Deciphering the Ruby Object Model

Who am I?

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- A Pragmatic Programmer @ ThoughtWorks
- VB freelance programmer for about a year
- Java/JEE apps. developer for about 5 years
- Ruby Enthusiast for over 8 months now
- Haskell newbie
- Occasionally blog at kartzontech.blogspot.com
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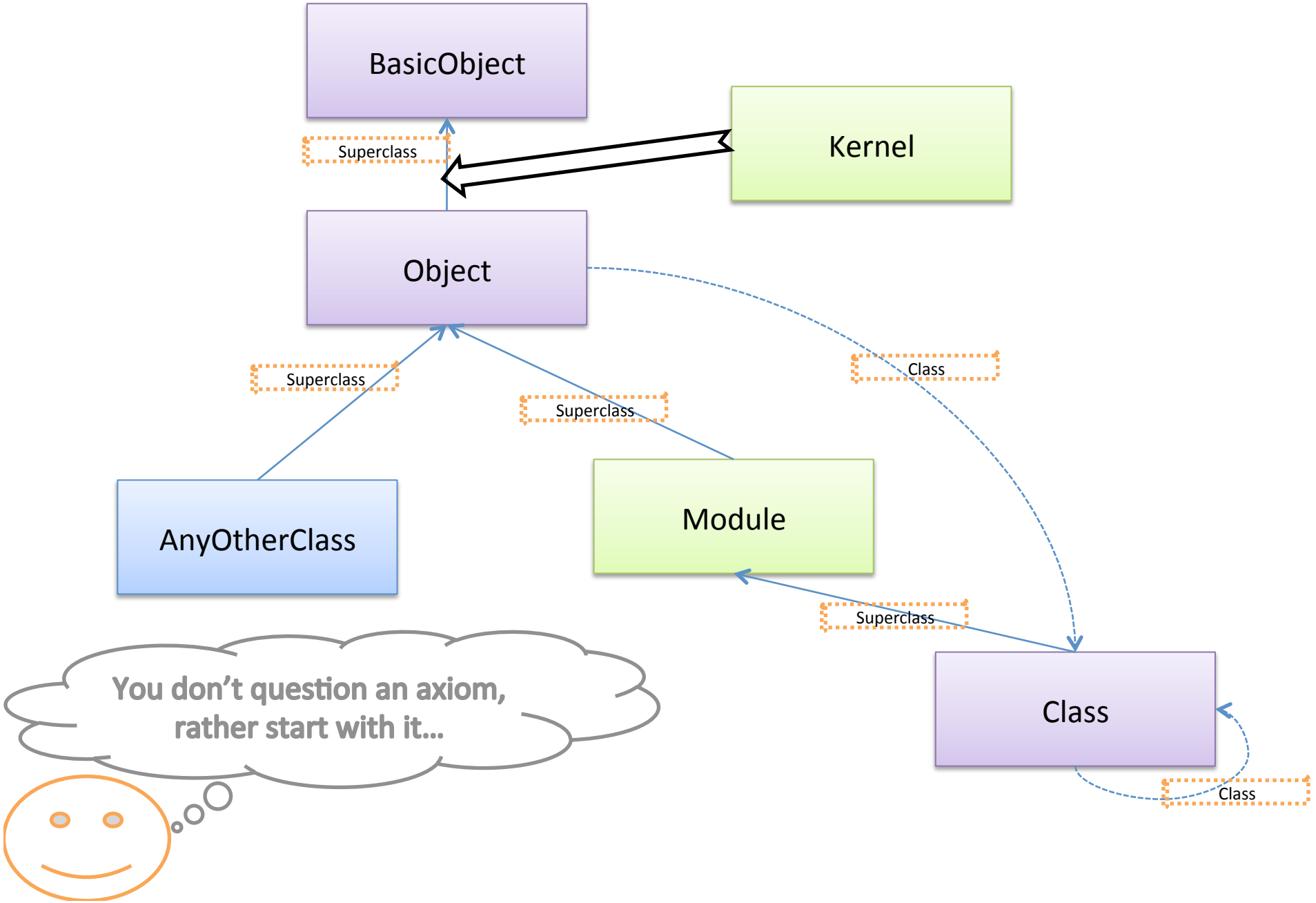
Why Learn Ruby Object Model?

- Good if you know “syntax and semantics”
- Better if you know “Ruby’s Object Model”
- *“A language the does not affect the way you think about programming is not worth learning at all” – Alan Perlis*

The Axiom


BasicObject
Superclass
Kernel
Object
Superclass
Superclass
Class
AnyOtherClass
Module
Superclass
Class
Class
You don't question an axiom,
rather start with it...

