

# Ruby

Dmitry Ratnikov

November 1, 2008

# Outline

General plan for today:

# Outline

## General plan for today:

- ▶ Introduce you to the ruby world.

# Outline

## General plan for today:

- ▶ Introduce you to the ruby world.

# Outline

## General plan for today:

- ▶ Introduce you to the ruby world.
- ▶ Show how one can do some cool things with it.

# Outline

## General plan for today:

- ▶ Introduce you to the ruby world.
- ▶ Show how one can do some cool things with it.
- ▶ Hopefully you'll get all excited about it.

# What is ruby?

Wikipedia says...

# What is ruby?

## Wikipedia says...

Ruby is a dynamic, reflective, general purpose object-oriented programming language that combines syntax inspired by Perl with Smalltalk-like features.



# What is ruby?

## Wikipedia says...

Ruby is a **dynamic**, **reflective**, general purpose **object-oriented** programming language that combines syntax inspired by **Perl** with **Smalltalk**-like features.

# What is ruby?

## Wikipedia says...

Ruby is a **dynamic**, reflective, general purpose object-oriented programming language that combines syntax inspired by Perl with Smalltalk-like features.

# What is ruby?

## Wikipedia says...

Ruby is a dynamic, **reflective**, general purpose object-oriented programming language that combines syntax inspired by Perl with Smalltalk-like features.

# What is ruby?

## Wikipedia says...

Ruby is a dynamic, reflective, general purpose **object-oriented** programming language that combines syntax inspired by Perl with Smalltalk-like features.

# What is ruby?

## Wikipedia says...

Ruby is a dynamic, reflective, general purpose object-oriented programming language that combines syntax inspired by **Perl** with **Smalltalk**-like features.

# In ruby you can...

- ▶ Create variables:

```
pickaxe_book = "Programming Ruby"  
cs_bible = "Art of Computer Programming"  
js_book = "Javascript: The Good Parts"
```

- ▶ Create arrays:

```
available_books = [ pickaxe_book, cs_bible ]
```

- ▶ Create hashes:

```
library = {  
  :available => available_books,  
  :checked_out => [ js_book ]  
}
```

# In ruby you can...

- ▶ Create variables:

```
pickaxe_book = "Programming Ruby"  
cs_bible = "Art of Computer Programming"  
js_book = "Javascript: The Good Parts"
```

- ▶ Create arrays:

```
available_books = [ pickaxe_book, cs_bible ]
```

- ▶ Create hashes:

```
library = {  
  :available => available_books,  
  :checked_out => [ js_book ]  
}
```

# In ruby you can...

- ▶ Create variables:

```
pickaxe_book = "Programming Ruby"  
cs_bible = "Art of Computer Programming"  
js_book = "Javascript: The Good Parts"
```

- ▶ Create arrays:

```
available_books = [ pickaxe_book, cs_bible ]
```

- ▶ Create hashes:

```
library = {  
  :available => available_books,  
  :checked_out => [ js_book ]  
}
```



# In ruby you can...

- ▶ Create variables:

```
pickaxe_book = "Programming Ruby"  
cs_bible = "Art of Computer Programming"  
js_book = "Javascript: The Good Parts"
```

- ▶ Create arrays:

```
available_books = [ pickaxe_book, cs_bible ]
```

- ▶ Create hashes:

```
library = {  
  :available => available_books,  
  :checked_out => [ js_book ]  
}
```

# In ruby you can...

► Create methods:

```
def available?(library, book_name)
  library[:available].include?(book_name)
end
```

► Invoke methods (and print to screen):

```
str = "Available: #{available? library, book_name}"
puts str
```

# In ruby you can...

- ▶ Create methods:

```
def available?(library, book_name)
  library[:available].include?(book_name)
end
```

- ▶ Invoke methods (and print to screen):

```
str = "Available: #{available? library, book_name}"
puts str
```

# In ruby you can...

► Do if/else:

```
if available?(library, "Art of War")  
  puts "Sun Tzu's Art of War is available."  
else  
  puts "Art of War is not available."  
  puts "Try later..."  
end
```

► Inline conditionals:

```
puts "Hello world" unless lhs.started?
```

# In ruby you can...

► Do if/else:

```
if available?(library, "Art of War")  
  puts "Sun Tzu's Art of War is available."  
else  
  puts "Art of War is not available."  
  puts "Try later..."  
end
```

