PHANtom:
A Modern Aspect Language for Pharo

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Pleiad

Programming Languages and Environments for Intelligent, Adaptable and Distributed systems

AOP ??

AOP ??

Cross-cutting concerns

Aspect = module

- Behavior = WHAT = advice
- Quantification = WHEN = pointcuts

Running application = stream of join points

- ST computation = messages
- In PHANtom: method exec

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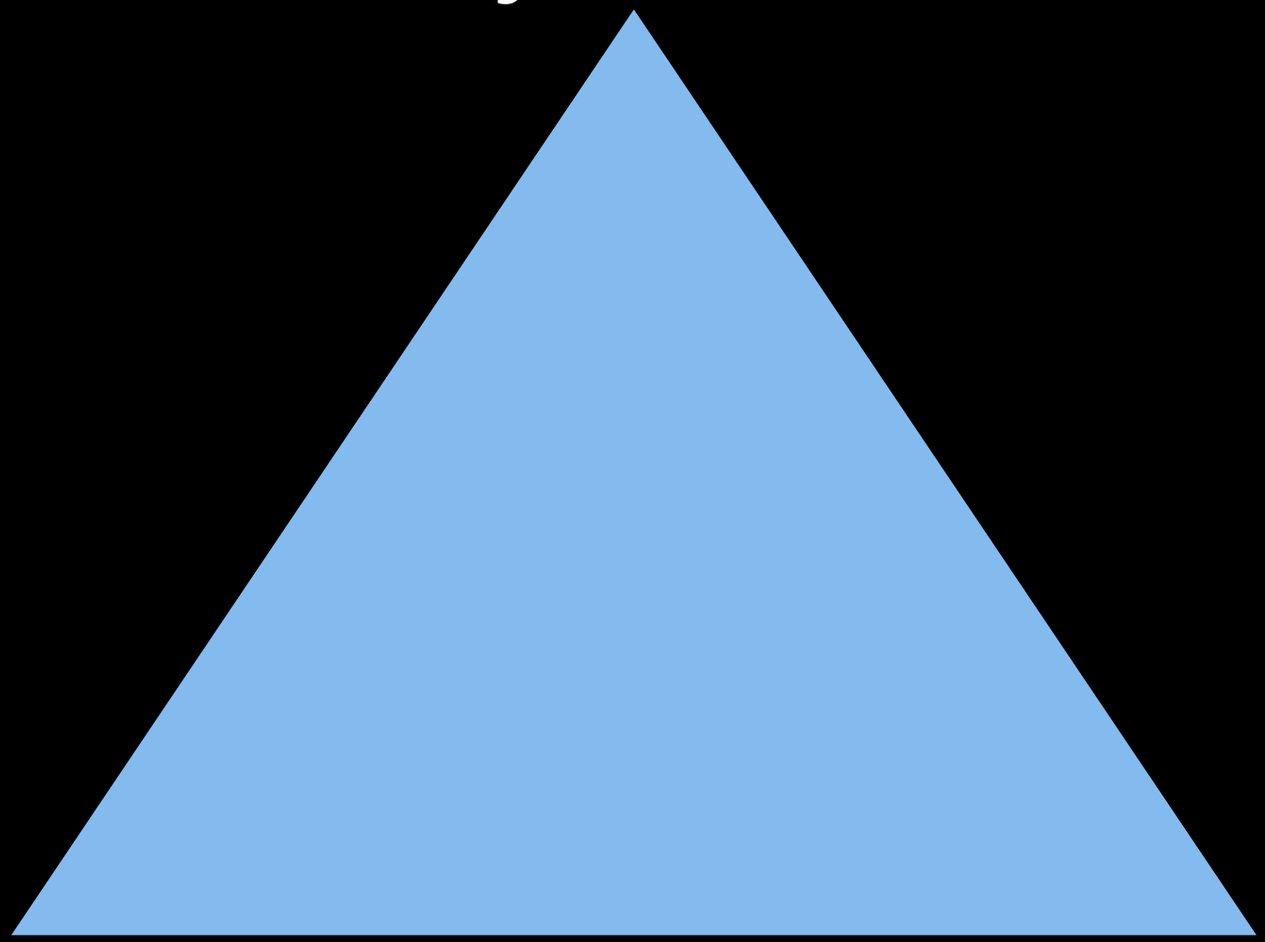
In the spirit of Smalltalk

