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Java Puzzle Ball

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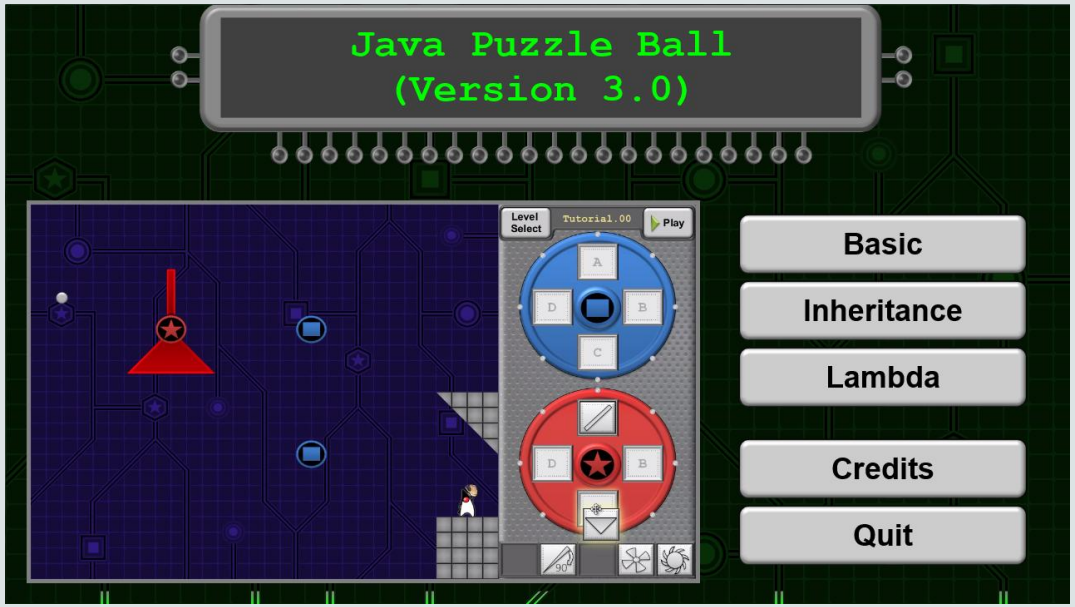
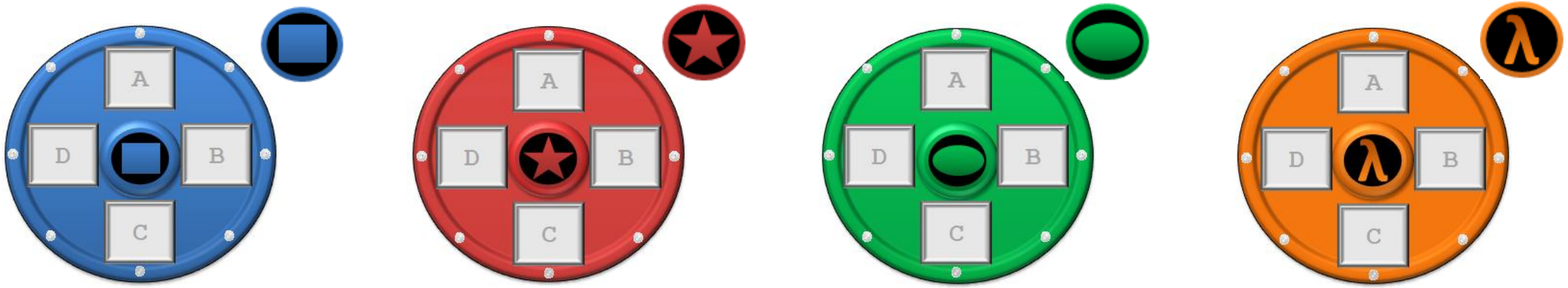
Lesson 4-1
Designing Lambda Puzzles



Mysterious Lambda

- I knew I was going need to make Lambda Puzzles.
  - Or maybe even a new game to teach Lambda expressions.
  - This would be for the Oracle University Java SE 8 New Features course.
- But I didn't know what this would look like.
  - Basic and Inheritance puzzles were developed without a design for Lambda.
  - I made art for Lambda wheels and bumpers, not knowing how I'd ever use them.