Classes

~~Classes should be closed for modification and open to extension~~

```
class MyClass
end

class MyClass
    def im          # instance method
        puts “Instance method”
    end

    def self.cm        #class method
        puts “Class method”
    end
end
```

Classes

Open Classes ???

Monkey Patching ???

"With more power comes more responsibilities" opines Matz,
like uncle Ben in the spiderman movie

Classes

Class methods can be defined in number of ways:

```
class MyClass
    def MyClass.cm1
        puts “cm1() invoked…”
    end

    def self.cm2
        puts “cm2() invoked…”
    end

    class << self
        def cm3
            puts “cm3() invoked…”
        end
    end

end
```

Classes

Classes are objects

```
class MyClass
    def im
        puts “Instance method”
    end
end
```

is the same as:

```
MyClass = Class.new do
    def im
        puts “Class method”
    end
end
```

Classes

Quiz Time:

```
class MyClass < String.new
    def self.to_s
        puts “Class method”
    end
end

MyClass.to_s
```

What is the output?

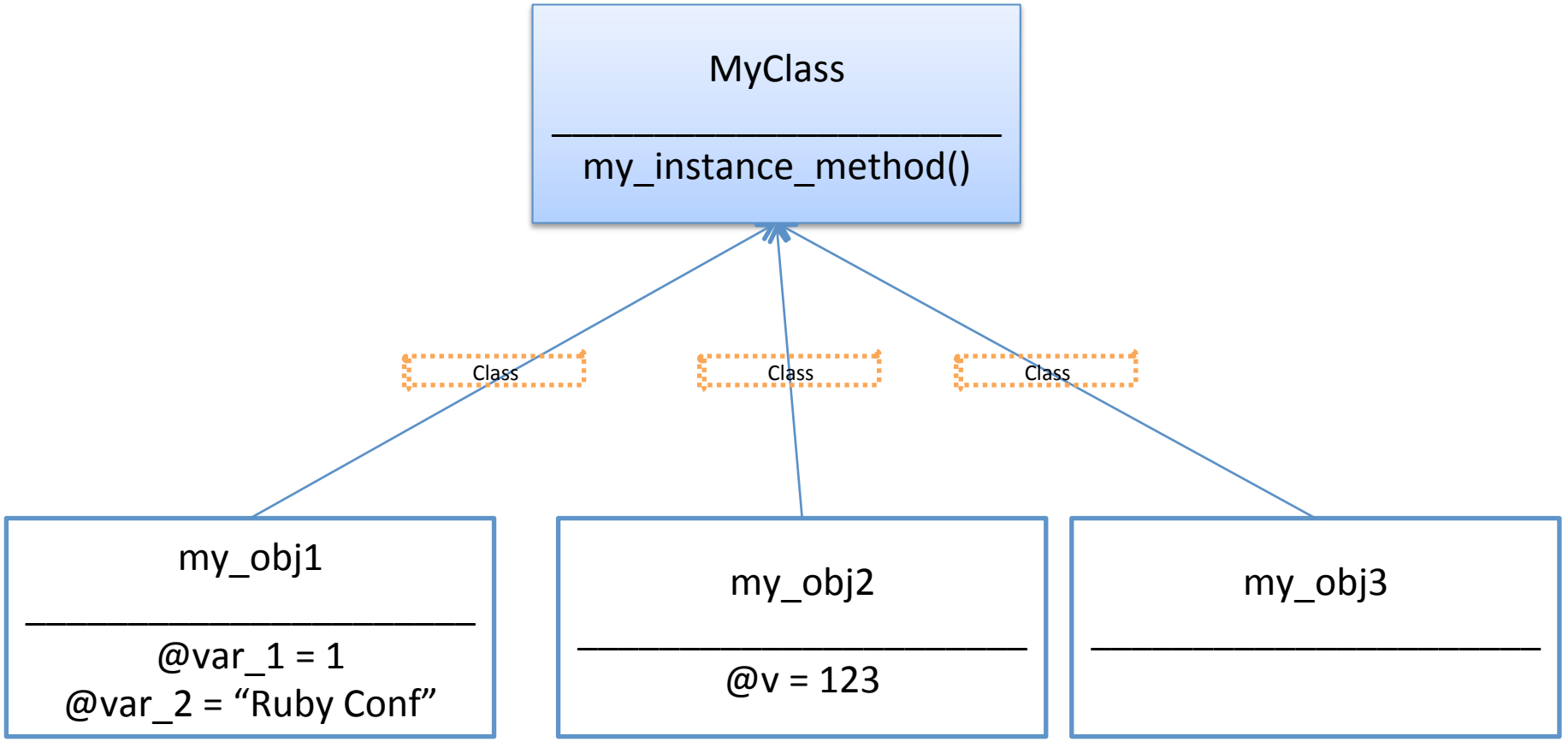
TypeError: Wrong argument type String (expected Class)

Lesson:

Classes inherit from classes only not from just any object

Classes

No connection between a class and its objects' instance variables



Classes

Quiz:

What is the Java/C# Interface equivalent in Ruby?