► Inline conditionals:

```
puts "Hello world" unless lhs.started?
```

# In ruby you can...

► Do while loops:

```
file = File.open("checked_out_backup.txt")
while (book = file.gets)
  library[:checked_out] << book
end
```

► Do for loops:

```
str = ""
for i in 0..(library[:checked_out].size) do
  str += "#{library[:checked_out][i]} "
end
puts "Checked out books: #{str}"
```

# In ruby you can...

- ▶ Do while loops:

```
file = File.open("checked_out_backup.txt")
while (book = file.gets)
  library[:checked_out] << book
end
```

- ▶ Do for loops:

```
str = ""
for i in 0..(library[:checked_out].size) do
  str += "#{library[:checked_out][i]} "
end
puts "Checked out books: #{str}"
```

# Using blocks

But ruby allows simpler iteration via blocks:

```
str = ""  
books.each do |book|  
  str += "#{book} "  
end  
puts "Checked out books: #{str}"
```

- ▶ Define what to do with an element of the array in a block.
- ▶ Apply that block to each element of the array.



# Using blocks

But ruby allows simpler iteration via blocks:

```
str = ""  
books.each do |book|  
  str += "#{book} "  
end  
puts "Checked out books: #{str}"
```

- ▶ Define what to do with an element of the array in a block.
- ▶ Apply that block to each element of the array.

# Using blocks

But ruby allows simpler iteration via blocks:

```
str = ""  
books.each do |book|  
  str += "#{book} "  
end  
puts "Checked out books: #{str}"
```

- ▶ Define what to do with an element of the array in a block.
- ▶ Apply that block to each element of the array.

# Using accumulating blocks

Might as well use accumulator style:

```
str = arr.inject("") do |acc, item|  
  "#{acc} #{item}"  
end  
puts "Checked out books: #{str}"
```

- ▶ `inject`'s block takes accumulator and book parameters.
- ▶ Return of the block is passed in the next acc
- ▶ Last acc is returned by the `inject` which is assigned to `str`.

# Using accumulating blocks

Might as well use accumulator style:

```
str = arr.inject("") do |acc, item|  
  "#{acc} #{item}"  
end  
puts "Checked out books: #{str}"
```

- ▶ `inject`'s block takes accumulator and book parameters.
- ▶ Return of the block is passed in the next `acc`
- ▶ Last `acc` is returned by the `inject` which is assigned to `str`.

# Using accumulating blocks

Might as well use accumulator style:

```
str = arr.inject("") do |acc, item|  
  "#{acc} #{item}"  
end  
puts "Checked out books: #{str}"
```

- ▶ `inject`'s block takes accumulator and book parameters.
- ▶ Return of the block is passed in the next `acc`
- ▶ Last `acc` is returned by the `inject` which is assigned to `str`.

# Using accumulating blocks

Might as well use accumulator style:

```
str = arr.inject("") do |acc, item|  
  "#{acc} #{item}"  
end  
puts "Checked out books: #{str}"
```

- ▶ `inject`'s block takes accumulator and book parameters.
- ▶ Return of the block is passed in the next `acc`
- ▶ Last `acc` is returned by the `inject` which is assigned to `str`.

# Declaring a Method With Block

## Sample implementation of inject

```
def available_inject(library, init)
  raise "Block missing" unless block_given?
  arr = library[:checked_out]
  acc = init
  arr.each { |item| acc = yield(acc, item) }
  acc
end
```

# Declaring a Method With Block

## Sample implementation of inject

```
def available_inject(library, init)
  raise "Block missing" unless block_given?
  arr = library[:checked_out]
  acc = init
  arr.each { |item| acc = yield(acc, item) }
  acc
end
```

- `block_given?` returns whether method was provided a block.



# Declaring a Method With Block

## Sample implementation of inject

```
def available_inject(library, init)
  raise "Block missing" unless block_given?
  arr = library[:checked_out]
  acc = init
  arr.each { |item| acc = yield(acc, item) }
  acc
end
```

- `yield` yields control to the provided block with specified parameters.

# In ruby you can...

► Create classes:

```
class Foo
  @@description = "The most important class"
  def foo
    @foo ||= busily_lookup_foo
    @foo
  end
end
```

# In ruby you can...

► Extend classes:

```
class Bar < Foo
  attr_accessor :bar
  def initialize options = {}
    self.bar = options.delete(:bar)
  end
end
```

# In ruby you can...

- ▶ Extend classes:

```
class Bar < Foo
  attr_accessor :bar
  def initialize options = {}
    self.bar = options.delete(:bar)
  end
end
```

- ▶ Defines a reader/writer for bar attribute.
- ▶ Defines constructor for Bar class.

