Java™

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Java Puzzle Ball

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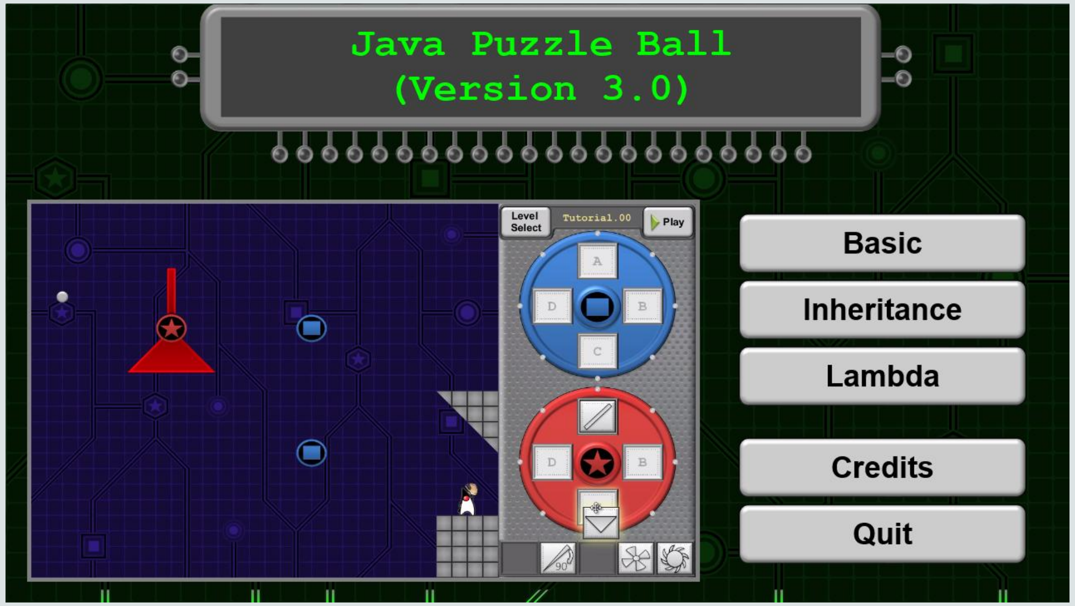
Lesson 1-3
Editing Java Code



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Triangle Wall Icon

Java Puzzle Ball Code is Complex

```
theta = Math.toRadians(180-theta);
double r = image.getHeight();
double x = r*Math.sin(theta) -(image.getWidth()/2)*Math.cos(theta) +pivotX;
double y = r*Math.cos(theta) +(image.getWidth()/2)*Math.sin(theta) +pivotY;
p1.setLocation(x,y);

x = r*Math.sin(theta) +(image.getWidth()/2)*Math.cos(theta) +pivotX;
y = r*Math.cos(theta) -(image.getWidth()/2)*Math.sin(theta) +pivotY;
p2.setLocation(x,y);

r = 0;
x = r*Math.sin(theta) +pivotX;
y = r*Math.cos(theta) +pivotY;
p3.setLocation(x,y);

walls.get(0).setLine(p1,p2);
walls.get(1).setLine(p2,p3);
walls.get(2).setLine(p3,p1);
```

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Very Complex…

Triangle Wall Icon

```
if(javafxapplication01.Ball.getSingletonBall().getIsBladeBall() == true && !isDestroyed){
      javafxapplication01.Ball.getSingletonBall().setBladeToBall();
      bumper.destroy();
      }
if(!isDestroyed){
      return new GameObjectAction(true, new Behavior() {
          @Override
          public GameStatus step(Ball ball, Game game) {
               Level.sfxEngine.addSfx(new FireworksSFX(Level.sfxlayer,
Level.game.getBall().getLocation(), 25, 7, 15, Level.game.getBall().getDirection()));
               bumper.bumpedByBall();
               Point2D destination = ball.calculateDestination();
               ball.setLocation(destination);
               ball.setBehavior(null);
               return GameStatus.RUNNING;
           }
       });
   }
```

How will we Handle Complex Code?

- The previous two slides show just a portion of how the Triangle Wall code is implemented.
- It's complex.
  - In fact, it's too complex for this course.
- Solution: Abstract complex code
  - The Triangle Wall Icon (▽) represents this implementation in-game.
  - The syntax `TriangleWall()` also represents this implementation in examples.

