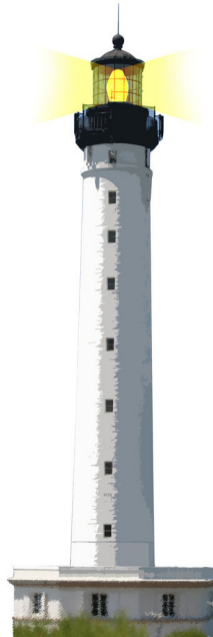


# Messages: Composition and Precedence



# Composition: from Left to Right!

What happens when we have two messages of the same kind?

- Execution from left to right

```
1000 factorial class name  
> 'LargePositiveInteger'
```

is equivalent to

```
((1000 factorial) class) name)
```

- Ease the composition of messages



# Complete Message Precedence

- (Msg) > Unary > Binary > Keywords
- From left to right



# Precedence Example

$2 + 3$  squared

$> 2 + 9$

$> 11$

- unary (squared) first
- then binary (+)

# Precedence Example

```
2 raisedTo: 3 + 2  
> 2 raisedTo: 5  
> 32
```

- binary (+) first
- then keyword-based (raisedTo:)

# Precedence Example

```
Color gray - Color white = Color black  
> aGray - aWhite = aBlack  
> aBlack = aBlack  
> true
```

- unary messages
- then binary from left to right



# Precedence Example

```
1 class maxVal + 1  
> 1152921504606846976
```

- unary, unary and binary

```
1 class  
> SmallInteger
```

```
1 class maxVal  
> 1152921504606846975
```

```
1 class maxVal + 1  
> 1152921504606846976
```

```
(1 class maxVal + 1) class  
> LargePositiveInteger
```

# Parentheses take Precedence!

0@0 extent: 100@100 bottomRight  
> Message not understood  
> 100 does not understand bottomRight

Should use ()

(0@0 extent: 100@100) bottomRight  
> (aPoint extent: anotherPoint) bottomRight  
> aRectangle bottomRight  
> 100@100





# The Price for Simplicity

Only messages:

- +
  - is a message, no precedence
  - can be redefined in domain classes
- Simple
- One limit: no mathematical precedence



# No Mathematical Precedence

$3 + 2 * 10$   
 $> 5 * 10$   
 $> 50$

- should be rewritten using parentheses

$3 + (2 * 10)$   
 $> 3 + 20$   
 $> 23$



# No Mathematical Precedence

$$\begin{aligned} &1/3 + 2/3 \\ &> 7/3 / 3 \\ &> 7/9 \end{aligned}$$

- should be rewritten using parentheses

$$\begin{aligned} &(1/3) + (2/3) \\ &> 1 \end{aligned}$$

# Summary

- Three kinds of messages: unary, binary and keywords
- (...) > unary > binary > keywords
- Then from left to right
- There is no mathematical precedence because mathematical operations are plain messages
- Arguments are placed inside message structure:
  - 2 between: 0 and: 5 (the message is between:and:)



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