Dynamic



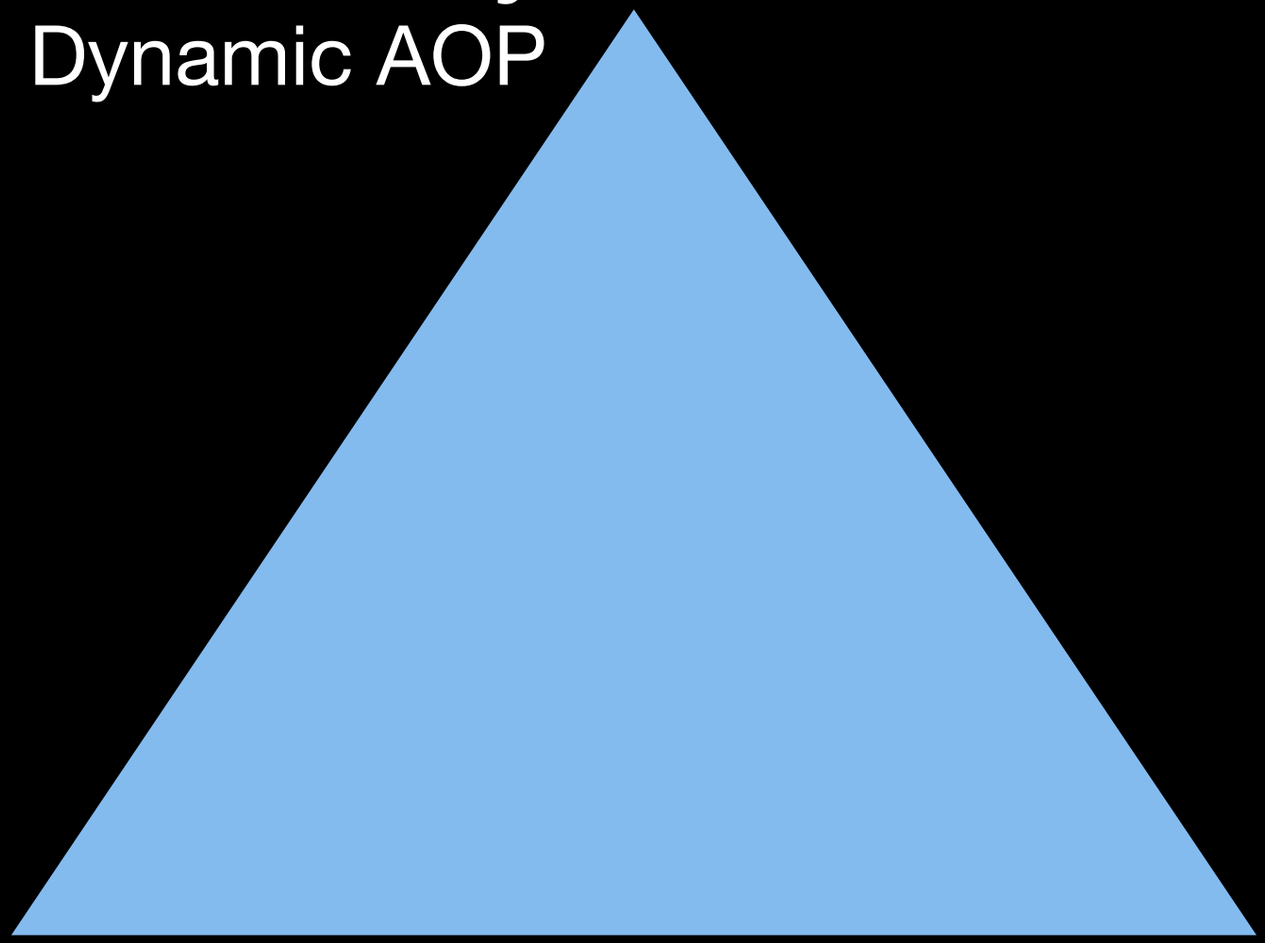
Simple

Powerful

In the spirit of Smalltalk

Dynamic

Dynamic AOP



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