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Java Puzzle Ball

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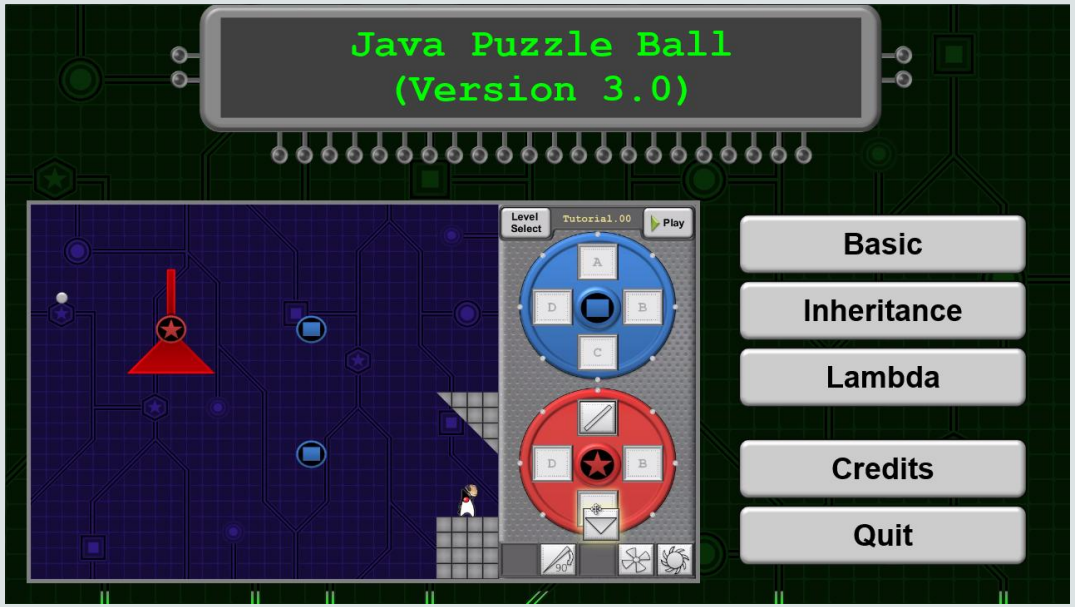
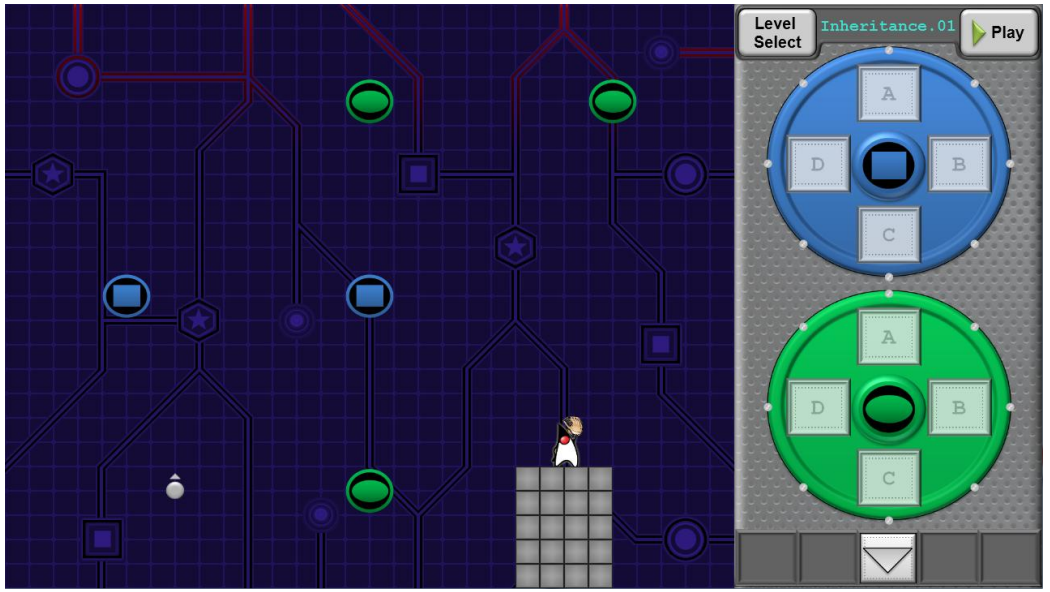
Lesson 3-2
Inheritance



Exercise 3

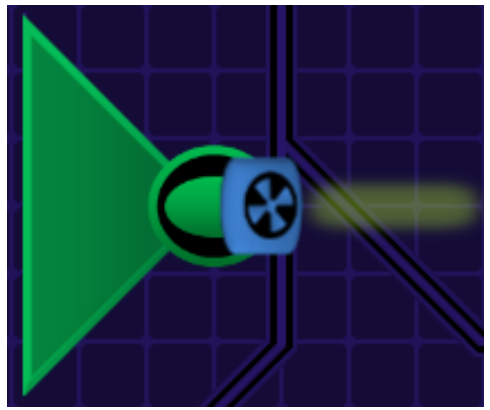
- Play **Inheritance Puzzles 1 through 3.**
- Consider the following:
  - What is inheritance?
  - Why are these considered "Inheritance" puzzles?

4 & 5 too, if you want to play more inheritance puzzles



What Is Inheritance?

- Did you notice blue shapes appearing on Green Bumpers?
- **Inheritance** allows one class to be derived from another:
  - A child class inherits the fields and methods of a parent class.
- The parent class is known as the **super class**.
- The child class is known as the **sub class**.
- From playing the game, you've observed and come to understand three key aspects of inheritance and the relationship between super classes and sub classes.