# In ruby you can...

- ▶ Extend classes:

```
class Bar < Foo
  attr_accessor :bar
  def initialize options = {}
    self.bar = options.delete(:bar)
  end
end
```

- ▶ Defines a reader/writer for bar attribute.
- ▶ Defines constructor for Bar class.

# Library manager

Boss says:

*Make a library managing application.*

# Library manager

Boss says:

*Make a library managing application.*

After researching the topic, we deduce that the application should:

- ▶ Track books and games for check in and check out.
- ▶ Provide cataloging of available items.

# Library manager

Boss says:

*Make a library managing application.*

After researching the topic, we deduce that the application should:

- ▶ Track books and games for check in and check out.
- ▶ Provide cataloging of available items.



## app/models/book.rb

```
class Book
  attr_accessor :name, :author, :isbn
  def desc
    "#{name} by #{author}"
  end

  def initialize options = {}
    self.name = options.delete(:name) or
      raise("Need name.")
    self.author = options.delete(:author) or
      raise("Need author.")
    self.isbn = options.delete(:isbn)
  end
end
```

## test/unit/book\_test.rb

```
class BookTest < Test::Unit::TestCase
  def test_desc
    assert_equal "foo by bar",
      Book.new(:name => "foo", :author => "bar").desc
  end
  def test_required_options
    assert_raise(RuntimeError, "should need name") do
      Book.new :author => "foo"
    end
    assert_raise(RuntimeError, "should need author") do
      Book.new :name => "bar"
    end
  end
end
```

## app/models/game.rb

```
class Game
  attr_accessor :name, :author, :platform
  def desc
    "#{name} by #{author}"
  end

  def initialize options = {}
    self.name = options.delete(:name) or
      raise("Need name.")
    self.author = options.delete(:author) or
      raise("Need author.")
    self.platform = options.delete(:platform)
  end
end
```

## app/models/game.rb

```
class Game
  attr_accessor :name, :author, :platform
  def desc
    "#{name} by #{author}"
  end

  def initialize options = {}
    self.name = options.delete(:name) or
      raise("Need name.")
    self.author = options.delete(:author) or
      raise("Need author.")
    self.platform = options.delete(:platform)
  end
end
```

## app/models/game.rb 2.0

```
class Game < Book
  attr_accessor :platform
  def initialize options = {}
    super(options)
    self.platform = options.delete(:platform)
  end
end
```

- ▶ Now Game inherits all methods from Book class.
- ▶ Has an additional platform attribute.
- ▶ But... inherits isbn, which games do not really have.

## app/models/game.rb 2.0

```
class Game < Book
  attr_accessor :platform
  def initialize options = {}
    super(options)
    self.platform = options.delete(:platform)
  end
end
```

- ▶ Now Game inherits all methods from Book class.
- ▶ Has an additional platform attribute.
- ▶ But... inherits isbn, which games do not really have.

## app/models/game.rb 2.0

```
class Game < Book
  attr_accessor :platform
  def initialize options = {}
    super(options)
    self.platform = options.delete(:platform)
  end
end
```

- ▶ Now Game inherits all methods from Book class.
- ▶ Has an additional platform attribute.
- ▶ But... inherits isbn, which games do not really have.

## app/models/game.rb 2.0

```
class Game < Book
  attr_accessor :platform
  def initialize options = {}
    super(options)
    self.platform = options.delete(:platform)
  end
end
```

- ▶ Now Game inherits all methods from Book class.
- ▶ Has an additional platform attribute.
- ▶ But... inherits isbn, which games do not really have.



# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the Book and Game classes.

# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the Book and Game classes.

# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the Book and Game classes.

# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the `Book` and `Game` classes.

# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the Book and Game classes.

# How do we fix it?

What we really want is:

- ▶ Encapsulate the 'Catalogable' functionality that:
  - ▶ does book-keeping of having a name
  - ▶ does book-keeping of having an author.
  - ▶ builds description out of the name and author.
- ▶ Include that functionality in the Book and Game classes.

Solution:  
Modules

# Planning the module

## Definition (Module)

A Module is a collection of methods and constants.

Game plan:

- ▶ Create Catalogable module that provides desired functionality.
- ▶ Include it into Book and Game classes.