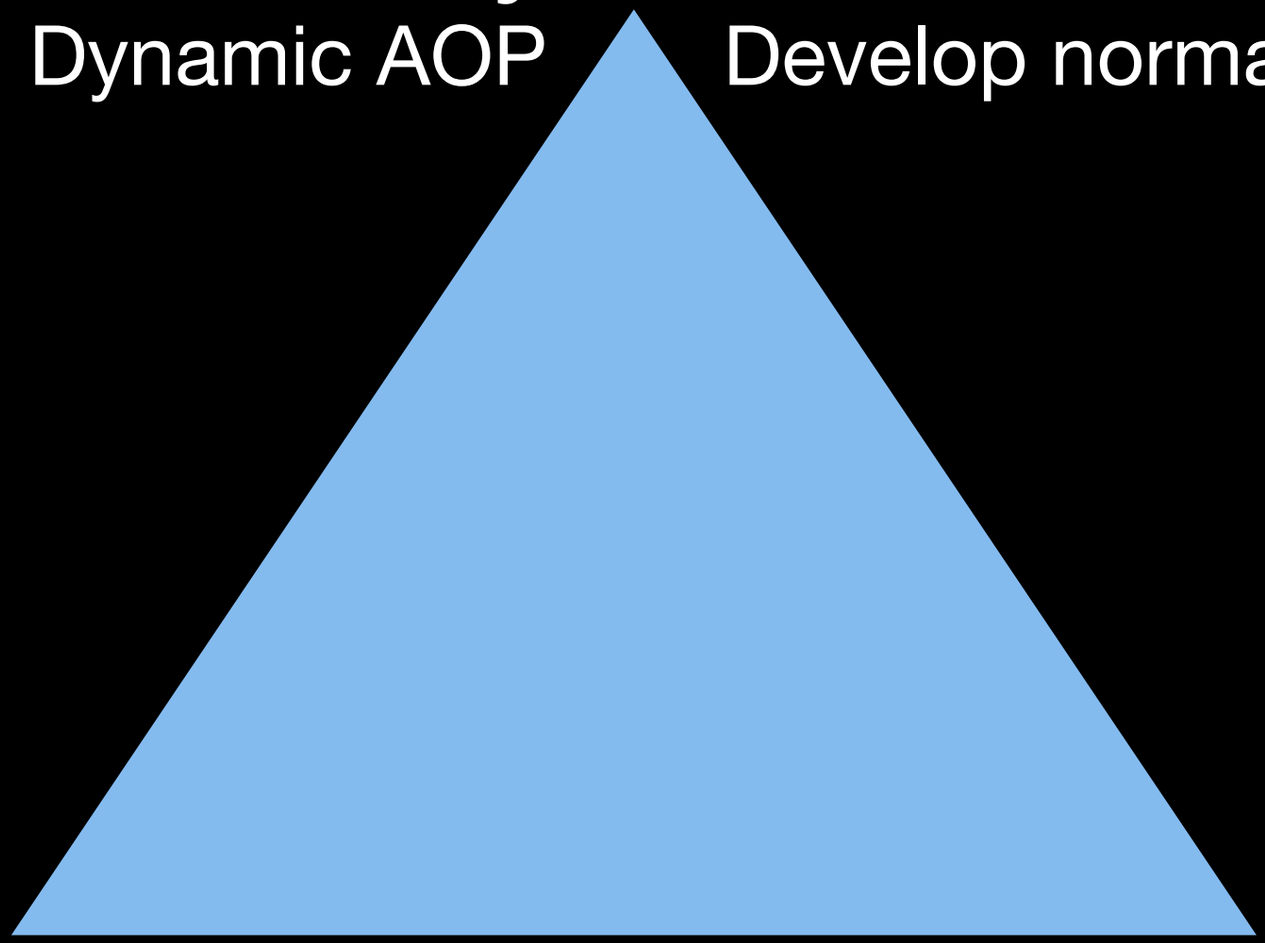

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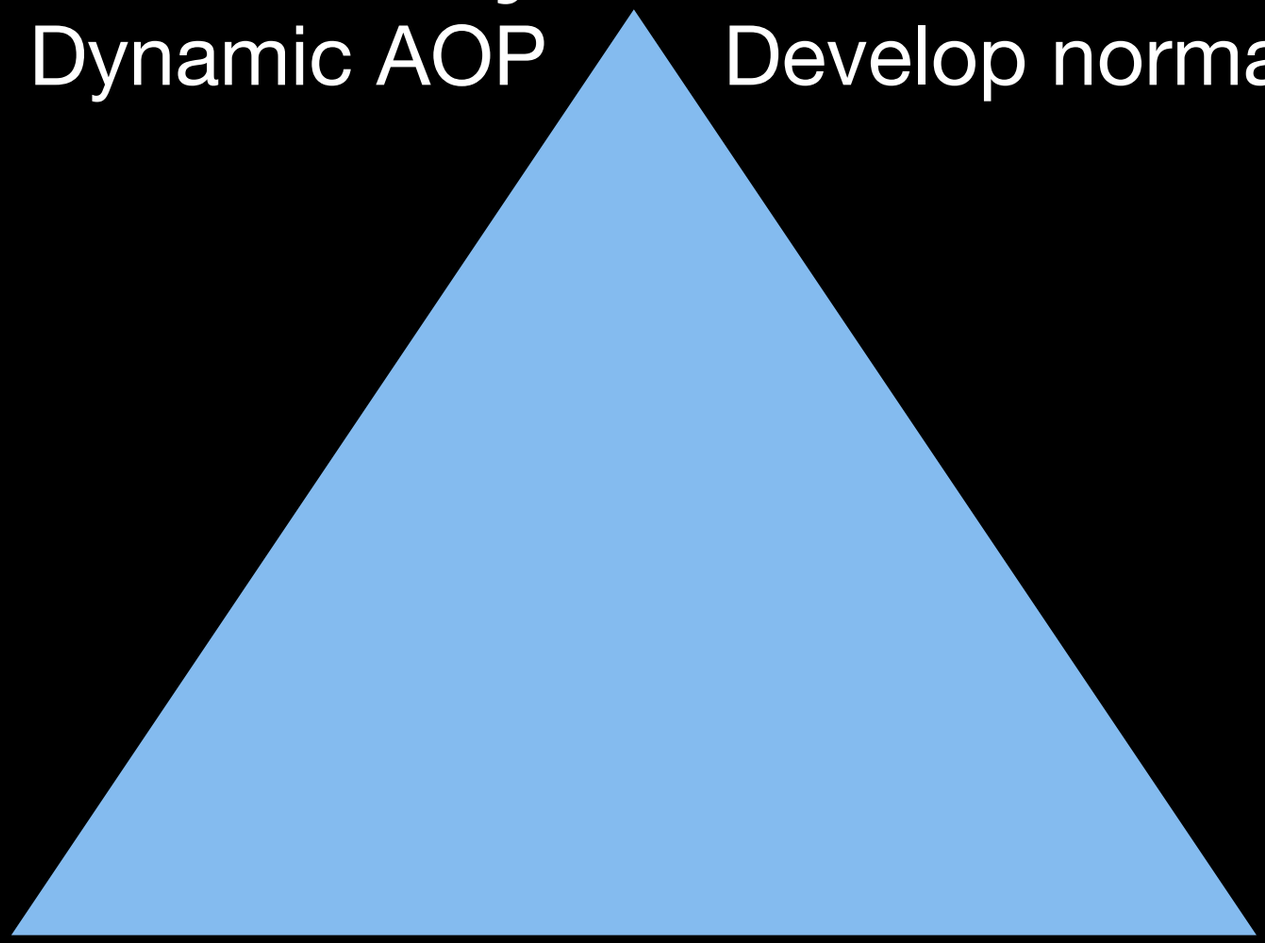

