# Functional Object-Oriented Design in Ruby

@mctaylorpants

April 2018

# Conf & Coffee

# Conf & Tea ☕

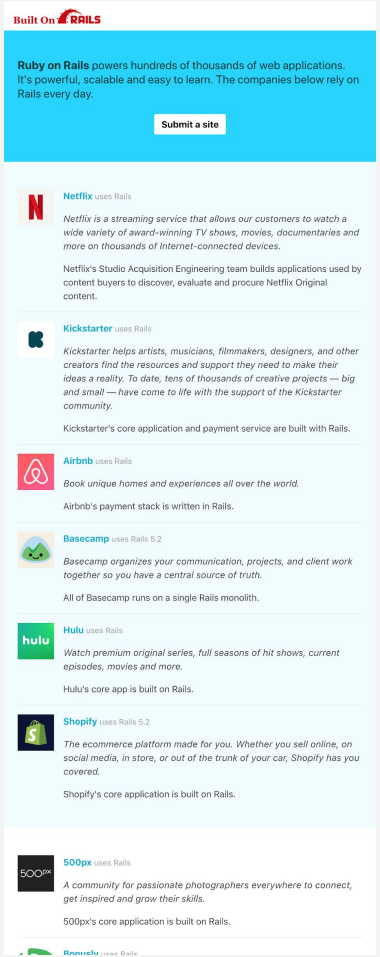
# I’m Alex

I ♥ Ruby since 2015
Software Developer @ Unbounce


PEPPER


VANRUBY

builtonrails.com



# Functional Object-Oriented Design

# ABSTRACTIONS

# Nouns & Verbs

- Two important abstractions in human language
- *Separate concepts*

# Noun

photo

# Verb

photo

Nouns

Verbs

# Nouns & Verbs

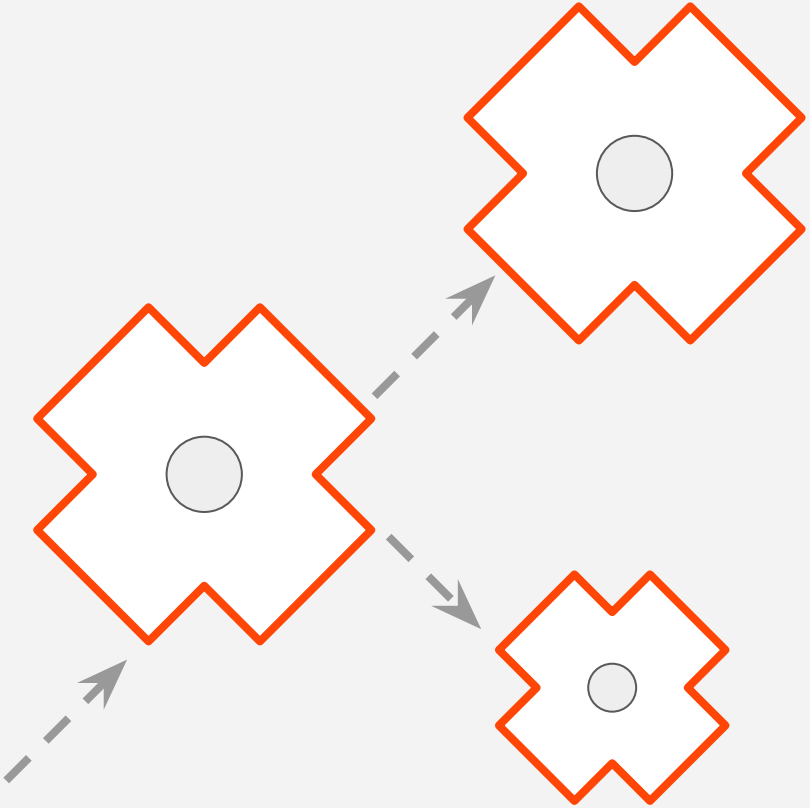
- Separate concepts in speech
- Good to keep them separate in our applications

