Markup Languages und Anwendungen

Ruby XML Mapping

Marc Seeger (20488)
mail@marc-seeger.de
Computer Science and Media,
HdM Stuttgart, WS 08/09

Agenda

- Ruby
- XML Mapping Libraries
- YAML

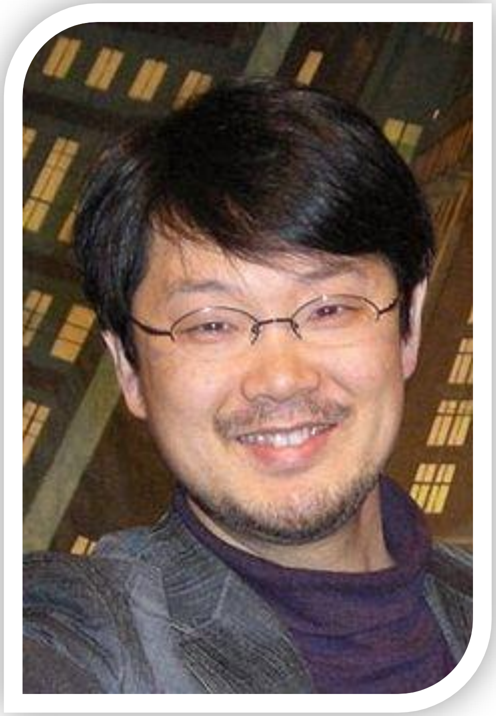
Why Ruby?

A language that doesn't affect the way you think about programming, is not worth knowing

Alan Perlis

History

- Origin:
  - Yukihiro "Matz" Matsumoto
  - Japan 1993



- 1st english book: 2000
- Ruby on Rails: 2004

Language Basics

- Variable Declaration:

```
text = "Hallo Welt" <== String
zahl = 3.5 <== Float
bla = 3 <== Fixnum
blubb = 2325234586346536456456456 <== Bignum
```

- Function Declaration:

```
def do_something(text, number)
  puts text * 3
  puts number * 3
end
```

do_something("Marc", 4)
➔
MarcMarcMarc
12

Language Basics

- ClassNames
- method_names and variable_names
- methods_asking_a_question?
- slightly_dangerous_methods!
- @instance_variables
- $global_variables
- SOME_CONSTANTS or OtherConstants

Language Basics: Hashes

```
h = { 'dog' => 'wuff', 'cat' => 'miau', 'donkey' => 'ihah' }
h.length                          »3
h['dog']                          »"wuff"
h['cow'] = 'muh'
h['cat'] = 7
h                         »{"cow"=>"muh", "cat"=>7, "donkey"=>"ihah", "dog"=>"wuff"}
```

Ruby is a syntactic sugar factory

Principle of Least Surprise

Language Basics: Arrays

```
a = [ 3.14159, "pie", 99, "Blubb" ]
a.type                  »Array
a.length                »3
a[1]                    »"pie"
a[4]                    »nil
a[-1]                   »"Blubb"
a[-2]                   »99
a[1, 3]                 »["pie", 99, "Blubb"]
a[0..2]                 »[3.14159, "pie", 99]

b = Array.new
b.type                  »Array
b.length                »0
b[0] = "second"
b[1] = "array"
b                       »["second", "array"]
```

Give me some sugar: Array

```ruby
people = Array.new
people << "Marc" << "Christian" << "Jakob" << "Michael"
people = ["Marc", "Christian", "Jakob", "Michael"]
people.push("Marc", "Christian", "Jakob", "Michael")
people = %w("Marc", "Christian", "Jakob", "Michael")
```

Give me some sugar : more…

```
5.times { print "Hallo HdM!" }
```

Control Structures

```
if expr [then]
   expr...
[elsif expr [then]
   expr...]...
[else
   expr...]
end
```