[FYI: This has nothing to do with what I have been talking about all through!!]

Answer:

Interfaces are irrelevant in Ruby.

But why?

Duck Typing is the answer.

~~Program to an interface~~

No need to inherit from a common interface.

The joy of "**self**" discovery

- self is not the same as this in Java
- self is synonymous to **current/default object**
- Who gets to be self
  depends on
  Where self is

The joy of "self" discovery

Code is an unbeatable teaching aid. What say?

```
p "At Topmost level, self is #{self}"

class MyClass

    p "In class definition block, self is #{self}"

    def self.my_class_method
        p "In my_class_method, self is #{self}"
    end

    def my_instance_method
        p "In my_instance_method, self is #{self}"
    end

end
```

Class, Instance and Class Instance Variables

Experience is the best teacher.

```
class A
      y = 1
      @p = 2
      @q
      @@t = 3

      def initialize
            @@r ||= 4
            @s = 5
      end
end

puts “Class instance variables of A are #{A.instance_variables}”
[:@p]

puts “Class variables of A are #{A.class_variables}”
[:@@t]

a = A.new
puts “a, of type A, has instance variables #{a.instance_variables}”
[:@s]

puts “Class variables of A are #{A.class_variables}”
[:@@t, :@@r]
```

Access modifiers

- Ruby has 3 access modifiers for methods:
  - Public (default)
  - Private
  - Protected

- Access modifiers apply until the end of scope, or until another access modifier pops-up

```
class MyClass

    #public is the default access modifier
    def m1; end

    private
    def m2; end;
    def m3; end;

    protected
    def m4; end;
end
```

Access modifiers

- **private**, **public**, **protected are all methods**, so you can pass method name as symbol to it and change its visibility

```
class MyClass

    def m1; end
    def m2; end;
    def m3; end;
    def m4; end;

    public :m1
    private :m2, :m3
    protected :m4
end
```

Access modifiers

- public
- private
  - only accessible within the scope of a single object in which it is defined (truly private)
- protected
  - accessible from the scope of a method belonging to any object that's an instance of the same class

```
class MyClass

    protected
    def my_protected_method
    end

    public
    def my_public_method(other)
        self.my_protected_method
        other.my_protected_method
    end
end

mc1 = MyClass.new
mc2 = MyClass.new
mc1.my_public_method(mc2)          #=> Works ☺
mc1.my_protected_method            #=> NoMethodError
```

Access modifiers

- Quiz

```
class Speaker

    def  talk
        self.confident? ? “lecture…” : “abscond!”
    end

private
    def  confident?
        true
    end

end

Speaker.new.talk
```

What is the output?
NoMethodError

Lesson:
Private methods can be called only with implicit receiver.
No explicit receiver. Not even self.

Access modifiers

- Quiz

We talked about access modifiers with methods as example.
What about the access modifiers for instance variables?

Answer:

Access modifiers don't apply to Instance variables (@inst_vari).

Instance variables always remain private.

Access to instance variables are only through getter and setter methods!

Singleton Methods

A method defined to be specific to a single object

```
statement = “Karthik is speaking at Ruby Conf India 2011”

def statement.really?
    true
end

statement.really?
```

What is the output?

```
#=> true

another_statement = “Karthik is bull shitting at Ruby Conf 2011”
another_statement.really?
```

What is the output?

```
#=> undefined method error
```

Singleton Methods

How about a class method? Isn't that tied to a single object?