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Minimal set of Constructs

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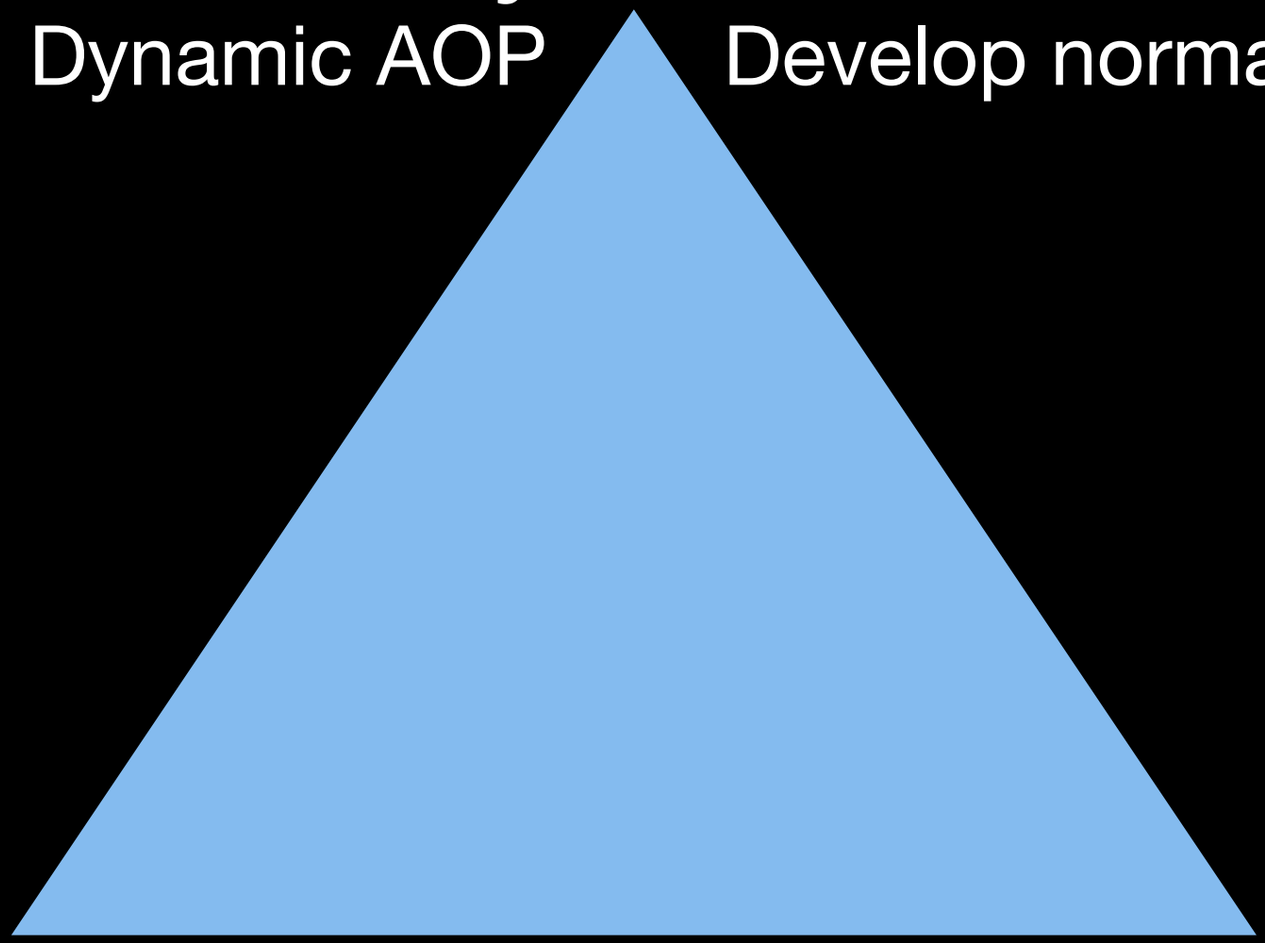