# FUNCTIONS & OBJECTS

# OBJECTS offer *encapsulation*

## Object-Oriented Programming

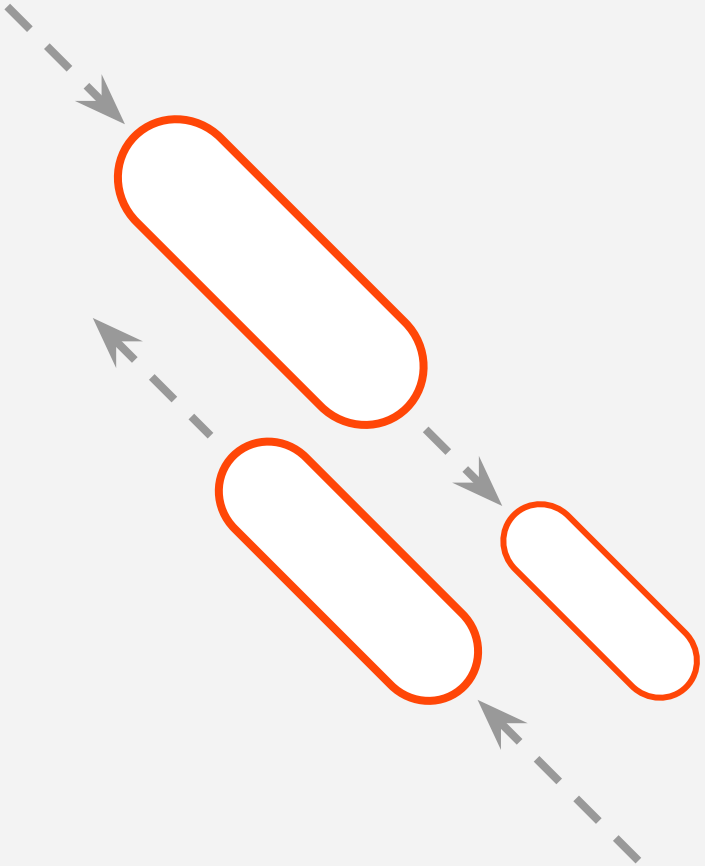
- Objects contain data *and* behaviour
- Object pass messages between each other to get work done



# FUNCTIONS offer *purity*

## Functional Programming

- Functions operate on immutable data
- Functions are composed together to get work done



# Functional Object-Oriented Design

# FOOD

photo

# What does good look like?

## Object-Oriented Programming

- Small classes, single responsibility
- Prefer composition over inheritance
- Inject dependencies

# What does good look like?

## Object-Oriented Programming

- Small classes, single responsibility
- Prefer composition over inheritance
- Inject dependencies

## Functional Programming

- Small functions, single responsibility
- Compose functions to build complex behaviour
- Only depend on a function's arguments

# What’s different?

# CO-LOCATION

# STATE

# 1. Co-location of data and behaviour

# To separate or not?

## Co-located

- Behaviour lives close to the data that it works with
- Changing behaviour happens in one place
- Learning how to work with the data is intuitive
- Behaviour often coupled to the data
- Easy to end up with too many responsibilities

# To separate or not?

## Co-located

- Behaviour lives close to the data that it works with
- Changing behaviour happens in one place
- Learning how to work with the data is intuitive
- Behaviour often coupled to the data
- Easy to end up with too many responsibilities

## Separated

- Behaviour is often reusable
- Data is lightweight, can be passed around
- Makes data transformations explicit
- Changing behaviour might need to happen in many places