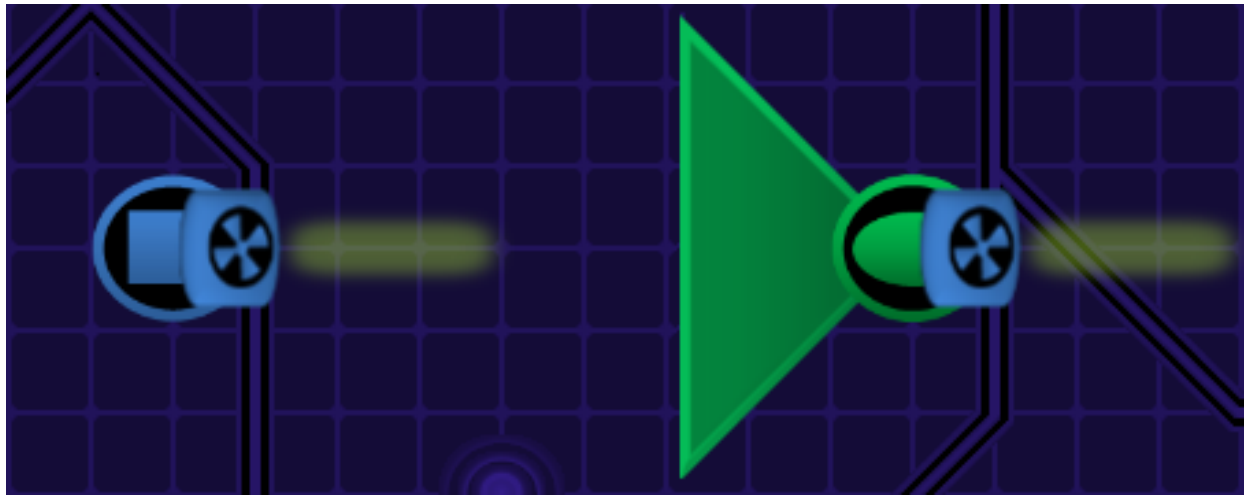


Inheritance Puzzle 1

- In the game:
  - Methods for deflecting the ball which were originally assigned to Blue Bumpers are also found on Green Bumpers.
- In Java:
  - A sub class shares the same methods as the super class.

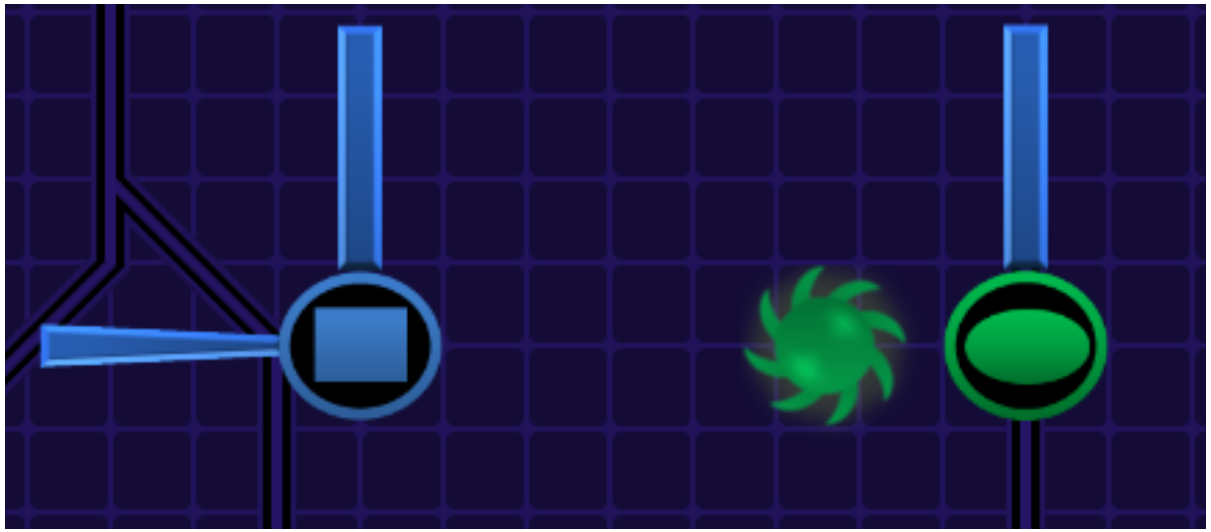
Inheritance Puzzle 2

- In the game:
  - Green Bumpers contain methods from Blue Bumpers, PLUS methods unique to Green Bumpers.
- In Java:
  - A sub class may have additional methods which aren't found in the super class.



Inheritance Puzzle 3

- In the game:
  - If Green Bumpers inherit unwanted Blue Bumper methods, it's possible to **override** or replace those methods.
- In Java:
  - A sub class may override the methods it inherits.



How Does this Happen?

- Inheritance is enabled in the sub class's declaration.
  - The GreenBumper class before inheritance is enabled:

```
public class GreenBumper{
    …
}
```

  - The GreenBumper class with inheritance enabled:

```
public class GreenBumper extends BlueBumper {
    …
}
```

- The sub class `extends` the super class.
  - The BlueBumper class acts as a super class.
  - The GreenBumper class acts as a sub class.
  - The GreenBumper class inherits, or extends, the blueprint of the BlueBumper class.

This is Inheritance!

- You've come to understand the effects of using the `extends` keyword:
  - A sub class shares the same methods as their super class.
  - A sub class may have additional methods which aren't found in the super class.
  - A sub class may override the methods it inherits.
- These are also known as some of the effects of **polymorphism**.
- Keep these three effects in mind as you explore the Java code more deeply in the next part of the lesson.
  - You'll see why inheritance is a useful programming technique.
  - And why we needed to label slots ABCD.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