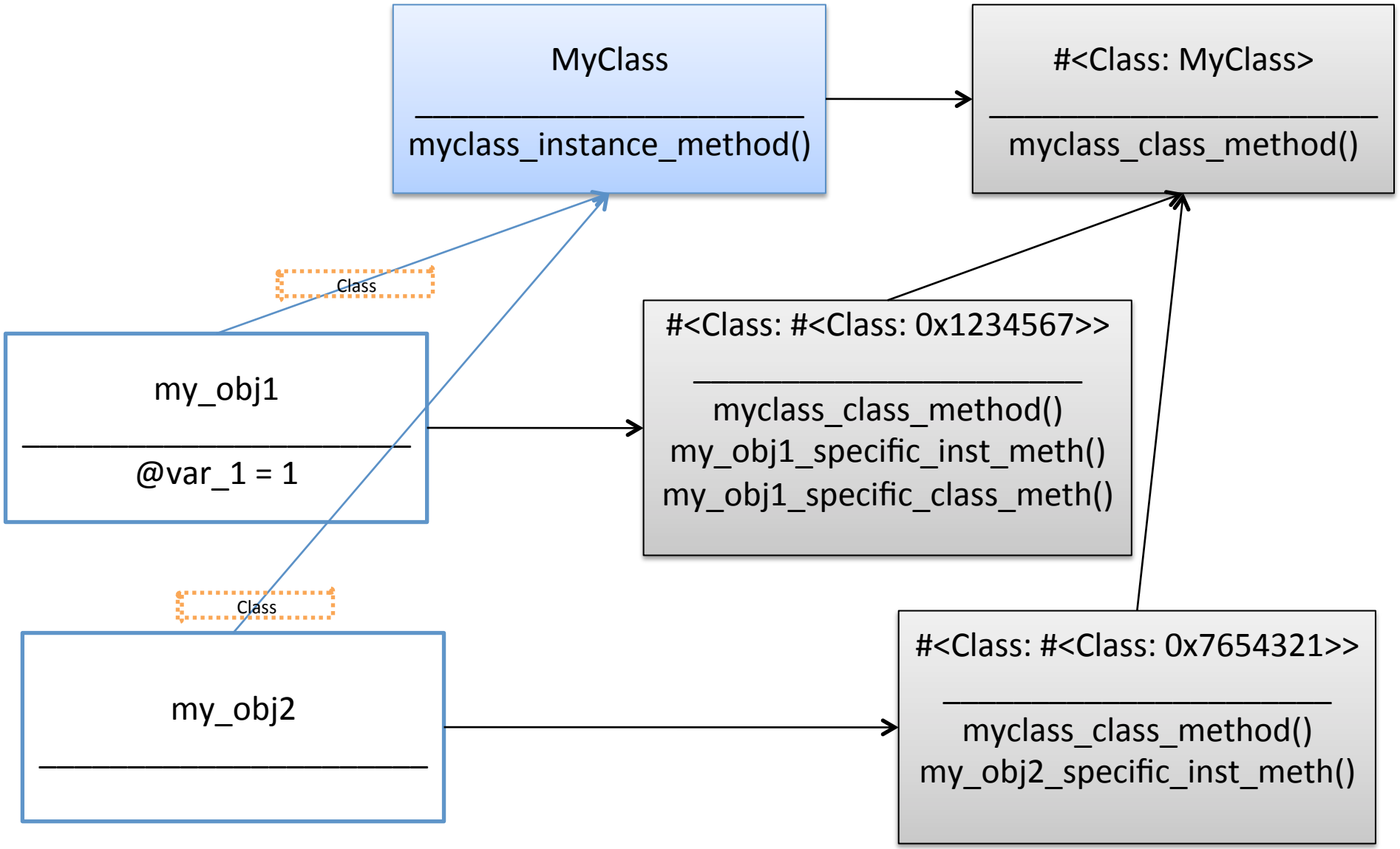
Eg:

```
def MyClass.my_class_method
        #blah..
end
```

Class methods are indeed singleton methods!

Methods – where do they reside?

It depends!!!



Methods -> Function call or Message???

- No function call. It's all messages!

- duck.quack()
  - As Java programmer, I see it as looking up for "quack" as member function in a table and call it.
  - As Ruby programmer, I see it as passing a message "quack" to the object "duck".

- No Method Overloading.

Module

- Used for namespacing

```
module MyModule
    MyConstant = “MyModule::Myconstant”

    class MyClass
            MyConstant = “MyModule::MyClass::MyConstant”
    end
end

puts MyModule::MyConstant        # => MyModule::MyConstant
puts MyModule::MyClass::MyConstant   #=> MyModule::MyClass::MyConstant
```

Another example:

```
ActiveRecord::Base.connection.execute(sql_query)
```

Module

- Better alternate to multiple inheritence.
- DP: “Favor composition over inheritence”
- Code Examples:

```
module MyModule
    def my_meth
            puts “my_meth() of MyModule”
    end
end

class MyClass
end
```

Case 1: Include MyModule instance methods as instance methods of myClass

```
class MyClass
    include MyModule    # ← ← Just include it…
end
```

Module

```
module MyModule
    def my_meth
        puts “my_meth() of MyModule”
    end
end

class MyClass
end
```

Case 2: Include instance methods of MyModule as class methods of MyClass

```
class MyClass
    class << self
        include MyModule
    end
end
```

```
class MyClass
    extend MyModule
end
```

Module

Quiz:

```
module MyModule
    def self.my_freakin_meth
            puts “my_freakin_meth() of MyModule”
    end
end

class MyClass
    include MyModule
end

MyClass.my_freakin_meth
```

What is the output?

