

# Pharo Object Model in a Nutshell

Elegance and Simplicity

Damien Cassou, Stéphane Ducasse and Luc Fabresse

W1S04



<http://www.pharo.org>



# Only Objects, Messages, ...

- **Objects**: mouse pointer, booleans, arrays, numbers, strings, windows, scrollbars, canvas, files, trees, compilers, sound, url, socket, fonts, text, collections, stack, shortcut, streams...
- **Messages** sent to these objects: size, +, at:put:, do:, ...



## ... and Block Closures

- Messages are **what** (intent)
- Methods are **how** to do it
- Closures are kind of anonymous methods
- Closures are called **blocks** in Pharo

```
4 timesRepeat:  
  [ Transcript show: 'Hello World' ]
```

- [ ... ] delimits a block



# A Simple and Uniform Model

- **Everything** is an object, instance of a class
  - Classes and messages are objects too!
- All computations between objects are done via **message passing**
- We use the term **sending a message** because:
  - methods are always looked up dynamically
  - only late binding, only virtual calls
- Only **ONE** method lookup for all objects



# Pharo Object Model

- Instance variables are protected:
  - private to the object
  - accessible from subclasses
- Methods are public and virtually bound
- Single inheritance between classes



# Messages

Computation between objects is done via message sends  
Example of the cross product of two points:

$$(\text{point1 } x * \text{point2 } y) - (\text{point1 } y * \text{point2 } x)$$

# Object Creation: Creating a Point

A new object can be created by sending a message to another object

```
10@20
```

A new Point object is created by:

- sending the message @
- to the object 10 (SmallInteger)
- with the argument 20 (SmallInteger)



# Object Creation: Creating a String

```
'Pharo', ' is Cool'  
> 'Pharo is Cool'
```

A new String is created as the concatenation of two strings by:

- by sending the message ,
- to the string 'Pharo'
- with the string ' is Cool' as argument





# Object Creation

Sending the messages `new` and `new:` to a class

```
Monster new  
> aMonster
```

```
Array new: 6  
> #(nil nil nil nil nil nil)
```

Here we get an array of size 6



# Object Creation

Sending instance-creation messages to a class

```
Tomagoshi withHunger: 10
```

This executes a class method



# Less is More :)

- No constructors
- No static methods
- No type declarations
- No interfaces
- No package/private/protected modifiers
- No parametrized types
- No boxing/unboxing
- still **really** powerful :)



# Summary

- Everything is an object
- Computation is done via messages sent to objects
- Methods are late bound (looked up dynamically in the inheritance chain)
- Blocks are kind of anonymous methods
- Instances are created by sending messages to other objects, or classes



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