Sharing Behavior

Week 3 / Lesson 2

Homework

- Still missing quite a few assignments from last week
- I'm holding off on reviewing Week 2 homework till this Sunday to give everyone more time to get it in
- I'll be in touch before this Tuesday's class to make sure no one is having issues submitting assignments
- For any code homework I'll be adding comments with feedback to the bottom of your submitted files. Look for those when you pull from upstream

Agenda

- Reviewing Scope
- Sharing Code: Inheritance
- Sharing Code: Mixins
- Lab Time

Scope

Method Scope

```
def SuperHero
    def fly
  "Here we go!"
end
end
```

```
def fly "I can't." end
```

```
>> superman = SuperHero.new
```

superman.fly => "Here we go!"
fly => "I can't."

Scope: Instance vs. Class Methods

- You don't need an instance to call a class method (not always necessary to call .new)
- Below is an example of the SecretNumber class re-implemented to use a class method

```
# gets a random number between 0-9, adds one
so it's between 1-10
class SecretNumber

   def self.generate rand(10)+1 end

end

number = SecretNumber.generate
```

The self keyword in class methods

- self keyword is used when definining a method name to indicate a class method
- self is also used INSIDE a method definition to indicate the current object
- a common use of self is to call the current objects methods (such as one of its attr_accessors)
- below, self is used to indicate that 'generate_random_story' is a class method
- in addition, self is then used to call the "stories" attr_accessor method on the NewsPaper instance (an attr_accessor getter method returns the instance variable e.g. @stories)

See:

`Week3/Lesson2/Examples/self_example.rb`

Sharing Behavior

Sharing is Caring

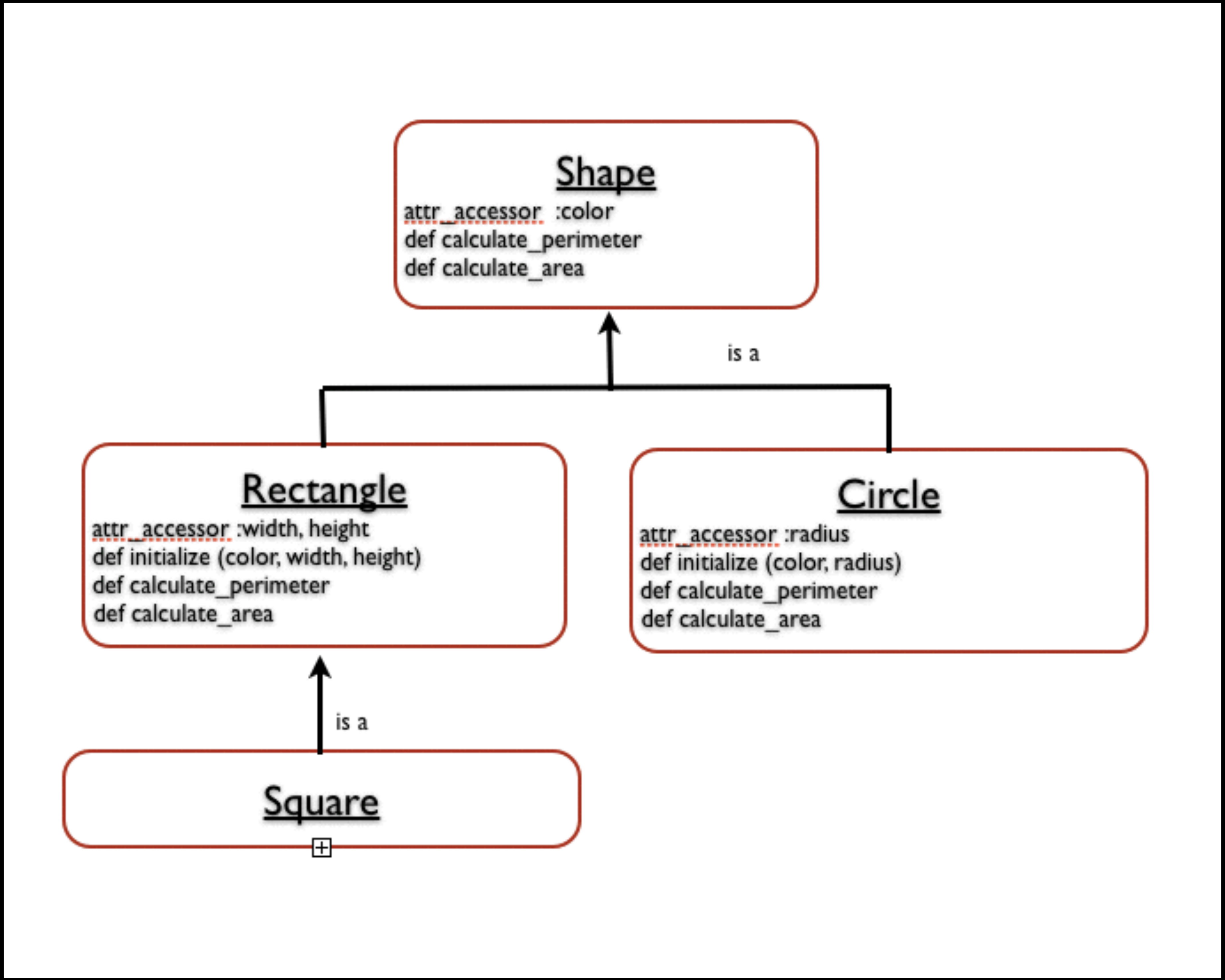
- Inheritance
- Mixins
- Modules

Inheritance

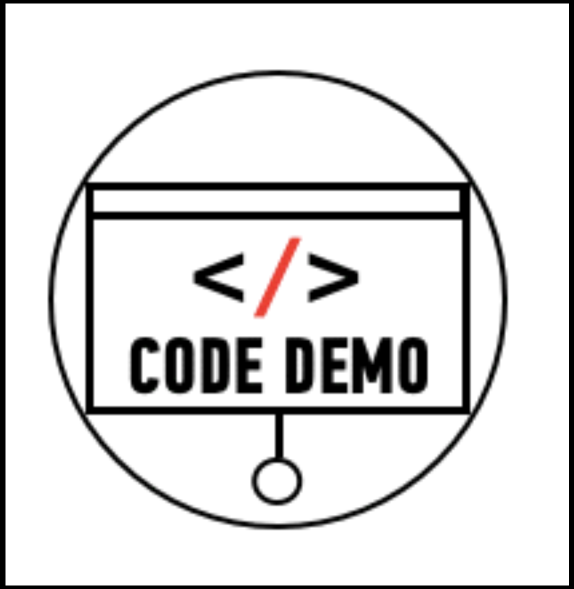
"I got it from my momma" - Will.i.am

- Share properties & behavior
- Keeps code DRY

Inheritance



Inheritance



Inheritance

Glimpse into Rails

- Where you'll see it…

```
class User < ActiveRecord::Base
end
```

Inheritance

Recap

- One class can inherit the capabilities of another using the < operator.
- Sub-class inherits from super-class (child class inherits from parent class)
- A child can override a parent variable or method by re-using its name class.
- If defined in different physical files, a child must require its parent

Sharing Behavior

Getting Ready for Rails

- The following slides introduce other ways to share behavior.
- This is an introduction and we will see more when we start Rails.
- For now lets understand the basics.

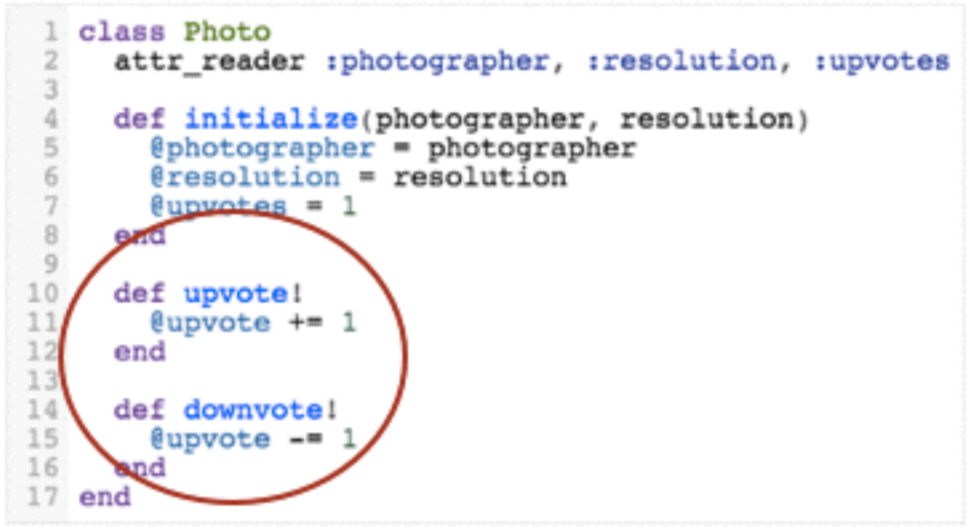
SHARING BEHAVIOR: Mixins

- "Mixins" are a facility to import code into a class
- They are used in cases when we don't want to use inheritance
  - Perhaps we only want a few methods from a small module, not the whole class
  - A class may want to mixin many different modules, but you can only inherit from one class
- In Ruby, we use Modules to facilitate mixins

Sharing Behavior

Teddit as an example

- Lets say teddit now accepts photos, videos and stories.
- You can up and down vote all of them.