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Methods and their Implementation

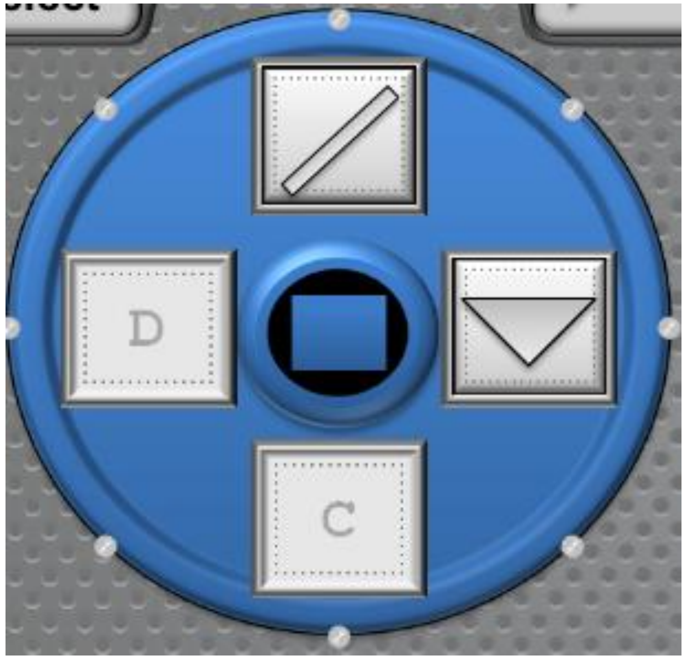
```
 public class BlueBumper {
     private Color color = Color.BLUE;
     private Shape shape = Shape.RECT;
     private int xPosition;
     private int yPosition;


…
     public void methodA(){
         simpleWall();
     }
     public void methodB(){
         triangleWall();
     }
     public void methodC(){

     }
     public void methodD(){

     }
 }
```

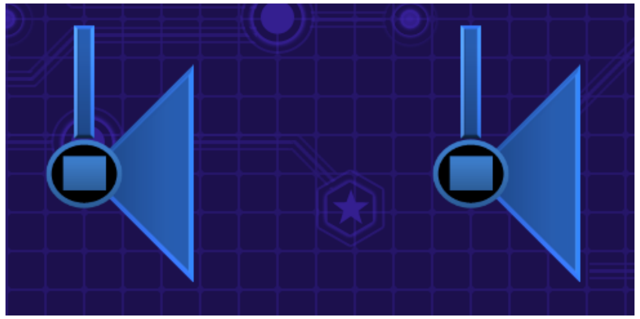
This method is called **`methodB()`**

Its implementation exists between two curly braces **`{ }`**

The complex implementation is represented by **`triangleWall()`**

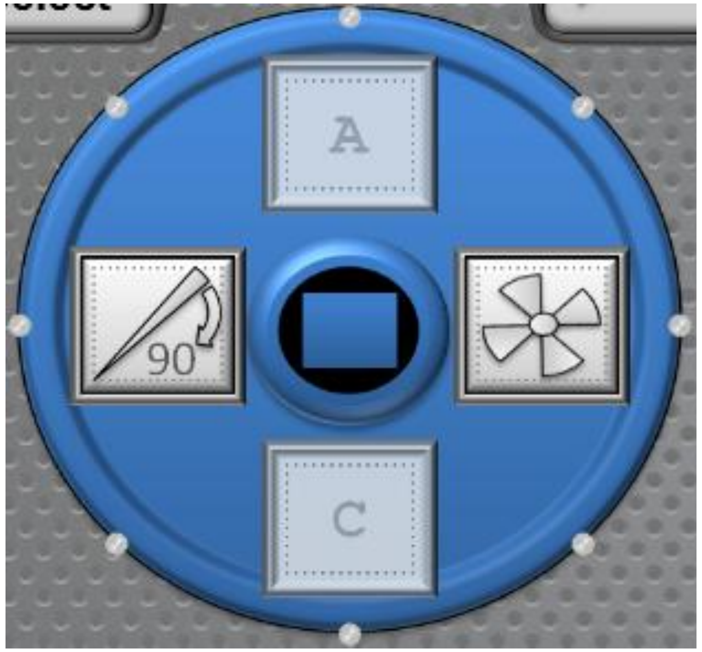
You've Dictated how Methods should be Implemented…

