Inheritance and Lookup: Self

Understand lookup once for all

S.Ducasse, L. Fabresse, G. Polito, and P. Tesone

http://www.pharo.org

Goals

Understand:

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

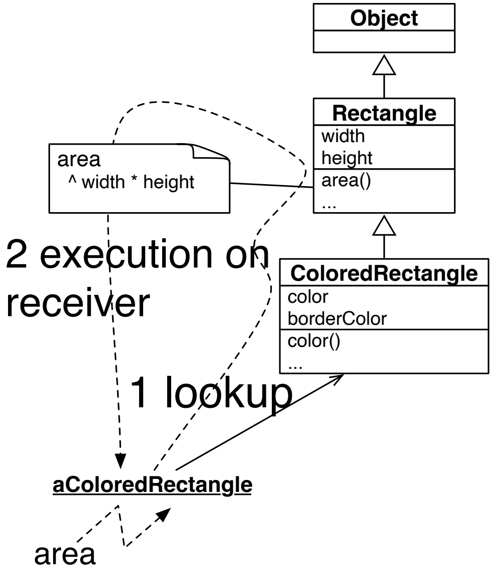
Remember inheritance

- 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:

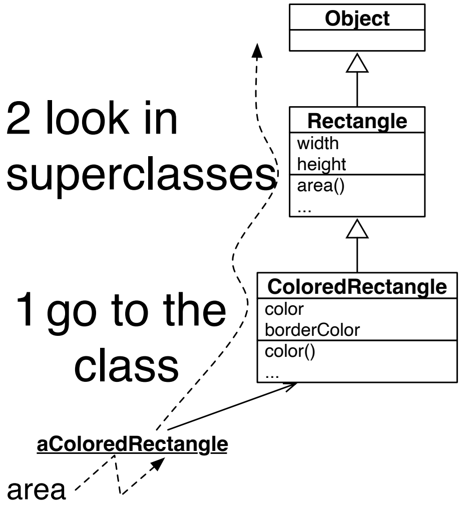
1. **look up** the **method** matching the message
2. **execute** this method on the **receiver**



Method lookup

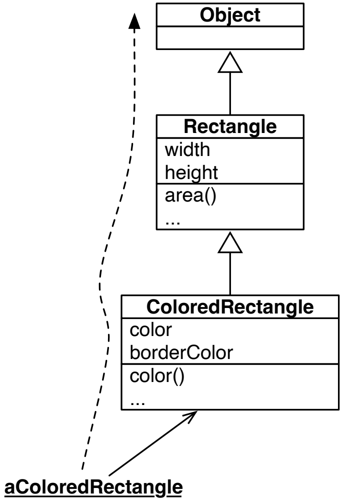
The lookup starts in the **class** of the **receiver** then:

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



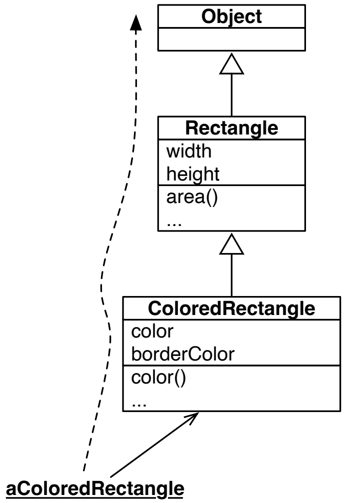
Some lookup cases

Sending the message color to aColoredRectangle



Some lookup cases

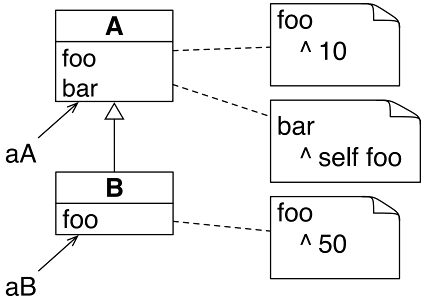
Sending the message area to aColoredRectangle