Data

Behaviour

Nouns

Verbs

~~Nouns~~Data

Verbs

~~Nouns~~Data

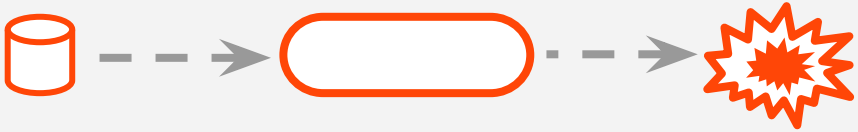
~~Verbs~~Behaviour

# VERBS are *side effects*

# Changing the world

- Be *explicit* about when you change the world
- Interactors, Service Objects, Command Objects, etc
- Single responsibility
- Single public interface (#call)

# Data + Behaviour == Action

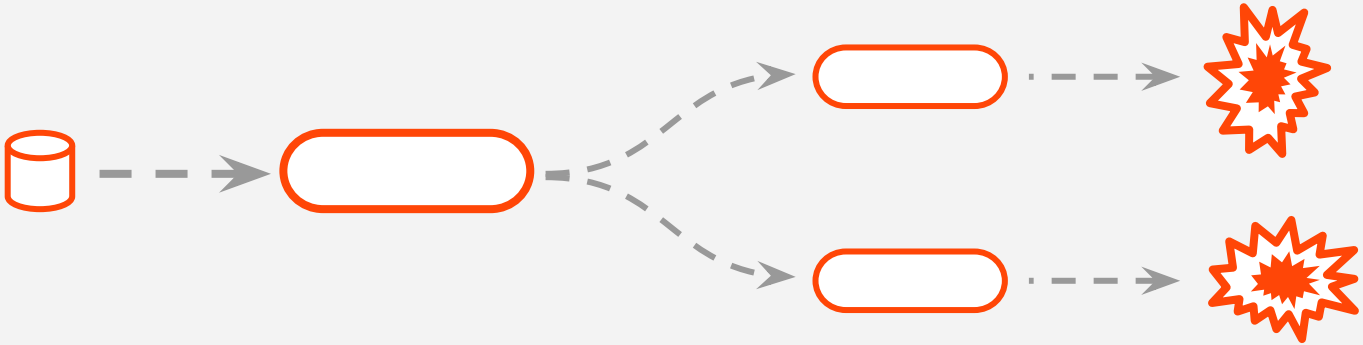


# Data + Behaviour == Action

- Data and behaviour still coupled, but loosely
- Good naming can help enumerate all possible actions

```
services
├── subscription
│   ├── activate.rb
│   ├── cancel.rb
│   └── renew.rb
└── user
    ├── create.rb
    ├── delete.rb
    └── update.rb
```

