

# Boring Object Orientation

Boring is better than interesting

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# Python and object oriented programming

Everything is an object

# Why OO design principles?

Guidelines to code that is easy to maintain

# Do OO design principles work?

Yes

# Do OO design principles work?

Yes ...but

# Principles

Make your objects more boring! The simple tricks that they don't want you to know!

- ▶ Declare interfaces

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# Principles

Make your objects more boring! The simple tricks that they don't want you to know!

- ▶ Declare interfaces
- ▶ Simplify initialization
- ▶ Avoid mutation
- ▶ Avoid hiding
- ▶ Avoid methods
- ▶ Avoid inheritance

# Why declare interfaces?

Explicit is better than implicit

## Declaring interfaces with zope.interface

```
from zope import interface

class ISprite(interface.Interface):

    bounding_box = interface.Attribute(
        "The bounding box"
    )

    def intersects(box):
        "Does this intersect with a box"
```

## Testing for interface provision

```
from zope.interface import verify

def test_implementation():
    sprite = make_sprite()
    verify.verifyObject(ISprite, sprite)
```

# Interesting constructor

```
class Stuff:

    def __init__(self, fname):
        # Create a new object
        self.destination = Destination()
        # Call a system call
        self.finput = open(fname)
```

## Boring constructor

```
class Stuff:

    def __init__(self, finput, destination):
        self.destination = destination
        self.finput = finput

    @classmethod
    def from_name(cls, name):
        # Create a new object
        destination = Destination()
        # Call a system call
        finput = open(fname)
        return cls(finput, destination)
```



# Why boring constructors

- ▶ No partial objects
- ▶ Easier testing

## Using attrs

```
import attr

@attr.s(auto_attribs=True)
class Stuff:
    finput: Any
    destination: Any
```

# Immutable objects

```
>>> @attr.s(auto_attribs=True, frozen=True)
... class Stuff:
...     destination: Any
...     finput: Any
...
>>> my_stuff = Stuff(Destination(), io.StringIO())
>>> my_stuff.finput = io.StringIO()
Traceback (most recent call last):
...
    raise FrozenInstanceError()
attr.exceptions.FrozenInstanceError
```

# Immutability as bug avoidance

```
def some_function(some_list=[]):  
    pass
```

# Immutability as interface simplifying

No variation, no invariant breakage!

## Frozen attrs

```
>>> @attr.s(auto_attribs=True, frozen=True)
... class Point:
...     x: float
...     y: float
...
>>> origin = Point(0, 0)
>>> up = attr.evolve(origin, y=1)
>>> origin, up
(Point(x=0, y=0), Point(x=0, y=1))
```

## Private methods

```
class HTTPSession:
    def _request(self, method, url):
        pass
    def get(self, url):
        return self._request('GET', url)
    def head(self, url):
        return self._request('HEAD', url)
```

## Refactoring private methods away

```
class RawHTTPSession:
    def request(self, method, url):
        pass

class HTTPSession:
    _raw: RawHTTPSession
    def get(self, url):
        return self._raw.request('GET', url)
    def head(self, url):
        return self._raw.request('HEAD', url)
```



# Methods

```
@attr.s(auto_attribs=True, frozen=True)
class Point2D:
    x: float
    y: float

    def distance_from_origin(self):
        return (self.x**2 + self.y**2) ** 0.5
```

# Methods

```
@attr.s(auto_attribs=True, frozen=True)
class Point3D:
    x: float
    y: float
    z: float

    def distance_from_origin(self):
        return (self.x**2 +
                self.y**2 +
                self.z**2) ** 0.5
```

# Why not methods?

Bloats classes

## singledispatch example

```
@attr.s(auto_attribs=True, frozen=True)
class Point2D:
    x: float
    y: float
```

```
@attr.s(auto_attribs=True, frozen=True)
class Point3D:
    x: float
    y: float
    z: float
```

## singledispatch example

```
@functools.singledispatch
def distance_from_origin(pt):
    raise NotImplementedError(point)

@distance_from_origin.register(Point2D)
def distance_2d(pt):
    return (pt.x**2 + pt.y**2) ** 0.5

@distance_from_origin.register(Point3D)
def distance_3d(pt):
    return (pt.x**2 + pt.y**2 + pt.z**2) ** 0.5
```

# Inheritance-as-API: Examples in the wild

```
# From the Twisted tutorial
class FingerProtocol(basic.LineReceiver):
    def lineReceived(self, user):
        self.transport.write(b"No such user\r\n")
        self.transportloseConnection()
```

## Inheritance-as-API: Examples in the wild

```
# From the Django tutorial
class IndexView(generic.ListView):
    template_name = 'polls/index.html'
    context_object_name = 'latest_question_list'

    def get_queryset(self):
        """Return the last five published questions
        return Question.objects.order_by('-pub_date')
```

## Inheritance-as-API: Examples in the wild

# From the Jupyter documentation

```
class EchoKernel(Kernel):
    implementation = 'Echo'
    implementation_version = '1.0'
    language = 'no-op'
    language_version = '0.1'
    language_info = {
        'name': 'Any text',
        'mimetype': 'text/plain',
        'file_extension': '.txt',
    }
    banner = "Echo kernel - as useful as a parrot"

    def do_execute(self, code, silent, store_history,
                  allow_stdin=False):
        if not silent:
            stream_content = {'name': 'stdout', 'text': code}
```



# Inheritance-as-API: Issues

"Shared everything"

# Composition

- ▶ Define *\*interface\**
- ▶ Useful behavior in *\*referred class\**

## Composition: Simple example

```
class IMovable(interface.Interface):  
    x_position = interface.Attribute()  
    y_position = interface.Attribute()  
    def tick():  
        pass
```

## Composition: Simple example

```
@interface.implementer(IMovable)
@attr.s(auto_attribs=True):
class StraightLine:
    dx: float
    dy: float
    x_position: float
    y_position: float
    def tick(self):
        self.x_position += dx
        self.y_position += dy
```

## Composition: Simple example

```
@interface.implementer(IMovable)
@attr.s(auto_attribs=True):
class Sprite:
    _movable: IMovable
    @property
    def x_position(self):
        return self._movable.x_position
    @property
    def y_position(self):
        return self._movable.y_position
    def tick(self):
        return self._movable.tick()
```

# Python: Language of the free

Diamond inheritance with overridable constructors as mandatory interface? Sure!

# With Great Power

Diamond inheritance with overriddable constructors as mandatory interface? ....Maybe not!

# Lessons Learned

- ▶ Do as we say, not as we do
- ▶ Big systems, big headaches



# Less interesting code

Be dumb as possible when writing code.