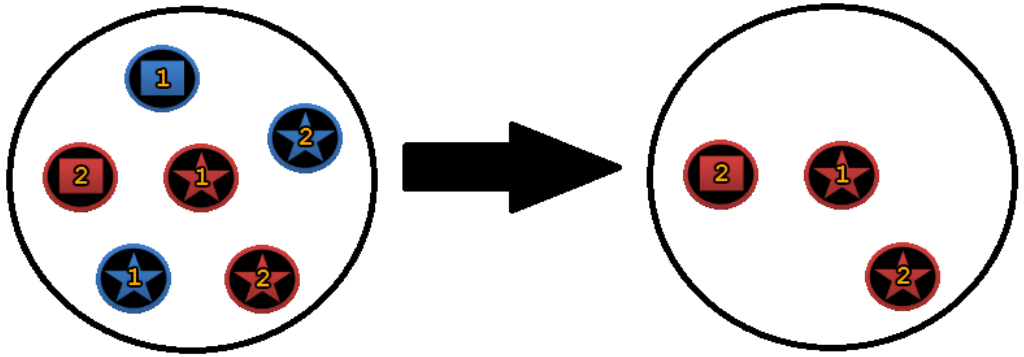


Areas to Improve

- Once you set the ball in motion, all you do is wait.
  - Could there be more interactivity?
  - Thankfully, Lambda can be used to process mouse events.
- Some testers thought they weren't learning if they weren't typing code.
  - Pig Pounder shows how this way of thinking can be dangerous.
  - I still wanted to see if Java syntax was a direction I could innovate.
- I wanted to destroy stuff.
  - You can turn the ball into a blade.
  - Can you ever slice Duke with the blade?
  - If not, it's just a big tease.

What did I Propose?

- I made a pitch at the beginning February 2014.
  - Lambda puzzles are different. You're not designing classes anymore.
  - But it **`extends`** the existing ball-bouncing and bumper code.
- One way I learn is by messing around with settings.
  - Observe the effects to gain insight into what a portion of code controls.
- Lambda puzzles let you…
  - Edit the values in Lambda expressions.
  - Click the ball as it moves to change its direction.
  - Filter away/destroy all BlueBumpers.
- This will make more sense as you play ;)

