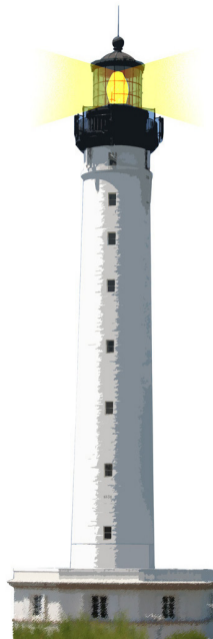


# Inheritance and Lookup: Self

Understanding lookup once for all

S. Ducasse and G. Polito



# Goals

## Understanding

- Sending a message
- Method lookup
- Semantics of `self/this`



# Remember inheritance

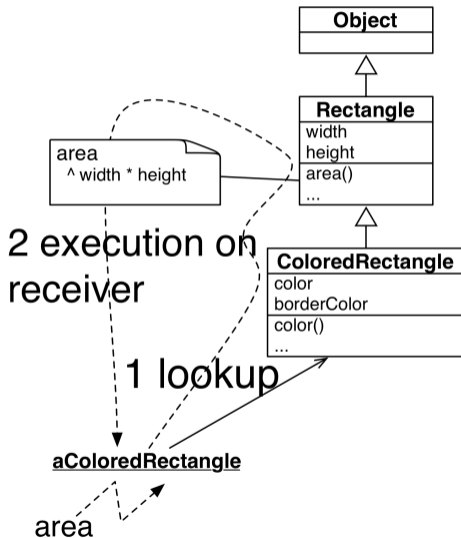
- Inheritance of **state** is **static** (done at compile time)
- Inheritance of **behavior** is **dynamic**
- In this lecture we focus on the behavior part



# Message sending

**Sending a message** is a two-step process:

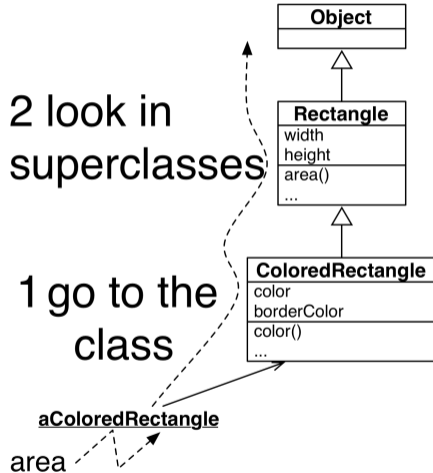
1. **look up** the **method** matching the message
2. **execute** this method on the **receiver**



# Method lookup

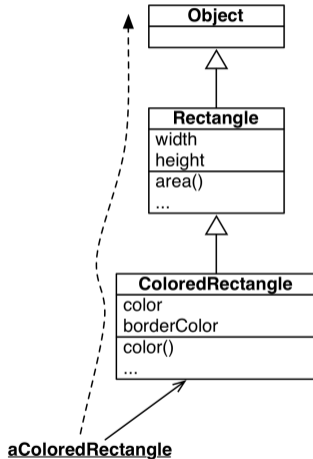
The lookup starts in the **class** of the **receiver** then:

- if the method is defined in the class, it is returned
- otherwise the search continues in the superclass



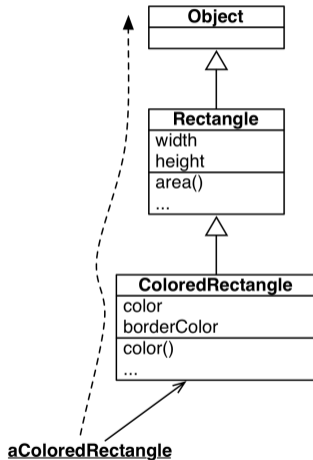
# Some lookup cases

Sending the message `color` to `aColoredRectangle`



# Some lookup cases

Sending the message `area` to `aColoredRectangle`



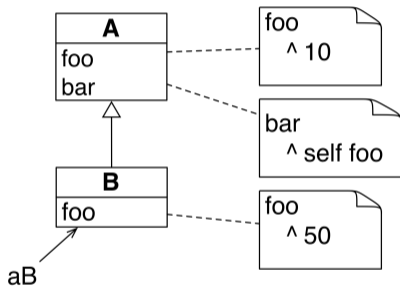
# About lookup

- Most of the time, the result of a lookup is cached
- In some languages, there are dispatch tables
- The point is that conceptually there is a lookup at execution



