Message Sends are Plans for Reuse

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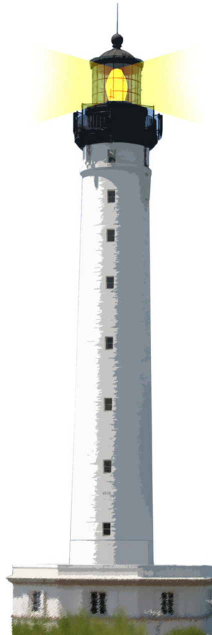
http://www.pharo.org



About this lecture

- Related to sending a message is making a choice lecture
- Relevant to any object-oriented language
- Another essential aspect of object-oriented design

What you will learn

- Message sends are hooks for subclasses
- Message sends are places where subclasses code can be invoked

Let us start to reflect

Anecdotes

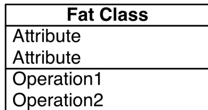
- *I like big methods because I can see all the code*
- *I do not like small methods*

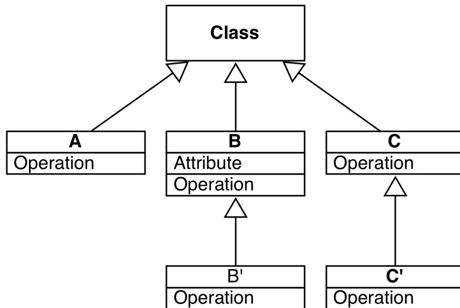
Questions

- Why large methods leads to *under-optimal* design?
- Why writing small methods is a sign of good design?

Remember...

- a message send makes a choice
- a class hierarchy defines the choices
- self **always represents the receiver**
- method lookup starts in the **class of the receiver** (except for super)





An example

Imagine

```
Node >> setWindowWithRatioForDisplay
  | defaultNodeSize |
  defaultNodeSize := mainCoordinate / maximizeViewRatio.
  self window add:
    (UINode new
      with: bandWidth * 55 / defaultWindowSize).
  previousNodeSize := defaultNodeSize.
```

What if we want to change the defaultNodeSize formula in a subclass

Duplication as a bad solution

Duplicate the code in a subclass

```
Node subclass: OurSpecificNode
  ...
```

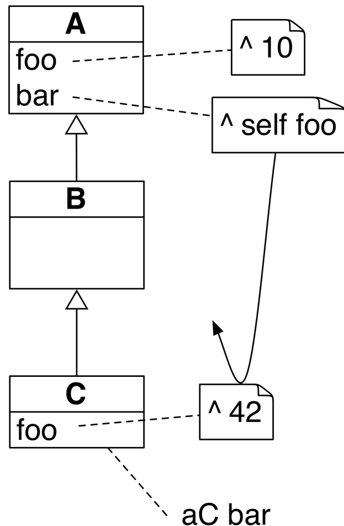
```
OurSpecificNode >> setWindowWithRatioForDisplay
  | defaultNodeSize |
  defaultNodeSize :=
    (mainCoordinate / maximizeViewRatio) + 10.
  self window add:
     (UINode new
        with: bandWidth * 55 / defaultWindowSize).
  previousNodeSize := defaultNodeSize.
```

Avoid duplication

- Duplication is not a good practice:
  - duplication copies bugs
  - changing one copy requires changing others
- Note that in Java-like languages, using `private` attributes makes duplication in subclasses impossible

A much better solution

- Define small methods
- Send messages
- Subclasses can override such methods



We can refactor this

```
Node >> setWindowWithRatioForDisplay
 | defaultNodeSize |
 defaultNodeSize := (mainCoordinate / maximizeViewRatio).
 self window add:
    (UINode new
       with: bandWidth * 55 / defaultWindowSize).
 previousNodeSize := defaultNodeSize.
```

Into ...

```
Node >> setWindowWithRatioForDisplay
  | defaultNodeSize |
  defaultNodeSize := self ratio.
  self window add:
    (UINode new
      with: bandWidth * 55 / defaultWindowSize).
  previousNodeSize := defaultNodeSize.
```

```
Node >> ratio
  ^ mainCoordinate / maximizeViewRatio
```

Subclasses reuse superclass logic

```
Node >> ratio
  ^ mainCoordinate / maximizeViewRatio
```

A subclass can refine the behavior

```
OurSpecificNode >> ratio
  ^ super ratio + 10
```

Another step

```
Node >> setWindowWithRatioForDisplay
  | defaultNodeSize |
  defaultNodeSize := self ratio.
  self window add:
    (UINode new
      with: bandWidth * 55 / defaultWindowSize).
  previousNodeSize := defaultNodeSize.
```

What if we want have a different UINode.

Another step

We can also extract the UINode instantiation.

```
Node >> setWindowWithRatioForDisplay
  | defaultNodeSize |
  defaultNodeSize := self ratio.
  self window add: self uiNode.
  previousNodeSize := defaultNodeSize.
```

```
Node >> uiNode
  ^ UINode new
      with: bandWidth * 55 / defaultWindowSize
```

Do not hardcode class use

```
Node >> uiNode
  ^ UINode new
      with: bandWidth * 55 / defaultWindowSize
```

Define methods returning classes

```
Node >> uiNode
  ^ self uiNodeClass new
    with: bandWidth * 55 / defaultWindowSize.
```

```
Node >> uiNodeClass
  ^ UINode
```

Many small messages

Small messages are a sign of good design, because:

- each little method is a potential **hook** for customization
- gives name to expressions

Some developers complain about all these small methods

- But small methods are good
- Give meaningful name to methods
- Do not need to read all method definitions

Gruyere-oriented programming

Conclusion

- Code can be reused and refined in subclasses
- Sending a message in a class defines a **hook**:
  - i.e., a place where subclasses can **inject variations**
- Prefer small methods because:
  - this gives names to expressions
  - this gives freedom to subclasses

A course by

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