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Uniform / no restrictions

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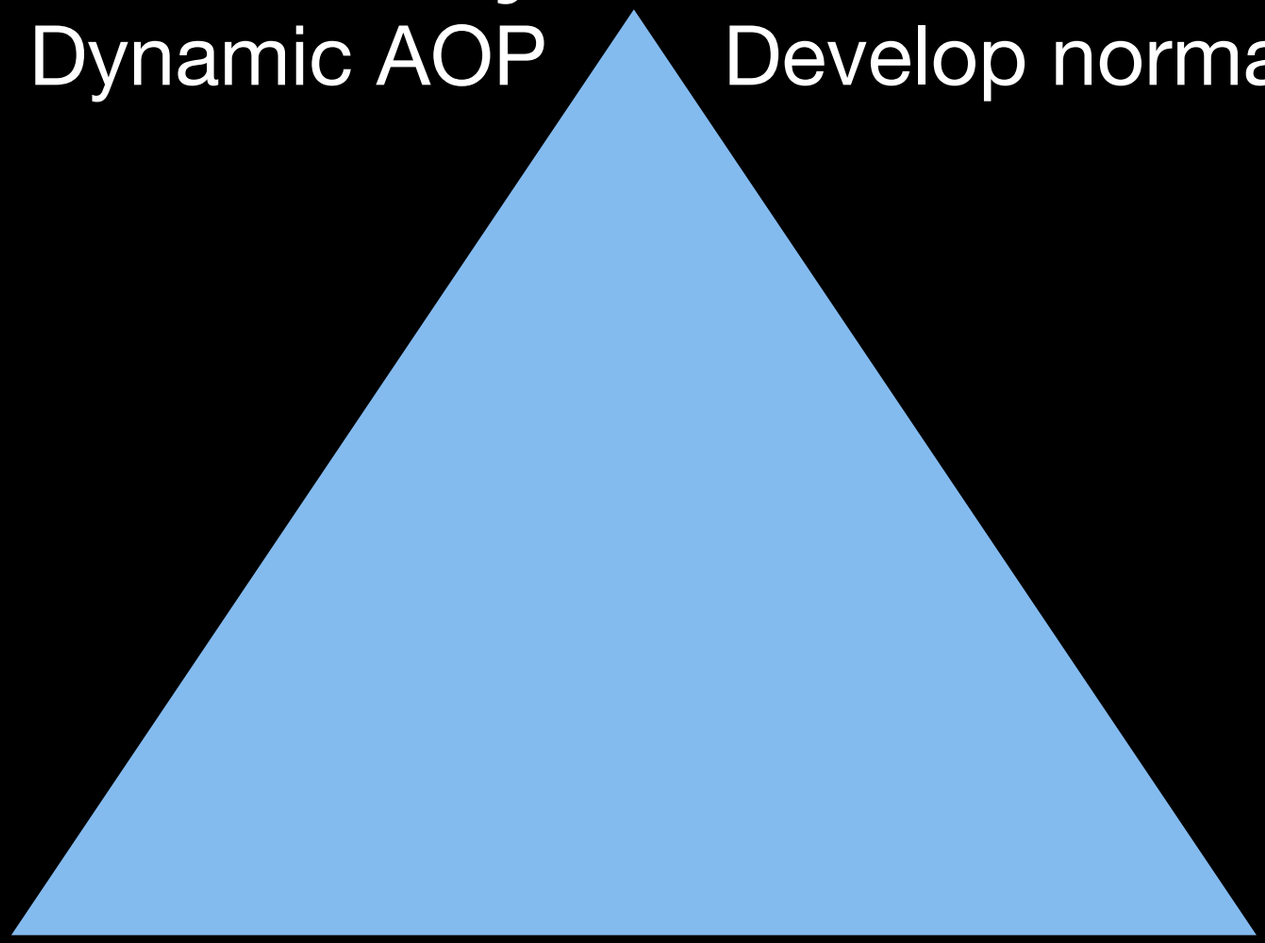

