

Lecture 9: Animating Objects

CS 51G
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Announcements

- Discuss Exercises 7.10.3
- Questions on Light Balloon?

Visibility Annotations

- **Public:**
 - Features can be seen from inside or outside the class
 - All methods are public by default
- **Confidential**
 - Features can only be seen from inside class (or subclass)
 - defs and vars at top level are confidential by default
 - Preserves abstraction:
 - From outside can't access or change handle of light

Helper methods

- Sometimes define method only as helper
 - Don't want visible to others
 - With laundry, could use helper method to change color
 - Declare as confidential
 - `method m(...) is confidential {...}`
 - Confidential methods not listed in type!

Public def

- If declare constant (def) public then system creates a parameterless method to return value
 - Can't tell difference from method you wrote:
 - `def width: Number = 10 is public`
equivalent to
 - `method width -> Number {10}`

Variable

- If declare var readable then system creates a parameterless method to return value
- If declare writeable then creates method with := to update value
 - Can't tell difference from method you wrote:
 - `var color: Color := colorGen.red` is writeable equivalent to
 - `var color': Color := colorGen.red`
`method color:= (newColor: Color) -> Done {color' := newColor}`
- If declare public, get both methods!

Can you tell how defined?

- From outside, can't tell how methods like
 - `color`, `color:= newColor` are defined
 - Would declaring variable `public` in `Tshirt` work?

Animations

- import “animation” as animator
- Provides methods:
 - while {cond} pausing (delay) do {...}
 - while {cond} pausing (delay) do {...} finally {...}
 - plus others.
- Methods are asynchronous
 - Following statements continue while animation is going.
 - If want to delay statements to end of loop, do in finally clause.

Real Pong

- Ball starts at random angle and bounces off walls and paddle.
 - <http://www.cs.pomona.edu/classes/cs051G/demos/Pong/>
 - PongBall.grace has ball bouncing off walls/paddle
 - PongBallNormalized uses elapsed time to move ball correctly when delay may be too long because computer busy!

Code Quality

- Code is high quality if it is easy to understand and efficient.
- See CS 51 Style guidelines for readability & comments/formatting
- Some bad code is unnecessarily wordy & inefficient.

Bad Examples

```
if (dragging == true) then {  
    doSomething  
} elseif {clicking == false} then {  
    doSomethingElse  
}
```

can be simplified to

```
if (dragging) then {  
    doSomething  
} elseif {!clicking} then {  
    doSomethingElse  
}
```

Bad Examples

```
if (theSwatch.contains (point)) then {  
    dragging := true  
} else {  
    dragging := false  
}
```

can be simplified to

```
dragging := theSwatch.contains (point)
```

Questions?