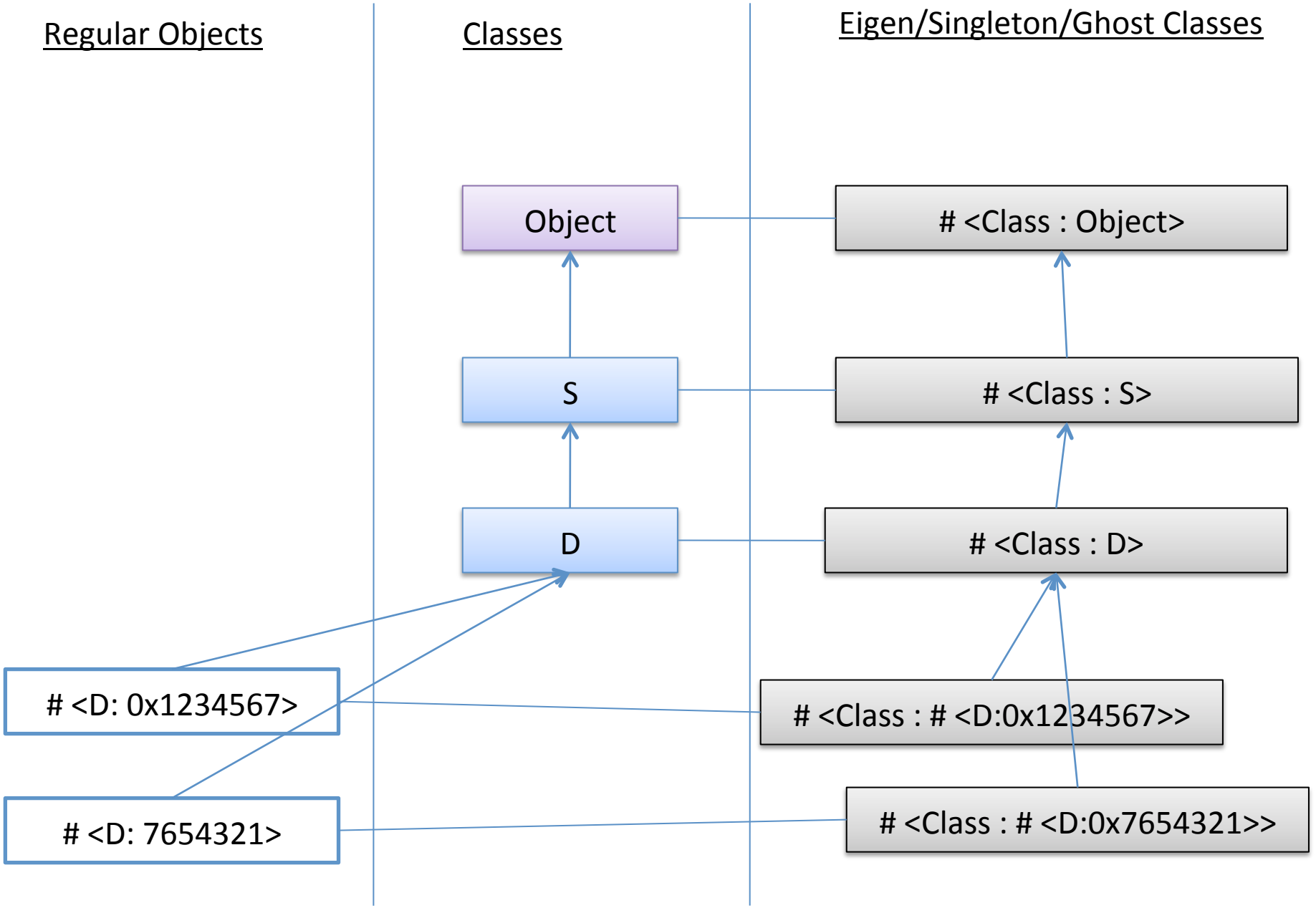
#NoMethodError

Lesson:

When an object includes a module

- Module’s instance methods are *included*
- Module’s class methods are *excluded*

Method Lookup



Resources

- Programming Ruby by Dave Thomas
- Metaprogramming Ruby by Paolo Perrotta
- The Well-grounded Rubyist by David A Black
- OneStepBack.org by Jim Weirich
- blog.jayfields.com

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Thanks.

Don’t forget to whisper your feedback in my ears!