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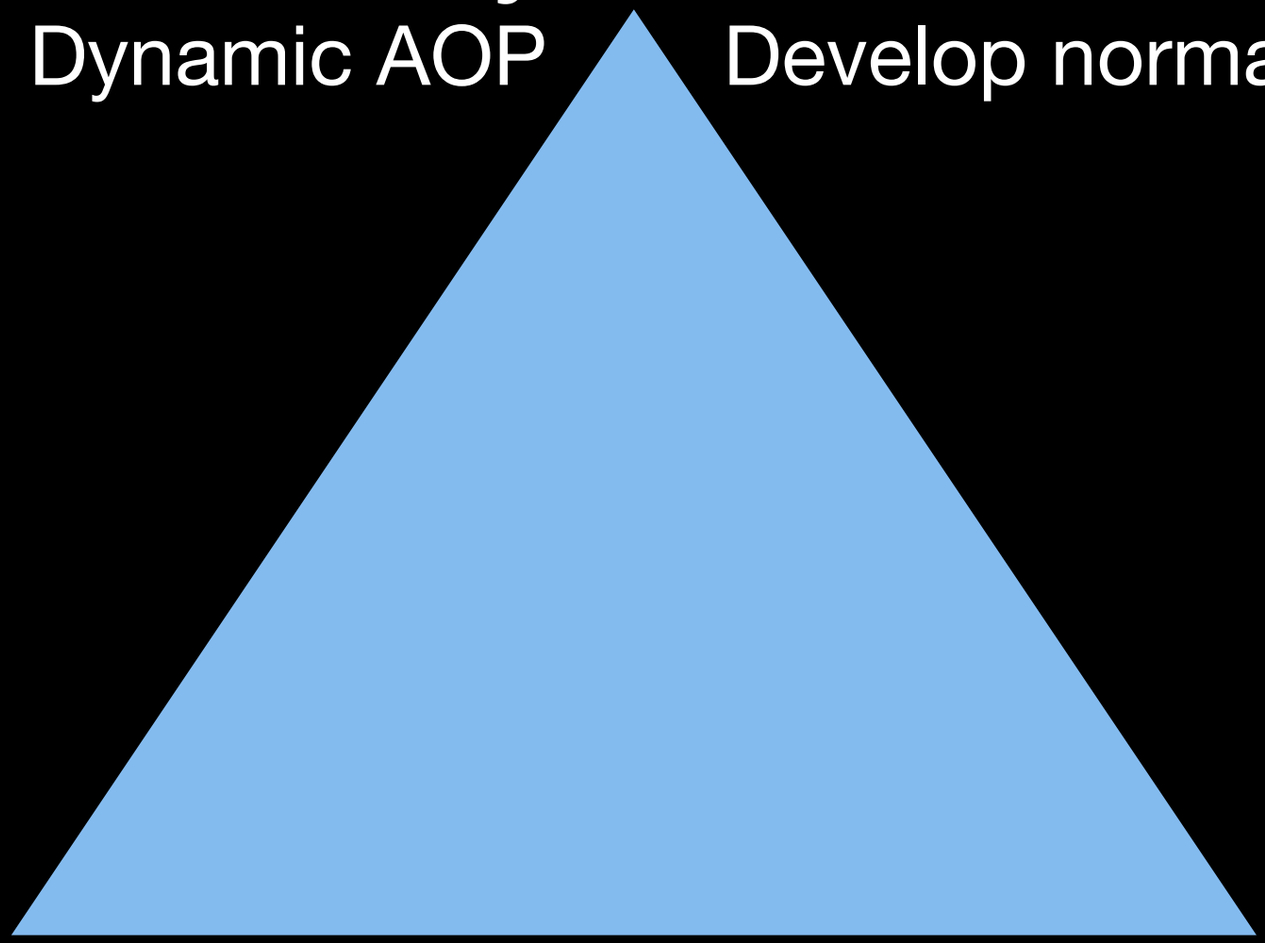

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Minimal set of Constructs

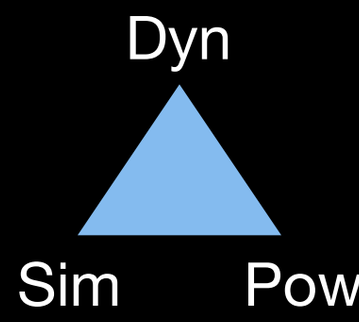
Uniform / no restrictions

Powerful

First-class everything

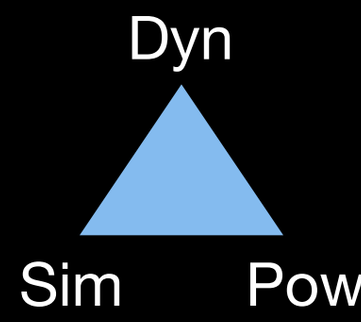
New language features

Pointcuts



Pointcuts

```
PhPointcut receivers: 'TestCase'
    selectors: 'assert:'
```



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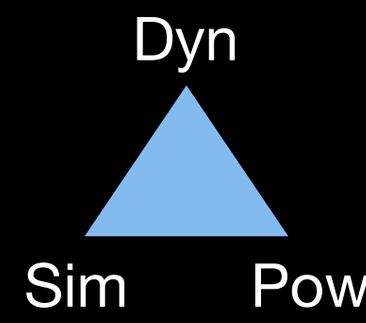
```
PhPointcut receivers: 'TestCase'
    selectors: 'assert:'

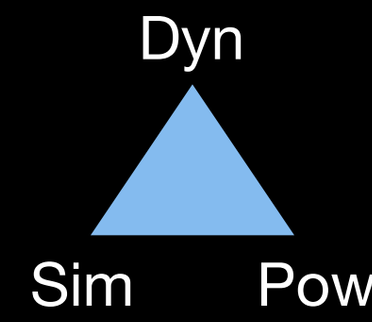
PhPointcut receivers: 'TestCase+'
    selectors: #(assert: assert:equals:)
```



Pointcuts

```
PhPointcut receivers: 'TestCase'
    selectors: 'assert:'

PhPointcut receivers: 'TestCase+'
    selectors: #(assert: assert:equals:)
    context: #(receiver sender arguments)
```