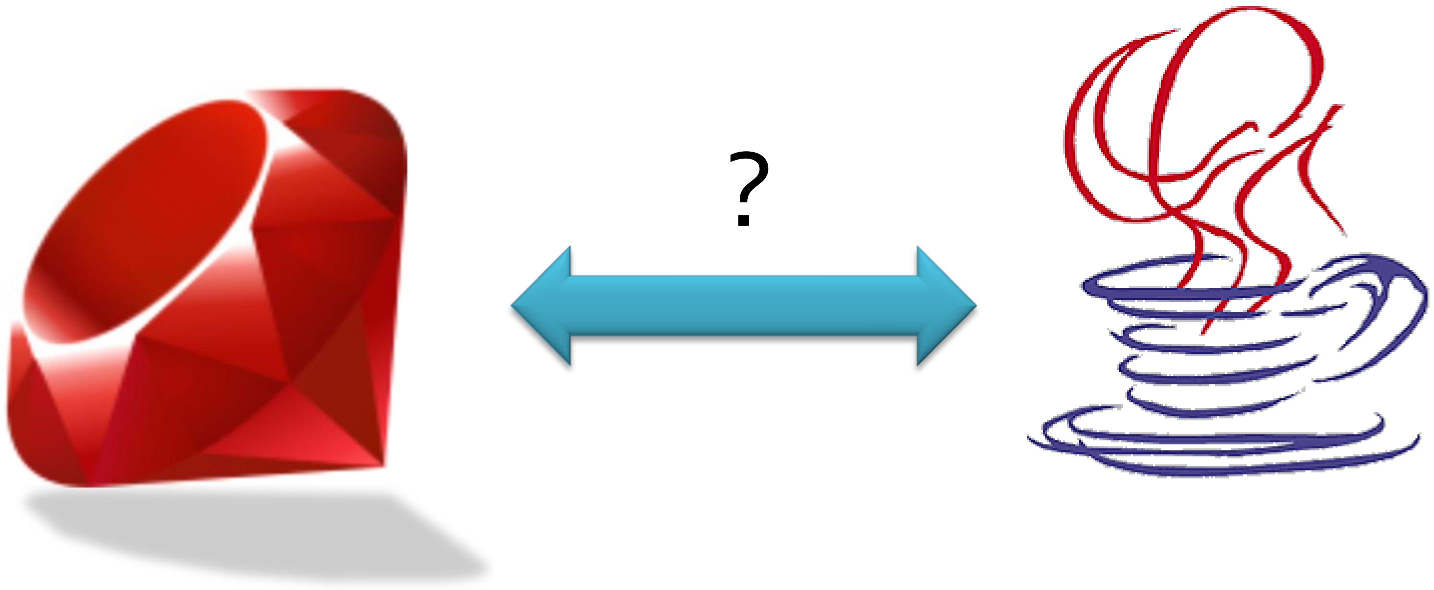
```
until expr [do]
         ...
end
```

```
for i in [1, 2, 3]
  puts i*2
end
```

```
puts "Error!" if $debug
```

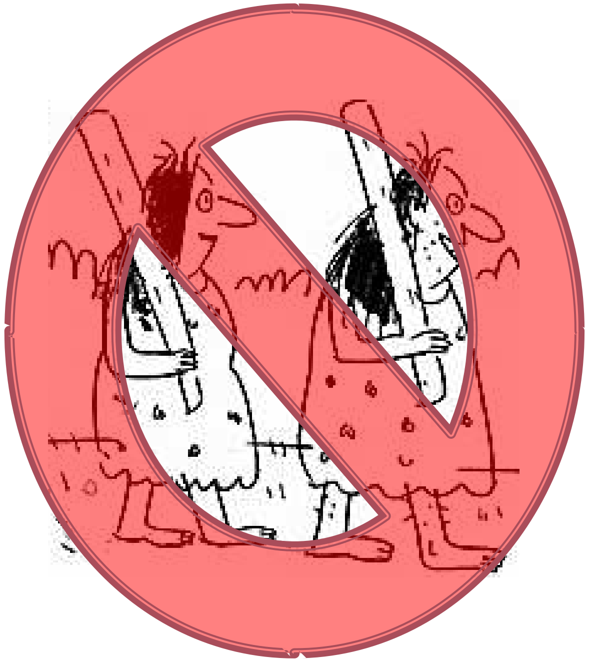
```
puts "Error!" unless $production_mode
```

Ruby for Java-Coders

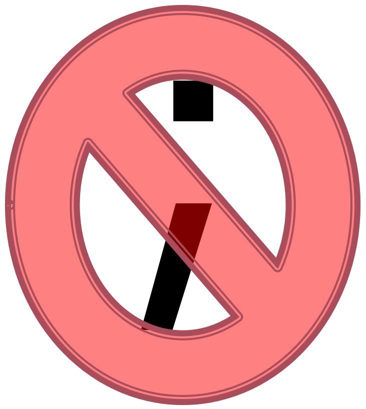


Ruby for Java-Coders

- No Primitives, Integers and floats are objects!
  - -1.abs => 1



Ruby for Java-Coders



No Semi-colons

Ruby for Java-Coders

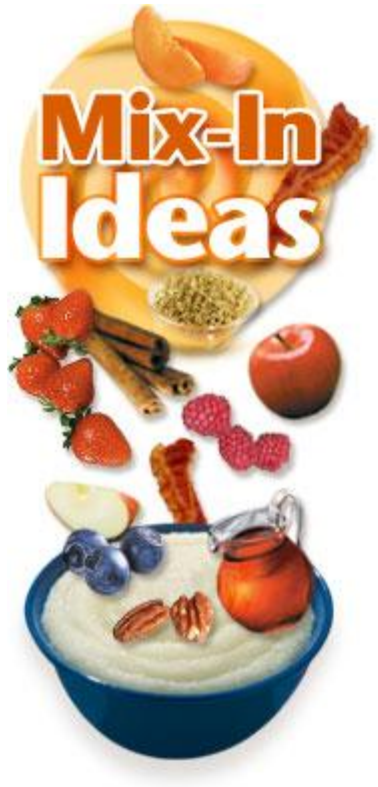
- nil, not null
- nil is an object!
  - nil.nil? => true
  - nil.class => NilClass
- nil and false are false
  - everything else, including 0, is true

