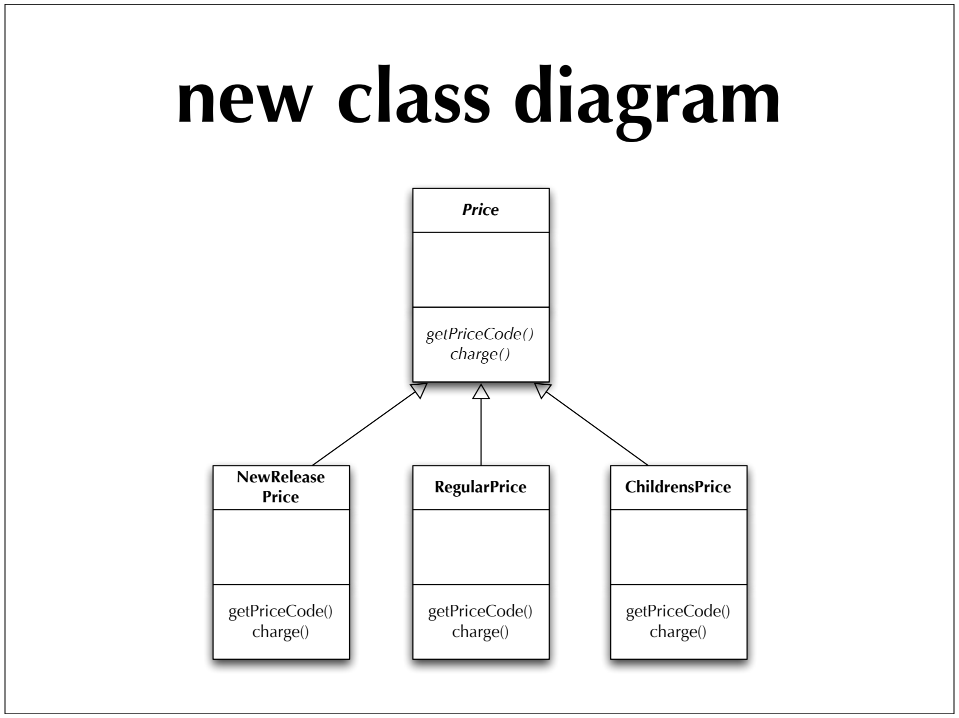
At end, leave `charge()` as an `abstract` method in `Price`. Vars typed to `Price` need to respond!



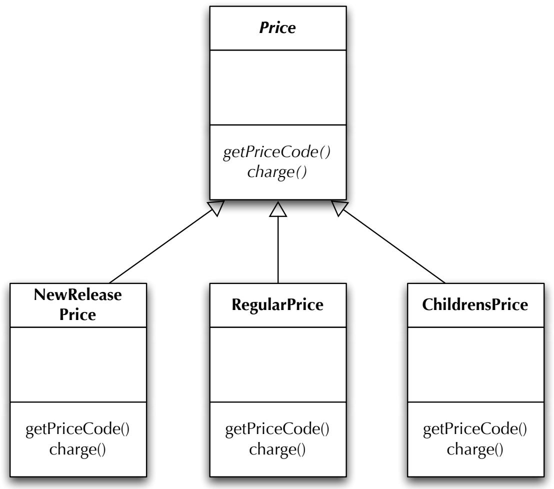
new class diagram



Better! `Movie` works.

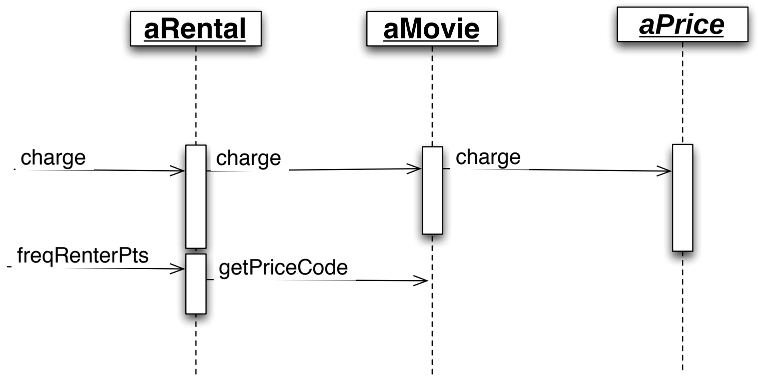


new class diagram

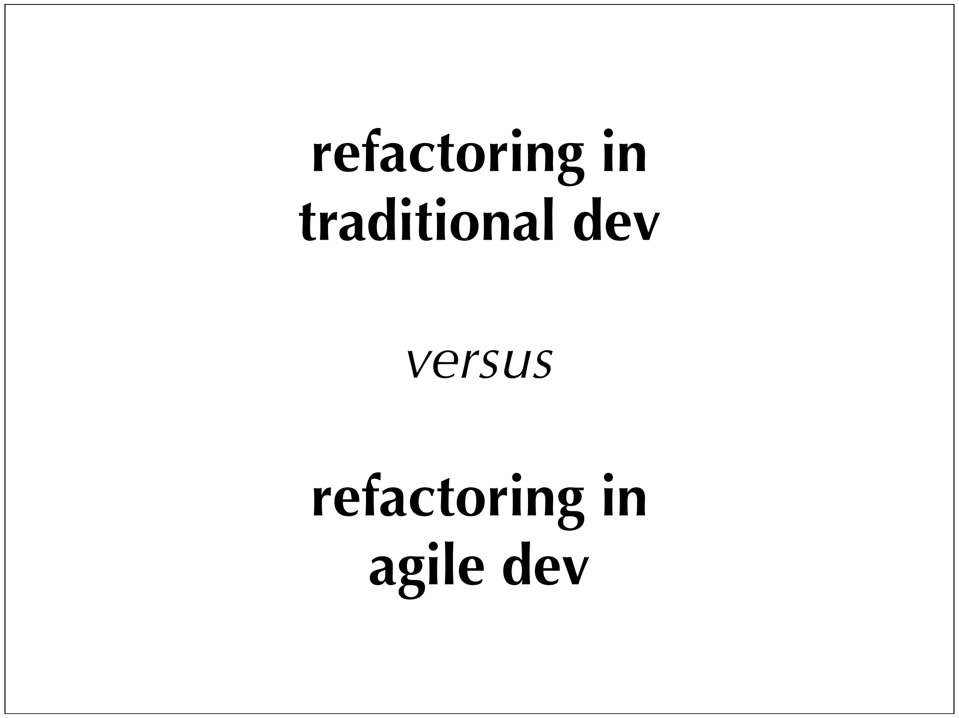


Better! `Price` is abstract, and instances of its subclasses do work.

new interaction diagram



Much better!!!!!



refactoring in traditional dev

versus

refactoring in agile dev

Do the simplest thing you possibly can.

Refactor to improve the code.

Red. Green. Refactor.

The design evolves slowly as we add features.
Refactoring is where we redesign!!!

[... fill in the blanks. Do the simplest thing. YAGNI. Refactor to create design.]