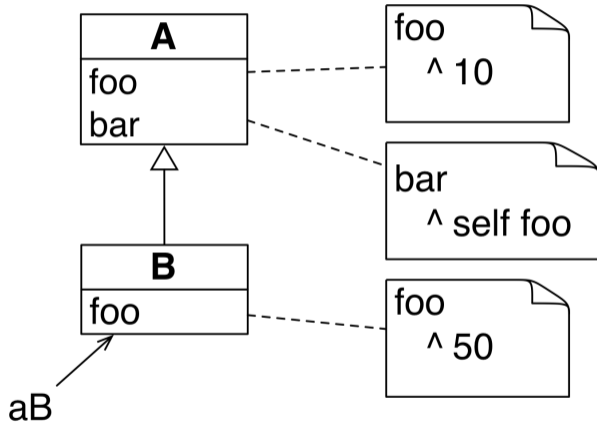


# What is self/this?



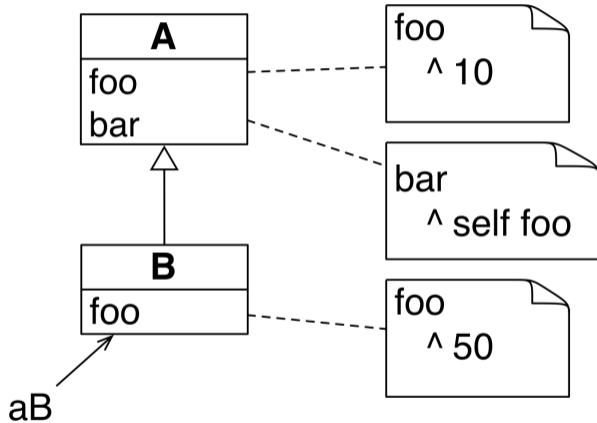
- Take 5 min and write the definition of `self` (this in Java).
- your definition should have two points:
  - what does `self` represent?
  - how is a method looked up when a message is sent to `self`?

# Let us explore a bit



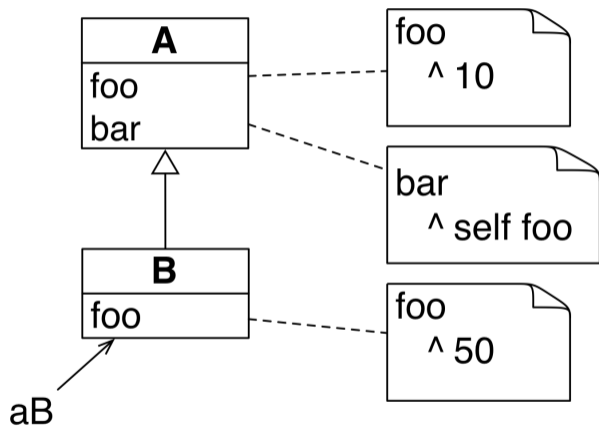
- `aA` is an instance of `A`  
(obtained executing `A new`)
- `aB` is an instance of `B`  
(obtained executing `B new`)

# Let us explore a bit



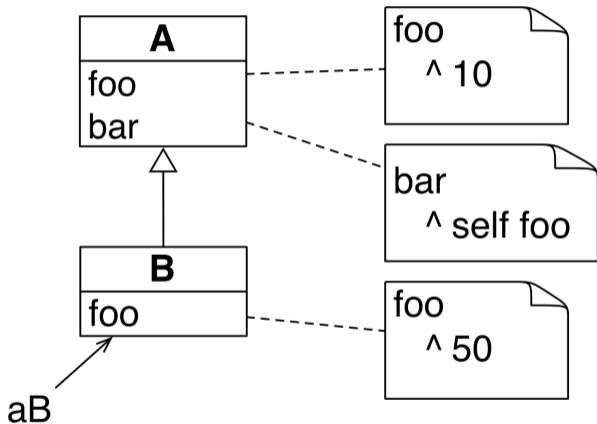
```
aA foo  
>>> ...  
aB foo  
>>> ...
```