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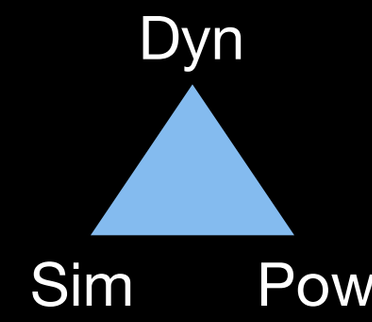
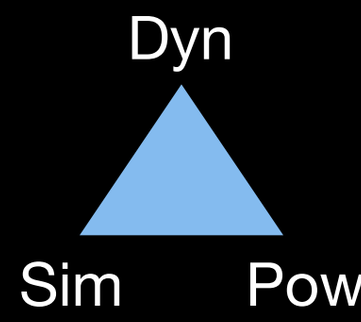
```
PhPointcut receivers: 'TestCase'
    selectors: 'assert:'

PhPointcut receivers: 'TestCase+'
    selectors: #(assert: assert:equals:)
    context: #(receiver sender arguments)

PhPointcut receivers: 'Test*'
    selectors: #(assert: assert:_:
                 assert:_:_:)
    context: #(receiver)
    restrict: #(Tests_Mine)
```

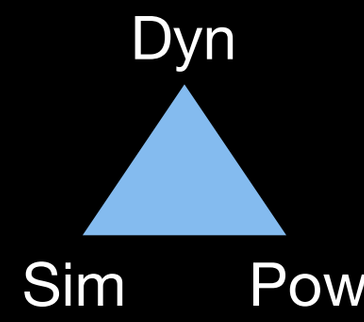


Advice



Advice

```
PhAdvice pointcut: pc
     send: #incCount: to: self
     type: #after
```



Advice

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PhAdvice pointcut: pc
     send: #incCount: to: self
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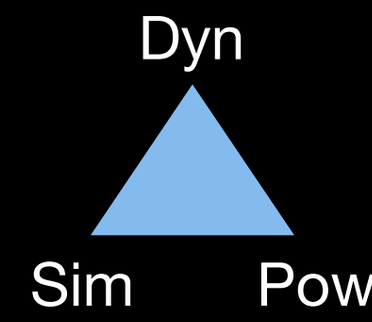
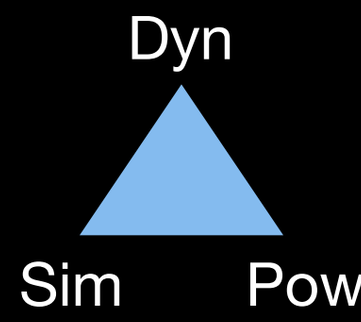
```

```
PhAdvice pointcut: pc
     advice: [:ctx |
          Transcript show:
               (ctx receiver asString);cr.
          ctx proceed.]]
     type: #around.
```



Inter-Type Declaration



Inter-Type Declaration

```
PhClassModifier on: ACTestCase
    addIV: 'phacount'
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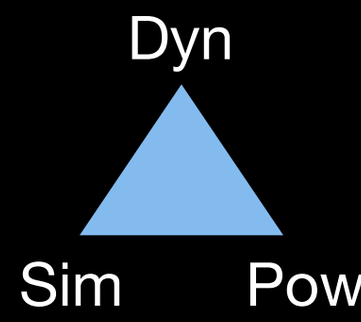
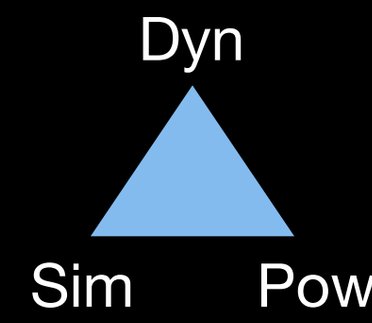


Inter-Type Declaration

```
PhClassModifier on: ACTestCase
    addIV: 'phacount'
```

```
PhClassModifier on: ACTestCase
    addIM: 'phacount
        ↑phacount ifNil: [phacount := 0]'
```



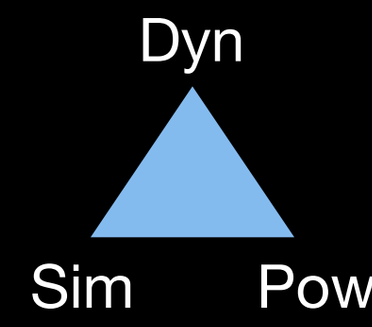
Aspect

```
PHAspect subclass: MyAspect ...
(Object subclass: #PhAspect ...)
```