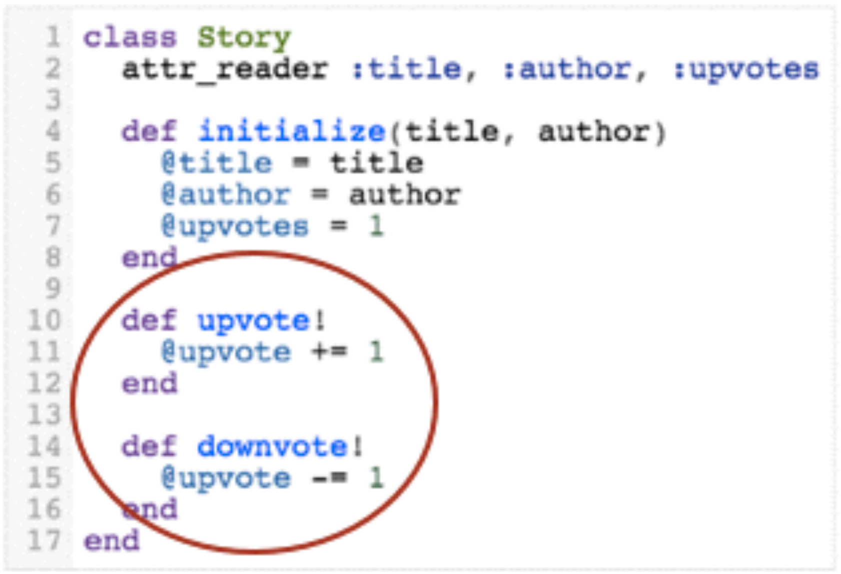


```ruby
class Photo
  attr_reader :photographer, :resolution, :upvotes

  def initialize(photographer, resolution)
    @photographer = photographer
    @resolution = resolution
    @upvotes = 1
  end

  def upvote!
    @upvote += 1
  end

  def downvote!
    @upvote -= 1
  end
end
```

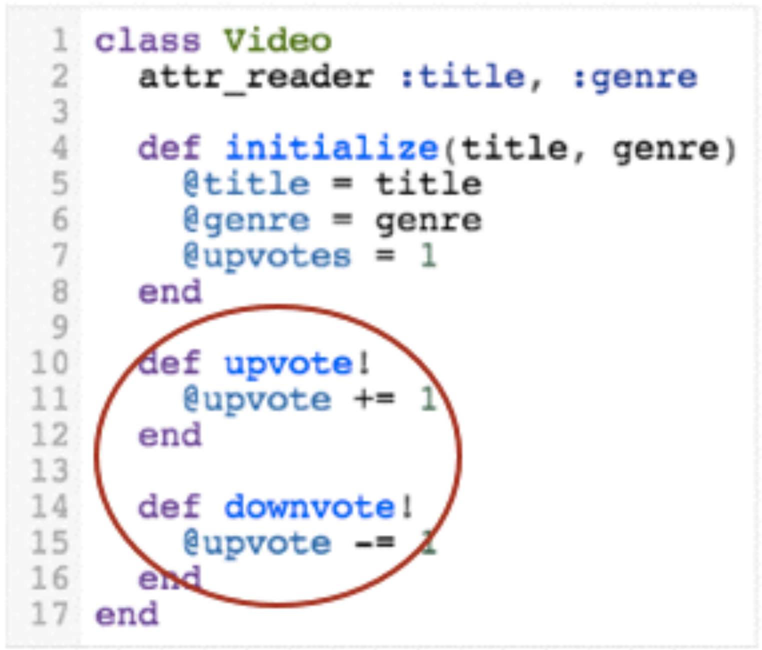


```ruby
class Story
  attr_reader :title, :author, :upvotes

  def initialize(title, author)
    @title = title
    @author = author
    @upvotes = 1
  end

  def upvote!
    @upvote += 1
  end

  def downvote!
    @upvote -= 1
  end
end
```



```ruby
class Video
  attr_reader :title, :genre

  def initialize(title, genre)
    @title = title
    @genre = genre
    @upvotes = 1
  end

  def upvote!
    @upvote += 1
  end

  def downvote!
    @upvote -= 1
  end
end
```

MIXINS: Upvotable Example

```
See mixins.rb in Examples folder
```

SHARING BEHAVIOR: Modules

- What if we wanted to have two bat classes.

```
class Bat
    def fly!
        puts "So free.. and blind"
    end
end

# Somewhere else in your code
class Bat
    def made_of
        "wood"
   end
end

slugger = Bat.new
slugger.fly?!??!
```

Inheritance vs Mixins

What’s the difference?