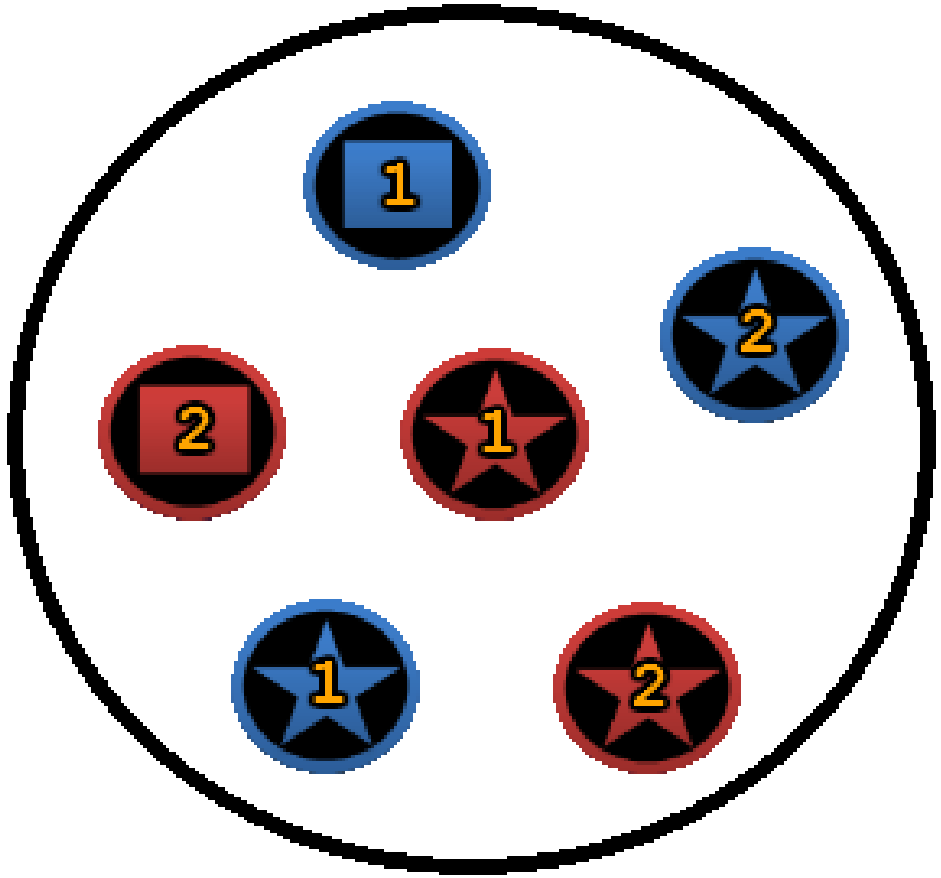


Filtering Based on Properties

- When you have a program with a lot of instances, you often need to search, compare, and filter those instances based on their properties.
  - Award a $20 monthly bonus for every account with at least $20,000.
  - Charge a fee for every account that hasn't posted enough transactions in a month.
  - Search for every account in your name.
- Performing these actions involves examining account object fields:
  - `balance`
  - `numberOfTransactions`
  - `accountOwner`
- Lambda expressions are very good at handling this logic.

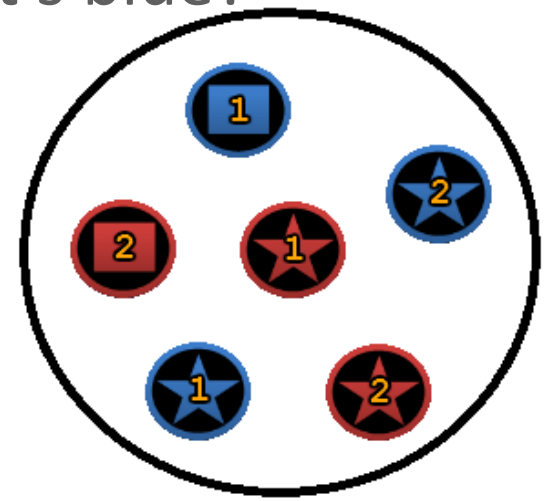
Filtering Based on Properties in Java Puzzle Ball

- Lambda Puzzles let you to perform actions and filter bumpers based on their properties.
- Bumper properties included…
  - `shape`
  - `color`
  - `number` This property is new
- However, this caused an issue for colorblindness.