# Planning the module

## Definition (Module)

A Module is a collection of methods and constants.

### Game plan:

- ▶ Create Catalogable module that provides desired functionality.
- ▶ Include it into Book and Game classes.



# Planning the module

## Definition (Module)

A Module is a collection of methods and constants.

### Game plan:

- ▶ Create Catalogable module that provides desired functionality.
- ▶ Include it into Book and Game classes.

## app/models/catalogable.rb

```
module Catalogable
  attr_accessor :name, :author
  def desc
    "#{name} by #{author}"
  end
end
```

# Using a module

```
class Book
  include Catalogable
  attr_accessor :isbn
end
class Game
  include Catalogable
  attr_accessor :platform
end
```

- ▶ Book and Game are now independent and shared functionality is abstracted neatly in the Catalogable module.

## Ruby: The cool bits

- ▶ Some ruby principles
- ▶ Extending ruby
- ▶ DRYing things up with dynamic method generation.

# Principle #1 (DRY)

“Don’t Repeat Yourself” principle:

If you have to do something more than once, abstract it away.

# Principle #1 (DRY)

“Don’t Repeat Yourself” principle:

If you have to do something more than once, abstract it away.

Why?

# Principle #1 (DRY)

“Don’t Repeat Yourself” principle:

If you have to do something more than once, abstract it away.

Why?

- ▶ Code duplication means you wrote it at least twice.

# Principle #1 (DRY)

“Don’t Repeat Yourself” principle:

If you have to do something more than once, abstract it away.

Why?

- ▶ Code duplication means you wrote it at least twice.
- ▶ Code duplication reduces clarity.



# Principle #1 (DRY)

“Don’t Repeat Yourself” principle:

If you have to do something more than once, abstract it away.

Why?

- ▶ Code duplication means you wrote it at least twice.
- ▶ Code duplication reduces clarity.
- ▶ Code duplication is much harder to keep in sync.

## Principle #2 (YAGNI)

“You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

## Principle #2 (YAGNI)

“You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

Why?

## Principle #2 (YAGNI)

“You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

Why?

- ▶ Time is better spent on something you actually need

## Principle #2 (YAGNI)

“You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

Why?

- ▶ Time is better spent on something you actually need
- ▶ What you predict will happen usually is not what really happens.

## Principle #2 (YAGNI)

### “You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

### Why?

- ▶ Time is better spent on something you actually need
- ▶ What you predict will happen usually is not what really happens.
- ▶ By the time you will need it, you will know the problem better.

## Principle #2 (YAGNI)

“You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

Why?

- ▶ Time is better spent on something you actually need
- ▶ What you predict will happen usually is not what really happens.
- ▶ By the time you will need it, you will know the problem better.

But what about DRY?

## Principle #2 (YAGNI)

### “You Ain’t Gonna Need It” principle:

Always implement things when you actually need them,  
never when you just foresee that you need them.

### Why?

- ▶ Time is better spent on something you actually need
- ▶ What you predict will happen usually is not what really happens.
- ▶ By the time you will need it, you will know the problem better.

### But what about DRY?

- ▶ DRY things up when you actually repeat yourself,  
not when you think you may repeat yourself.



## Principle #3 (Duck typing)

Duck typing principle:

If it walks like a duck and quacks like a duck, it is a duck.

## Principle #3 (Duck typing)

Duck typing principle:

If it walks like a duck and quacks like a duck, it is a duck.

In practice that means

- What's important is what an object does, not what it is.

## Principle #3 (Duck typing)

### Duck typing principle:

If it walks like a duck and quacks like a duck, it is a duck.

### In practice that means

- ▶ What's important is what an object does, not what it is.
- ▶ In duck-typed languages, interfaces are implicitly specified by defined methods.

# Duck typing in use

```
class Library
  attr_accessor :items
  def catalog
    items.map { |i| i.desc }.join ", "
  end
end
```

# Duck typing in use

```
class Library
  attr_accessor :items
  def catalog
    items.map { |i| i.desc }.join ", "
  end
end
```

Only things this Library implementation cares about:

- ▶ `items` responds to `map`.
- ▶ Each element of `items` responds to `desc`.
- ▶ Whatever `i.desc` returns must be concatenatable by `join`.