- inheritance (class SomeClass < OtherClass) is used to inherit the methods from one class into another class

- include (include SomeModule) is used to import the methods from one module into a class

- You're ready to start working with Rails now

Lab time & homework

- Object Oriented Secret Number
- Apartment exercise

Homework

- Midterm due lesson 8.

RESOURCES: More on Modules

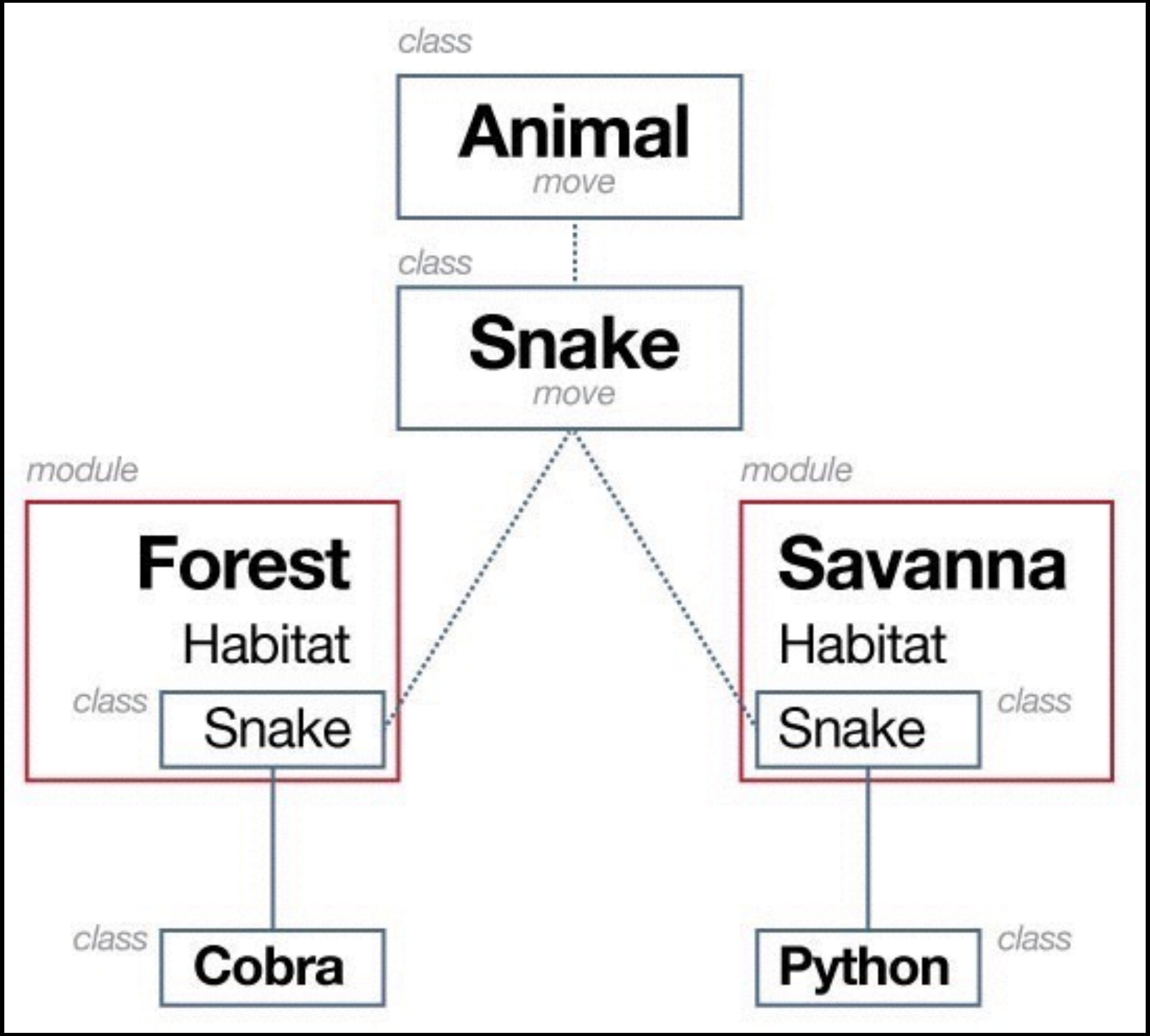
Namespacing

- We can define methods/classes with the same name, but namespaced differently
- We would do this if (in example below) we wanted the Bat to behave differently depending on which namespace it belongs to
- You will rarely use module namespacing (not at all in this course)

```
module Animal class Bat def fly! puts "So free.. and blind" end end end
Animal::Bat.new
module BaseballUtensils class Bat def made_of "wood" end end end
BaseballUtensils::Bat.new
```

RESOURCES: More on Modules

Namespacing



RESOURCES: Sharing Behavior

Good code should be reused!...