Addressing Colorblindness

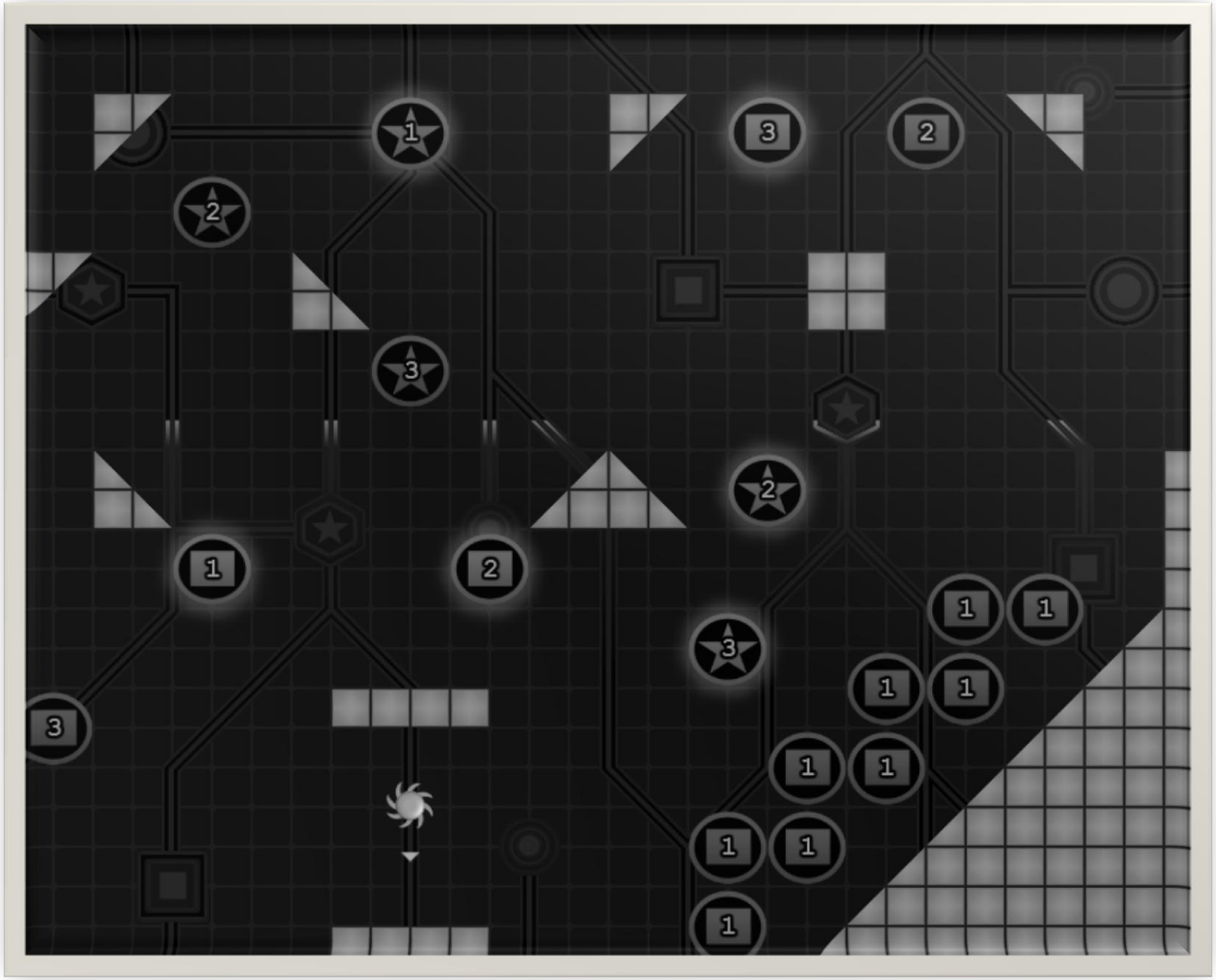
- Previously, all Blue Bumpers contained rectangles and Red Bumpers contained stars.
  - If you couldn't tell the difference between blue and red, you could at least tell the difference between a rectangle and a star.
- Lambda Bumpers wrecked this convention by mixing colors and shapes.
- How do players remove Blue Bumpers if they can't tell what's blue?
  - We added a glow around Blue Bumpers to address this.
  - This is called software **accessibility**.
  - You want to make software as accessible to everyone as possible.



Can You Tell Which Bumpers are Blue?