# Duck typing in use

```
class Library
  attr_accessor :items
  def catalog
    items.map { |i| i.desc }.join ", "
  end
end
```

Only things this Library implementation cares about:

- ▶ items responds to map.
- ▶ Each element of items responds to desc.
- ▶ Whatever i.desc returns must be concatenatable by join.

# Duck typing in use

```
class Library
  attr_accessor :items
  def catalog
    items.map { |i| i.desc }.join ", "
  end
end
```

Only things this Library implementation cares about:

- ▶ items responds to map.
- ▶ Each element of items responds to desc.
- ▶ Whatever i.desc returns must be concatenatable by join.

# Duck typing in use

```
class Library
  attr_accessor :items
  def catalog
    items.map { |i| i.desc }.join ", "
  end
end
```

Only things this `Library` implementation cares about:

- ▶ `items` responds to `map`.
- ▶ Each element of `items` responds to `desc`.
- ▶ Whatever `i.desc` returns must be concatenatable by `join`.



# Extending ruby

## Question:

What if I want a method that ruby doesn't have?

# Extending ruby

## Question:

What if I want a method that ruby doesn't have?

## Answer:

Extend ruby to have it!

# Adding Fixnum#inject

Suppose we want to be able to do:

```
sorted_profiles = 50.inject([]) do |acc|  
  acc + [Profile.random!]  
end.sort_by { |p| p.name }
```

But...

- ▶ But ruby doesn't have Fixnum#inject

# Adding Fixnum#inject

Suppose we want to be able to do:

```
sorted_profiles = 50.inject([]) do |acc|  
  acc + [Profile.random!]  
end.sort_by { |p| p.name }
```

But...

- ▶ But ruby doesn't have Fixnum#inject

# lib/extensions/fixnum.rb

No problem:

```
class Fixnum
  def inject(init = nil, &block)
    raise "Block missing" unless block_given?
    acc = init
    for i in 0..(self-1) do
      init = yield(init, i)
    end
  end
end
```

# Case study

```
module JavascriptHelper
  def author_js author
    "var author = constructAuthor(#{author.name})"
  end
  def book_js book
    "var book = constructBook(#{book.name})"
  end
  def author_js_tag author
    script_tag author_js(author)
  end
  def book_js_tag book
    script_tag book_js(book)
  end
end
```

## app/helpers/javascript\_helper.rb

```
# ...  
def author_js_tag author  
  script_tag author_js(author)  
end  
def book_js_tag book  
  script_tag book_js(book)  
end
```

- ▶ Both methods have a very similar structure.
- ▶ Both methods do the same things with their arguments.

## app/helpers/javascript\_helper.rb

```
# ...  
def author_js_tag author  
  script_tag author_js(author)  
end  
def book_js_tag book  
  script_tag book_js(book)  
end
```

- ▶ Both methods have a very similar structure.
- ▶ Both methods do the same things with their arguments.



## app/helpers/javascript\_helper.rb

```
# ...  
def author_js_tag author  
  script_tag author_js(author)  
end  
def book_js_tag book  
  script_tag book_js(book)  
end
```

- ▶ Both methods have a very similar structure.
- ▶ Both methods do the same things with their arguments.

## app/helpers/javascript\_helper.rb

After refactoring:

```
[ :book_js, :author_js ].each do |js_method|  
  define_method "#{js_method}_tag" do |item|  
    script_tag send(js_method, item)  
  end  
end
```

- What about making all methods that end in `_js` to have a `_tag` counterpart?

## app/helpers/javascript\_helper.rb

After refactoring:

```
[ :book_js, :author_js ].each do |js_method|  
  define_method "#{js_method}_tag" do |item|  
    script_tag send(js_method, item)  
  end  
end
```

- What about making all methods that end in `_js` to have a `_tag` counterpart?

## app/helpers/javascript\_helper.rb

After second refactoring:

```
instance_methods.select do |m|
  m =~ /^_js$/
end.each do |js_method|
  define_method "#{js_method}_tag" do |*args|
    script_tag send(js_method, *args)
  end
end
```

# More cool ruby things

Other things one can do with ruby:

- ▶ Stubbing things when testing.
- ▶ Generate classes and modules dynamically.
- ▶ Use hooks in ruby to provide aspect-oriented behavior.

# Resources

- ▶ This presentation git clone url:  
`git://github.com/ratnikov/ruby-presentation.git`
- ▶ Ruby documentation: <http://ruby-doc.org>
- ▶ `#ruby-lang` on IRC

# Questions?

**Questions?**