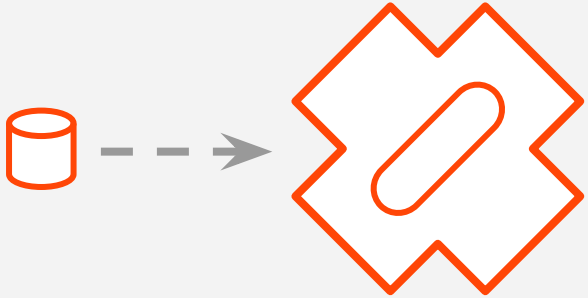
# Action Objects are composable



# Action Object == First-class Function

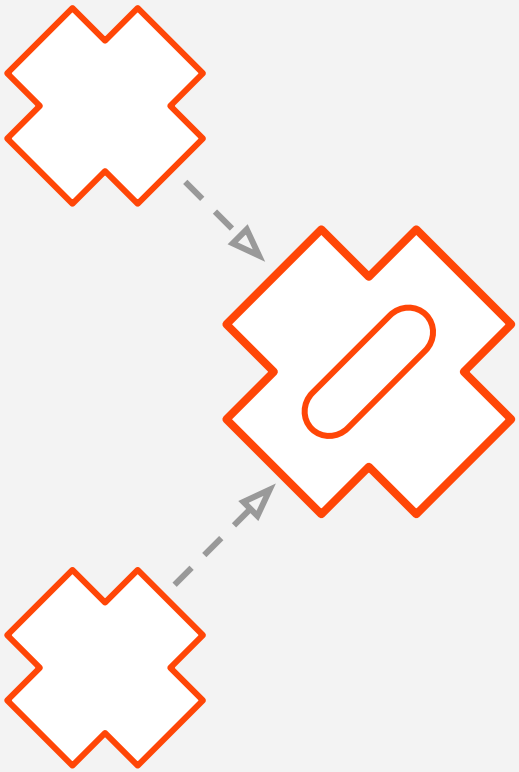
# Function Objects

- Single responsibility
- Single public interface (#call)
- Private methods for code clarity / organization
- Has state, but *immutable*
- Dependencies are injected



# Dependency Injection

- Makes an object's collaborators explicit
- Easy to test
- Can give you determinism



# 2. State

# STATE IS BAD*

```ruby
class Subscription

  def cancel
    @canceled = true
  end

  # ... 200 lines later...

  def amount
    @canceled ? 0 : amount
  end
end
```

```
# accounts/index.html.erb

...

<% account.balance += 150 %>

Your balance is <%= account.balance %>

...
```

# State is bad… when it’s *mutable*

- Hard to reason about
- Hard to reproduce bugs
- Hard to confidently change behaviour

# State can be OK!

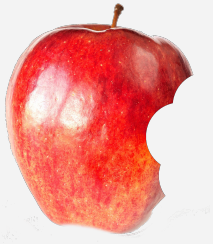
- Immutable state is good state
- State for presentation and consumption of data
- Safe to pass around

# Mutable State

You have an apple

You eat the apple

You've changed the apple's state



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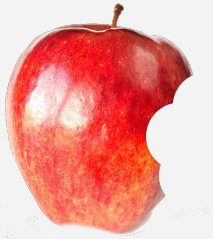


## Immutable State

You have an apple

You eat the apple

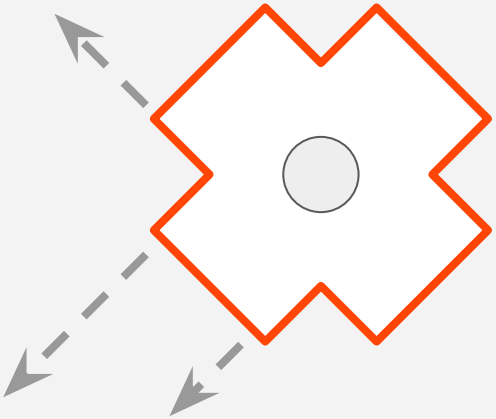
*Now you have two apples!*

# VERBS are *side effects*

NOUNS are *things*

# Look, but don’t touch

- Pure functions, immutable data
- Value Objects, Query Objects, etc
- Rich interfaces for interacting with your data



```ruby
class Price

  attribute :price_in_cents, Integer

  def humanized_price
    “$#{price_in_cents / 100.0}”
  end

  # ...

end
```

```
class SubscriptionPresenter

  attribute :subscription, Subscription
  attribute :plan, Plan

  def plan_status
    “Your plan #{plan.name} will renew on #{subscription.renewal_date}”
  end

  # ...

end
```

# Immutable state is good state

- Wrap immutable data in a nice interface
- No side effects - use with confidence!

# Recap

- Encapsulate behaviour in function objects
- Extend behaviour with composition
- Model data with immutable state
- Inject dependencies

# Functional Object-Oriented Design

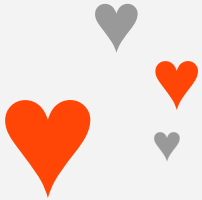
# SIMPLICITY

# Ruby ♥ FP + OO

- Everything is an Object*
- Lambdas == Functions as data
- Blocks == anonymous functions
- Callable objects with #call

# Community and Tooling

- dry-rb
  - **dry-view** for functional views
  - **dry-struct** for elegant function objects
- Web frameworks
  - Hanami
  - Roda



# Mmm, FOOD...

# Thanks!