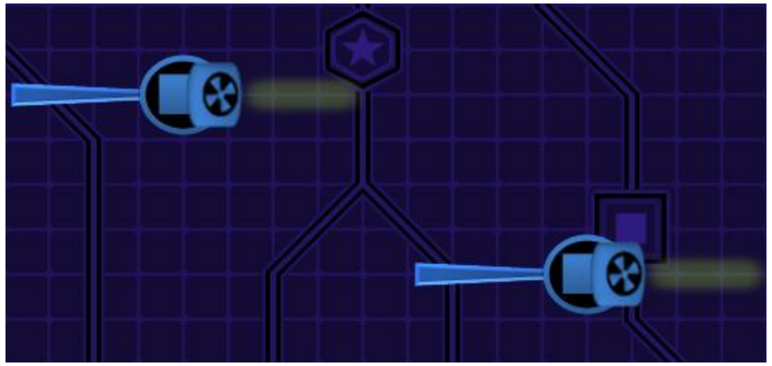




```
public class BlueBumper {
    private Color color = Color.BLUE;
    private Shape shape = Shape.RECT;
    private int xPosition;
    private int yPosition;

…

    public void methodA(){
        simpleWall();
    }
    public void methodB(){
        triangleWall();
    }
    public void methodC(){

    }
    public void methodD(){

    }
}
```

And Designed Classes to Accomplish your Goals





```
public class BlueBumper {
     private Color color = Color.BLUE;
     private Shape shape = Shape.RECT;
     private int xPosition;
     private int yPosition;

…
     public void methodA(){

     }
     public void methodB(){
          fan();
     }
     public void methodC(){

     }
     public void methodD(){
          rotationWall();
     }
}
```

You've Come Far

- Think about what you now understand better:
  - Objects and Instances
  - Classes
  - Fields
  - Methods
  - Implementations
  - Java syntax
- Think about what problems you now have experience wrestling:
  - Planning and designing classes
  - Distributing methods wisely between classes

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Your Hacking will be Sophisticated!

- Those are impressive and complex computer science topics!
- Now you're ready to apply this to editing your own Java code.

- You'll wisely edit code, not just hacking or guessing, to discover a solution
  - Because you have the conceptual understanding not to be helpless when faced with would-be walls of mystery syntax.
- This is how I learned programming at game studios:
  - Play with existing code to get a desired effect.
  - It would have gone faster if I understood what I was looking at.
  - You have advantages. Your hacking is "guided hacking" on a conceptual foundation.

Lab 1: Write a `CheckingAccount` class

- The Lab Instructions are available on the Lesson 1 page of the MOOC.
- As you work, consider…
  - What properties and behaviors are found in a checking account?
  - How can these be expressed through fields and methods?
- The remaining part of this lesson will give you tips.

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The `SavingsAccount` class

```
public class SavingsAccount {
    //Fields
    private String accountType;
    private String accountOwner;
    private double balance;
    private double interestRate;

    //Methods
    public void printDetails(){
       …
    }
    public void earnInterest(){
       …
    }
    public void deposit(double x){
       …
    }
}
```

- Properties:
  - Account Type
  - Account Owner
  - Balance
  - Interest Rate
- Behaviors:
  - Print Details
  - Earn Interest
  - Deposit
  - Withdraw

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The `CheckingAccount` class

```
public class CheckingAccount {
    //Fields




    //Methods







}
```

- Properties:
  - Account Type
  - Account Owner
  - Balance
  - ~~Interest Rate~~
- Behaviors:
  - Print Details
  - ~~Earn Interest~~
  - Deposit
  - Withdraw

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Study SavingsAccount to Build CheckingAccount

```
public class SavingsAccount {
    //Fields
    private String accountType;
    private String accountOwner;
    private double balance;
    private double interestRate;

    //Methods
    public void printDetails(){
       …
    }
    public void earnInterest(){
       …
    }
    public void deposit(double x){
       …
    }
}
```

```
public class CheckingAccount {
    //Fields





    //Methods
    public void printDetails(){
       …
    }





    }
}
```

Play with the `TestClass`

```
public class TestClass {
    public static void main(String[] args) {

    //Create new instance
    SavingsAccount savings1 = new SavingsAccount();

    //Call methods on instance
    savings1.printDetails();
    savings1.deposit(5000);
    savings1.widthdraw(100);
    savings1.earnInterest();

    //Create new instance
    CheckingAccount checking1 = new CheckingAccount();

    //Call methods on instance

    }
}
```

- You'll also notice the `TestClass`.
- It contains a special `main` method.
  - This is where Java code starts executing.
  - It creates instances and calls methods on those instances.
- Play with the `main` method to test Savings and Checking Account instances.

Lots More to Learn…

- What do `public` and `private` mean?
- What do `String`, `double`, and `void` mean?

- You won't need to know these keywords for this course.
  - But if you're curious, Oracle as other courses where you can learn more.

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