Add **`PHAdvice`** and **`PHClassModifier`** instances

Send **`install`** to activate

Send **`uninstall`** to deactivate



What happens here?

```
|asp|
asp := PhAspect new add:
  (PhAdvice
     pointcut: (PhPointcut
          receivers: 'Transcript class'
          selectors: 'show:')
     advice: [ Transcript show: 'Have ']
     type: #before).
asp install.
Transcript show: 'reentrancy control'; cr
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BOOM

Reentrancy control

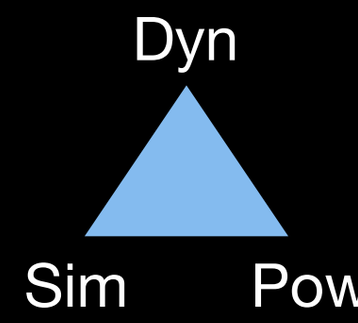
PHANtom: no problem!

- Aspect execution by default NOT MATCHED

More power if you want it: Membranes [Tanter & Tabareau]

Use membranes to control

- join point emission and capture scope
- aspect observing join points



Advice ordering

Multiple advice 1 join point

"Classic": advice precedence

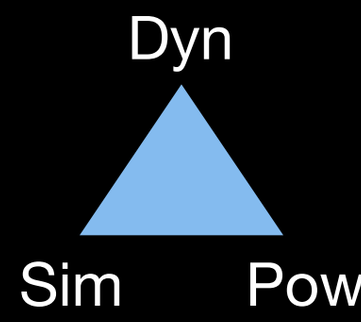
- Global and static

PHANtom deployment precedence

- Global and 'static'
- Complement or override on pointcut

PHANtom dynamic precedence in the advice

- **`OrderedCollection`** of **`PHAdvice`** instances
- get from context
- set on context



Not in the paper ...

TDD

- 155 tests
- 90+% coverage

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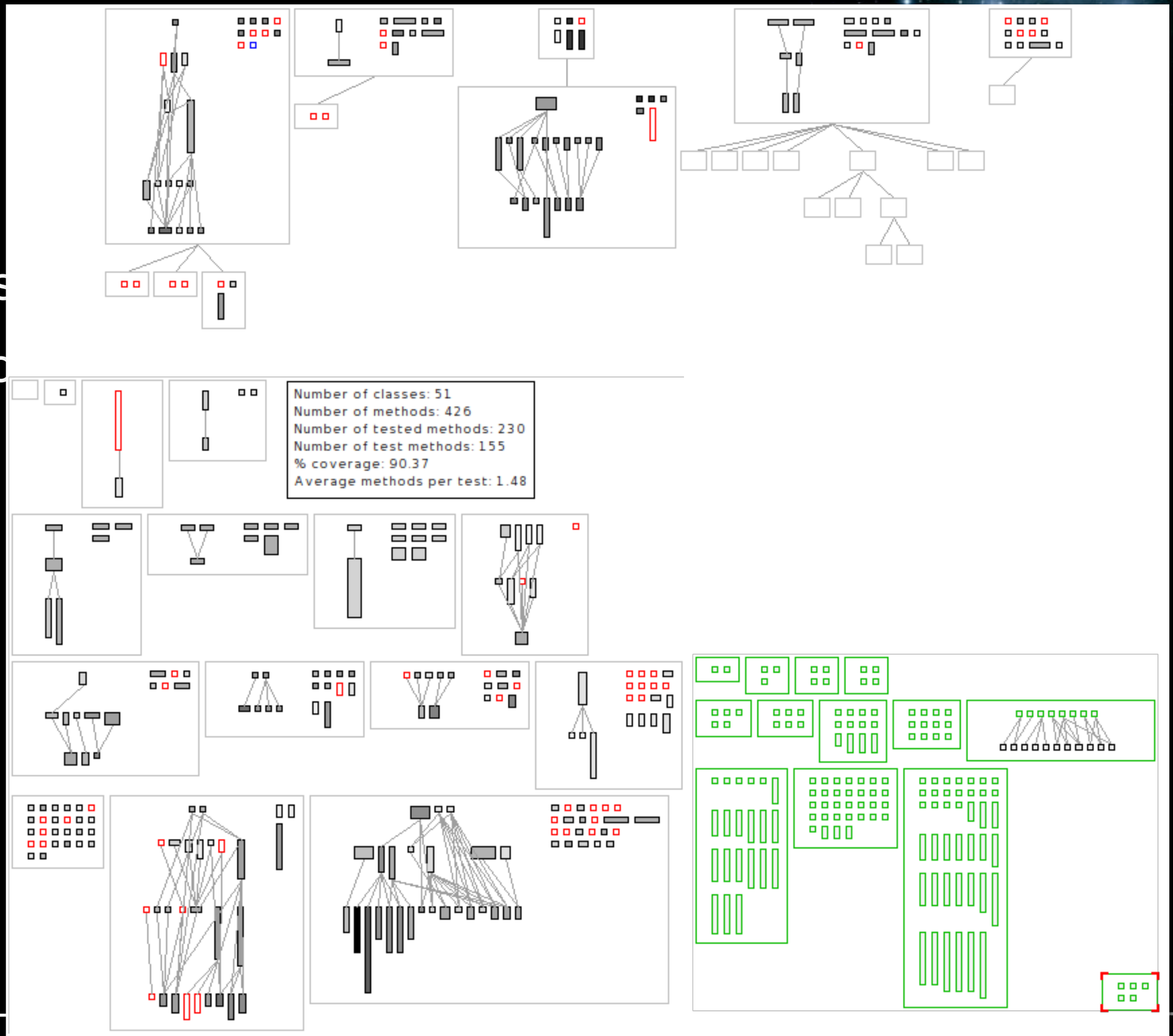

Future work

Optimize the implementation

Compile PHANtom code

Infrastructure for Domain-Specific Aspect Languages

http://pleiad.cl/PHANtom