About lookup implementation

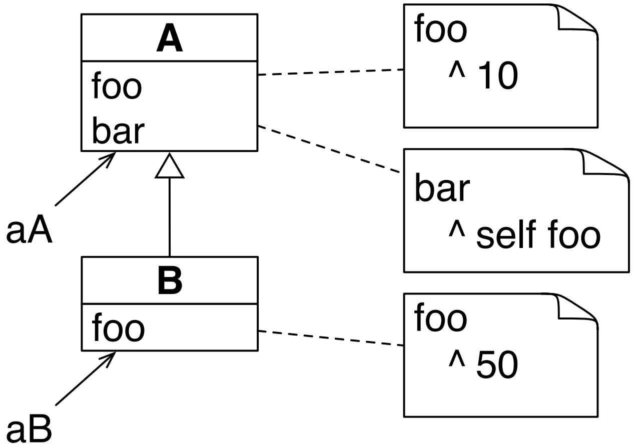
- Most of the time, the result of a lookup is **cached** and a lookup happens only once
- In some languages, there are dispatch tables
- The point is that conceptually there is a lookup at execution

What is self/this?



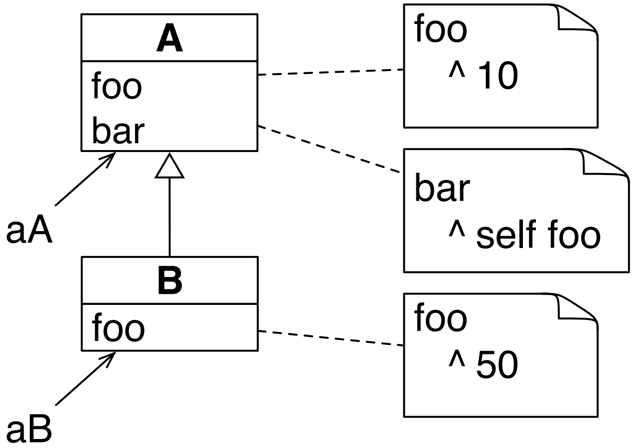
- Take 5 min and write the definition of self (this in Java)
- Your definition should have two points:
  - what does self represent?
  - how is a method looked up when a message is sent to self?

Let us explore a bit



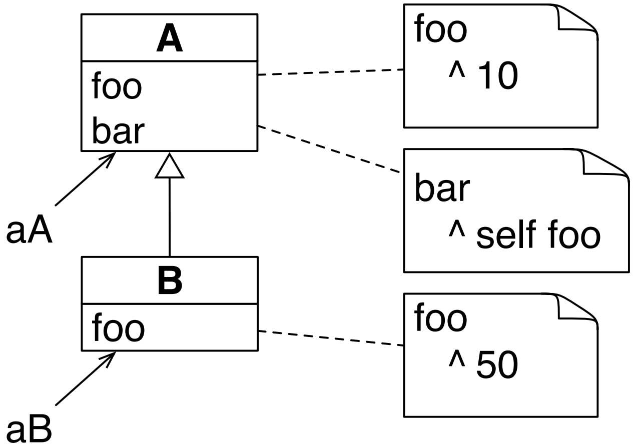
- aA is an instance of A (obtained executing A new)
- aB is an instance of B (obtained executing B new)