Cheat Sheet: load vs. require vs. include

Why do they all sound the same??!!!!

- load: inserts a file's contents
    - File can be loaded more than once.

```
load 'config.rb'
```

- require inserts parsed contents: We use it to require a class in another .rb file.
    - File is only required once.

```
require 'config'
```

- include 'mixes in' modules. Use to include modules and mixins.

~~~
```include 'my_module'```
~~~

Cheat Sheet: Inheritance

- One class can inherit the capabilities of another using <
- Sub-class inherits from super-class (child class inherits from parent class)
- If defined in different physical files, a child must require its parent

-- lib/person.rb —

```
 class Person
    end
```

--- lib/worker.rb ---

```
    require 'lib/person'

    class Worker < Person
    end
```

Cheat Sheet: Inheritance Cont.

Heres a lengthy example:

- Don't repeat yourself (DRY)
- Don't do this!

```ruby
class ScienceSubteddit
    @@name = "Science"
    @@description = "Where we blow stuff up for fun"
    def self.welcome
        puts "Welcome to the #{@@name} Subteddit!"
        puts @@description
    end
end

class MoviesSubteddit
    @@name = "Movies"
    @@description = "Because the Matrix was awesome"
    def self.welcome
        puts "Welcome to the #{@@name} Subteddit!"
        puts @@description
    end
end

class SportsSubteddit
    @@name = "Sports"
    @@description = "We have big muscles and we run fast"
    def self.welcome
        puts "Welcome to the #{@@name} Subteddit!"
        puts @@description
    end
end

class RubySubteddit
    @@name = "Ruby"
    @@description = "Because Python Sucks"
    def self.welcome
        puts "Welcome to the #{@@name} Subteddit!"
        puts @@description
    end
end
```

Cheat Sheet Inheritance Cont.

- This is a better approach and demonstrates the benefit of using Object Oriented programming.
  - News sections inherit from Subteddit.

```ruby
class Subteddit
    @@name = ""
    @@description = ""
    def self.welcome
        puts "Welcome to the #{@@name} Subteddit!"
        puts @@description
    end
end

class ScienceSubteddit < Subteddit
    @@name = "Science"
    @@description = "Where we blow stuff up for fun"
end

class MoviesSubteddit < Subteddit
    @@name = "Movies"
    @@description = "Because the Matrix was awesome"
end

class SportsSubteddit < Subteddit
    @@name = "Sports"
    @@description = "We have big muscles and we run fast"
end

class RubySubteddit < Subteddit
    @@name = "Ruby"
    @@description = "Because Python Sucks"
end
```

Cheat Sheet: Mixins

- Include a module in a class to access the module's methods. This also keeps code DRY.

```ruby
module MyModule
    def module_method(parameters)
        return parameter
    end
end
class MyClass
    include MyModule
end
```

```ruby
my_object = MyClass.new
my_object.module_method
```

Cheat Sheet: Modules

Ruby exposes much core functionality through modules

A commonly used built in module is Math The :: operator is used to refer to a constant set in a module

```
    puts Math.sqrt(9)
```

3.0

```
    puts Math::PI
```

3.1415926

- A module is like a class, except
  - You cannot create a new instance of a module
  - You cannot extend a module to create a child module
- Modules are a way to add namespaces

Ruby docs have a full list of available modules.

Cheat Sheet: Method Scope

```
class GA_course
      def initialize (course_name)
          @course_name = course_name
      end

      def announce_course
          puts "GA has a course on #{@course_name}"
      end

      def self.announce_courses
          puts "GA has a course on BEWD"
          puts "GA has a course on FEWD"
          puts "GA has a course on CSF"
          puts "GA has a course on DAT"
          puts "GA has a course on UXD"
          puts "GA has a course on PDM"
      end
  end

  my_course = GA_course.new("BEWD")
  my_course.announce_course #
  GA_Course.announce_courses
```

GA has a course on BEWD

GA has a course on BEWD GA has a course on FEWD GA has a course on CSF GA has a course on DAT GA has a course on UXD GA has a course on PDM

Still Feel Lost?

It’s ok, we will see these terms again in Rails,

but you can also…

Catch up With These Resources

- Working with Enumerables Video
- password => BEWD_GA
    - Modules
    - Mixins