# self always represents the receiver



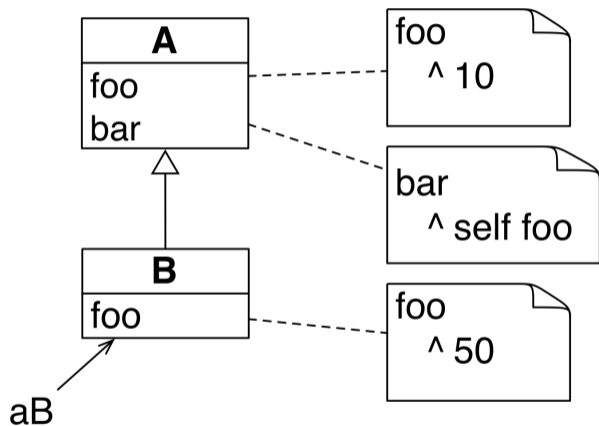
```
aA foo  
>>> 10  
aB foo  
>>> 50
```

# self always represents the receiver



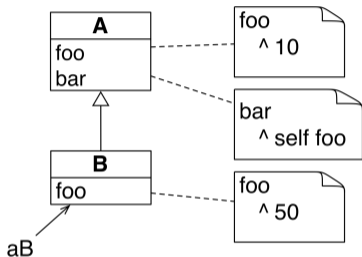
```
aA bar
>>> ...
aB bar
>>> ...
```

# self always represents the receiver



```
aA bar
>>> 10
aB bar
>>> 50
```

# Following message lookup and execution



```
aB bar  
>>> 50
```

Evaluation of `aB bar`

1. `aB`'s class is B
2. no method `bar` in B
3. look up in A - `bar` is found
4. method `bar` is executed
5. `self` refers to the receiver `aB`
6. `foo` is sent to `self`
7. look up `foo` in the `aB`'s class: B
8. `foo` is found there and executed

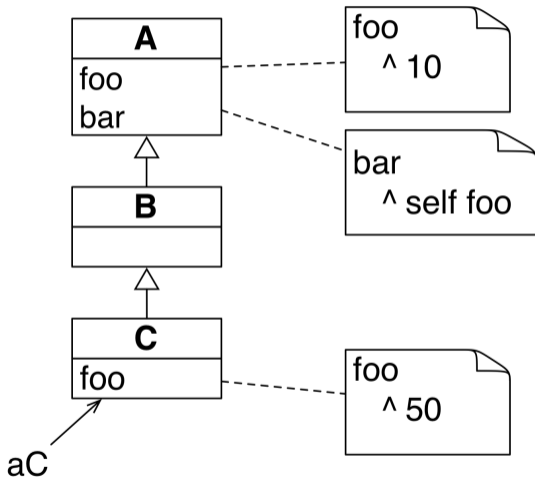
# self/this in two sentences

- self represents the **receiver** of the message
  - self in Pharo, this in Java
- The method lookup **starts in the class of the receiver**



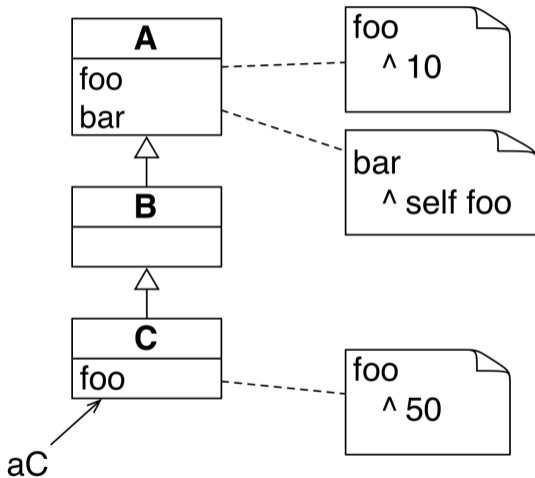


# self always represents the receiver



```
aA bar  
>>> ...  
aB bar  
>>> ...  
aC bar  
>>> ...
```

# self always represents the receiver



```
aA bar  
>>> 10  
aB bar  
>>> 10  
aC bar  
>>> 50
```

# What you should know

- `self` always represents the receiver
- Sending a message is a **two-step** process:
  1. **Look up** the method matching the message
  2. Execute this method **on the receiver**
- Method lookup maps a message to a method
- Method lookup starts in the **class of the receiver**
  - ...and goes up in the hierarchy



A course by

S. Ducasse, G. Polito, and Pablo Tesone



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