Yes

No



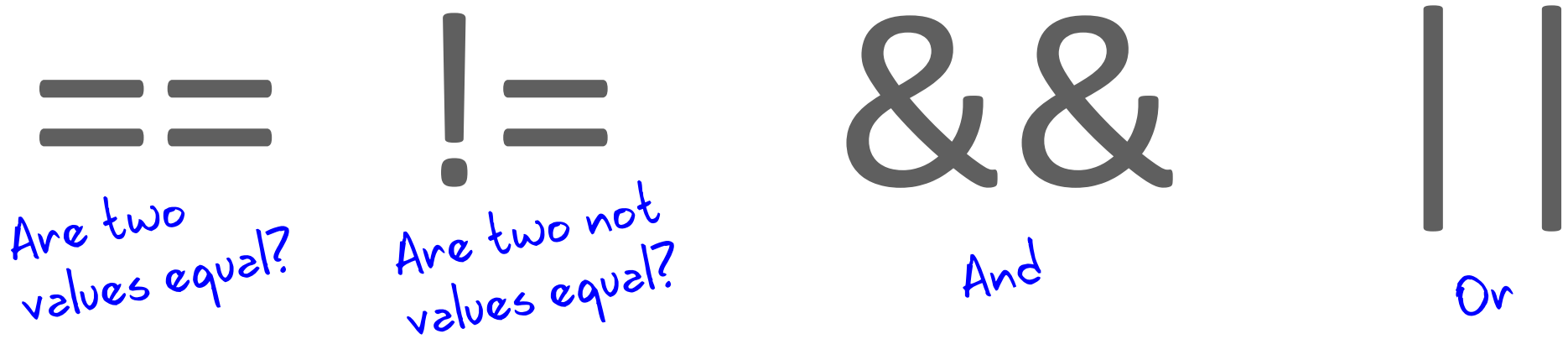
Developing Lambda Puzzles

- This game mode took 1 month to develop.
- It was tied to an Oracle University course with a more-advanced audience.
- It assumed players came already understanding a few things about Java syntax and boolean values.
- I'll explain these right now.

== != && ||

Logic Operators in Java

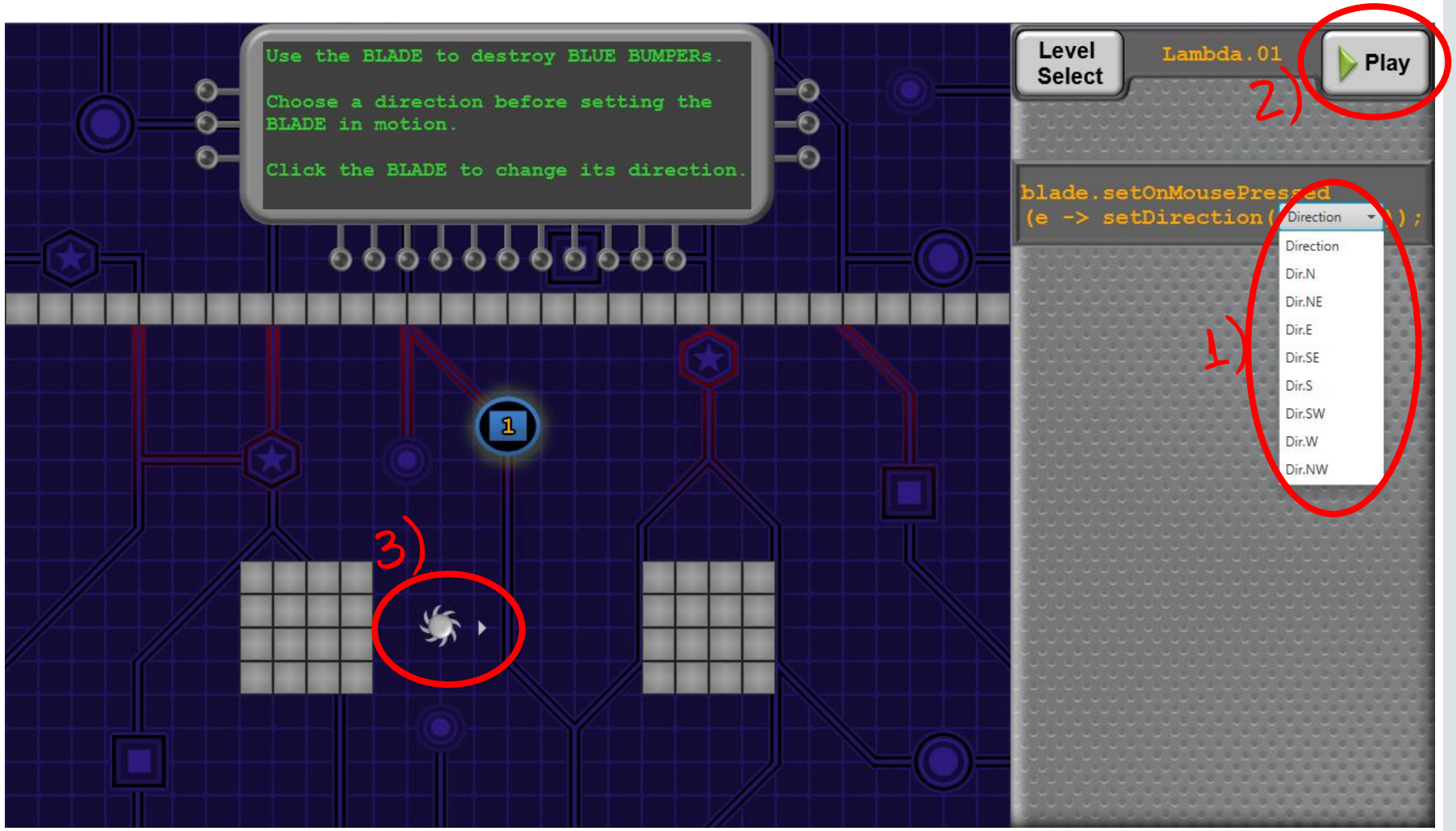
- Sometimes programs need to compare several values.
  - Java provides special operators to do this, including:



- As you play, try to discover more about how these operators work.
  - Remember, a goal of this course is to learn by playing around.

How to Play

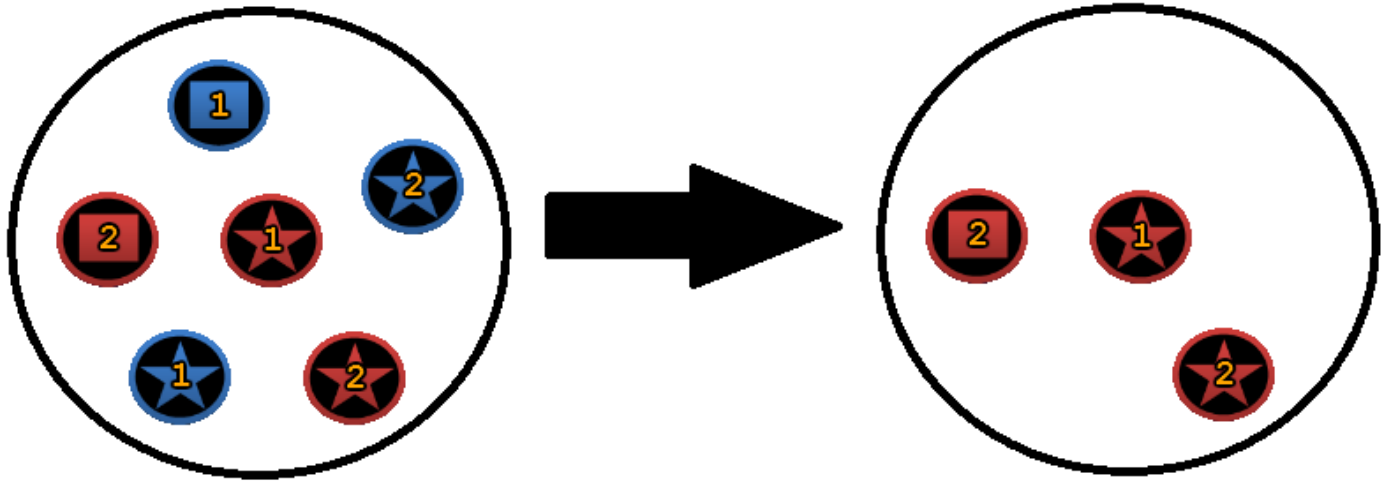
1. Alter settings
2. Set the blade in motion
3. Click the blade to change its direction



Exercise 4

- Play **Lambda Puzzles 1 through 7.**
  - Destroy Blue Bumpers
  - Preserve Red Bumpers
- Consider the following:
  - Can you identify use-cases for lambda expressions?
  - Can you figure out how the logic operators work?

You're welcome to play beyond puzzle 7

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