Let us explore a bit



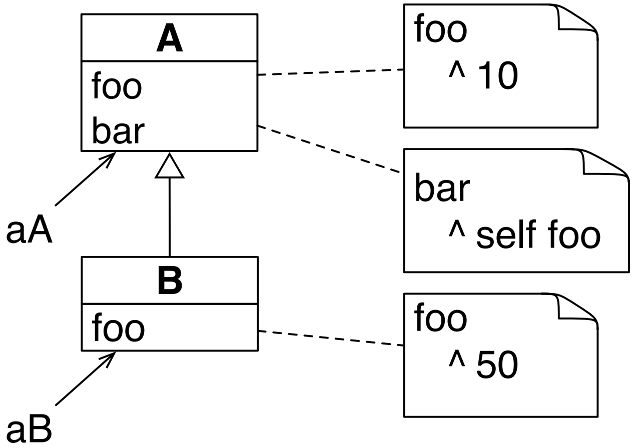
```
> aA foo
...
>  aB foo
...
```

self always represents the receiver



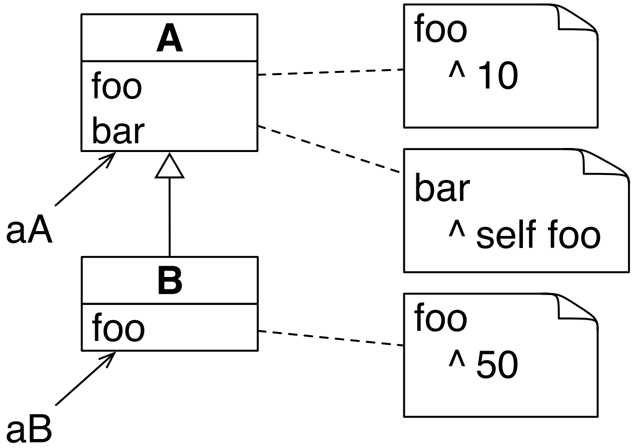
```
>  aA foo
10
> aB foo
50
```

self always represents the receiver



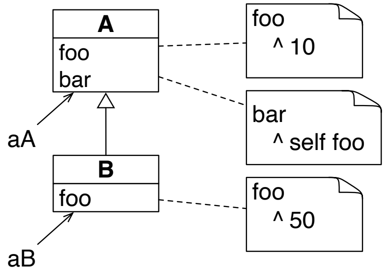
```
> aA bar
...
> aB bar
...
```

self always represents the receiver



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

Following message lookup and execution



```
> aB bar
50
```

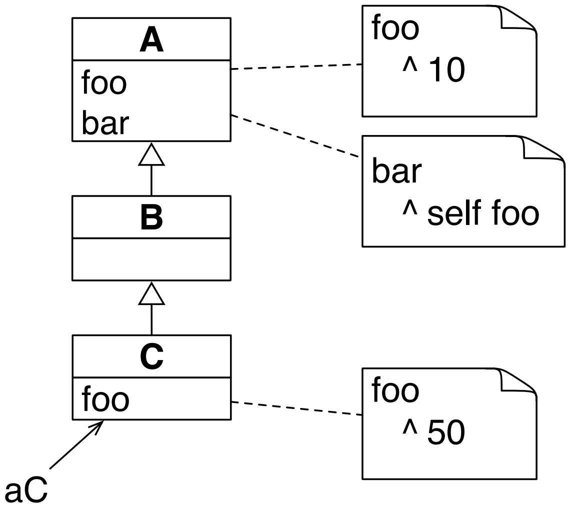
Evaluation of aB bar

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

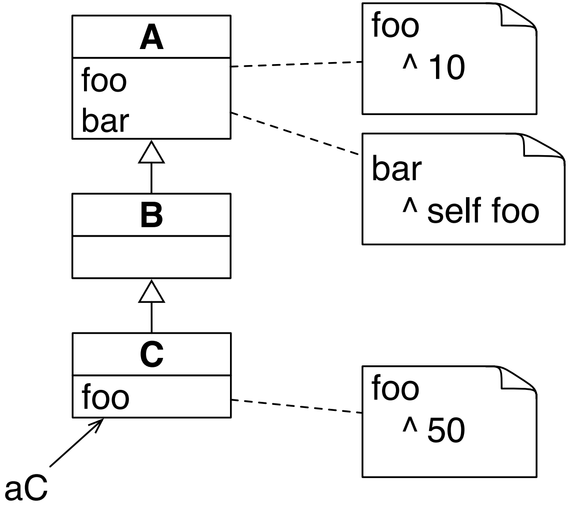
- self represents the **receiver** of the message
    - self in Pharo, this in Java
- The method lookup **starts in the class of the receiver**

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

Produced as part of the course on http://www.fun-mooc.fr

Advanced Object-Oriented Design and Development with Pharo

A course by

S.Ducasse, L. Fabresse, G. Polito, and P. Tesone

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2023