Ruby for Java-Coders

- Expression oriented syntax.
  - Almost everything returns a value
  - Methods automatically return their last expression.

Ruby for Java-Coders

- Single Inheritance
  - But mixins are available (= Interface with implemented methods)



Ruby for Java Coders: Mixin Example

```ruby
module BarModule
  def hello_world
    puts "Hello World"
  end
end

class BaseClass
  def class_method
    puts "In class method"
  end
end

class Foo < BaseClass
  include BarModule
end

f = Foo.new
f.class_method
f.hello_world
```

←This module implements the mixin

←A class that doesn‘t do that much

←inheriting
←and mixing!

←We inherited that one
←And mixed in that one

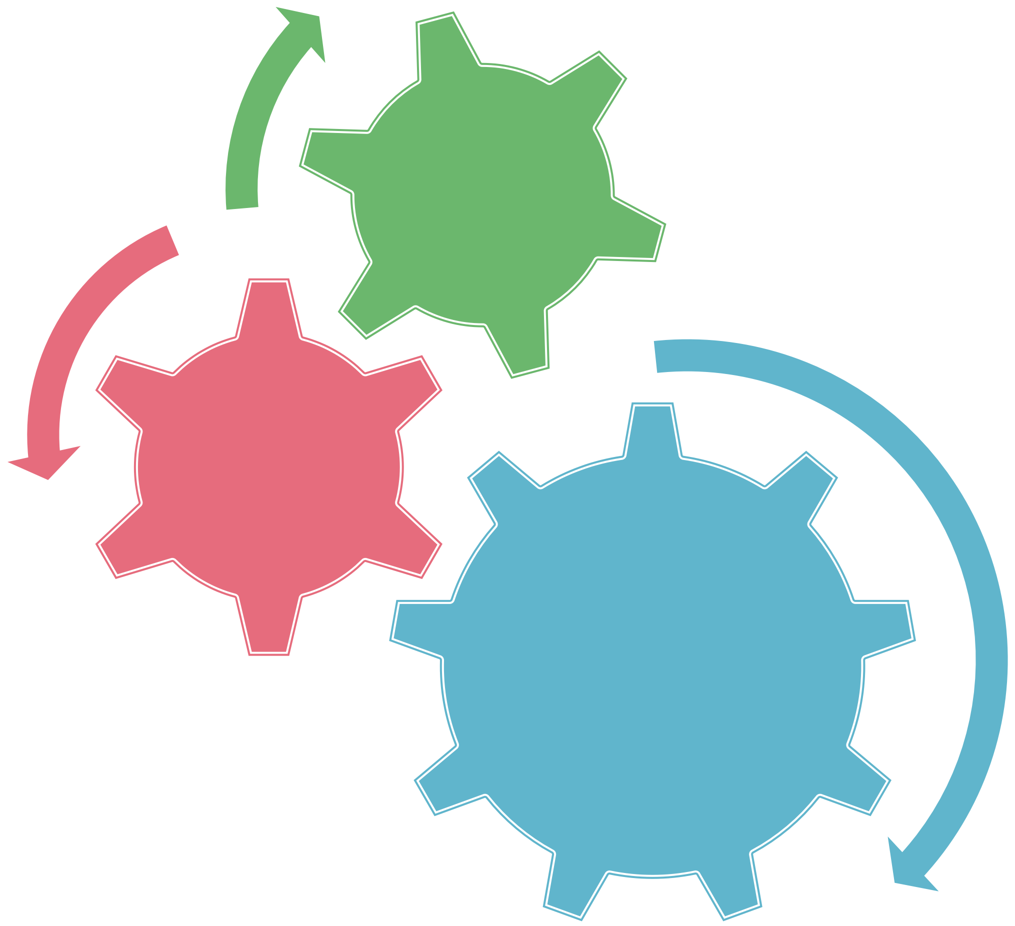
Ruby for Java-Coders

- Classes are always open (even built in classes)

```
class String
 def foo
 "foo"
 end
end

puts "hdm test".foo ==> "foo"
```

Another Example from Rails:
1.hour.from_now

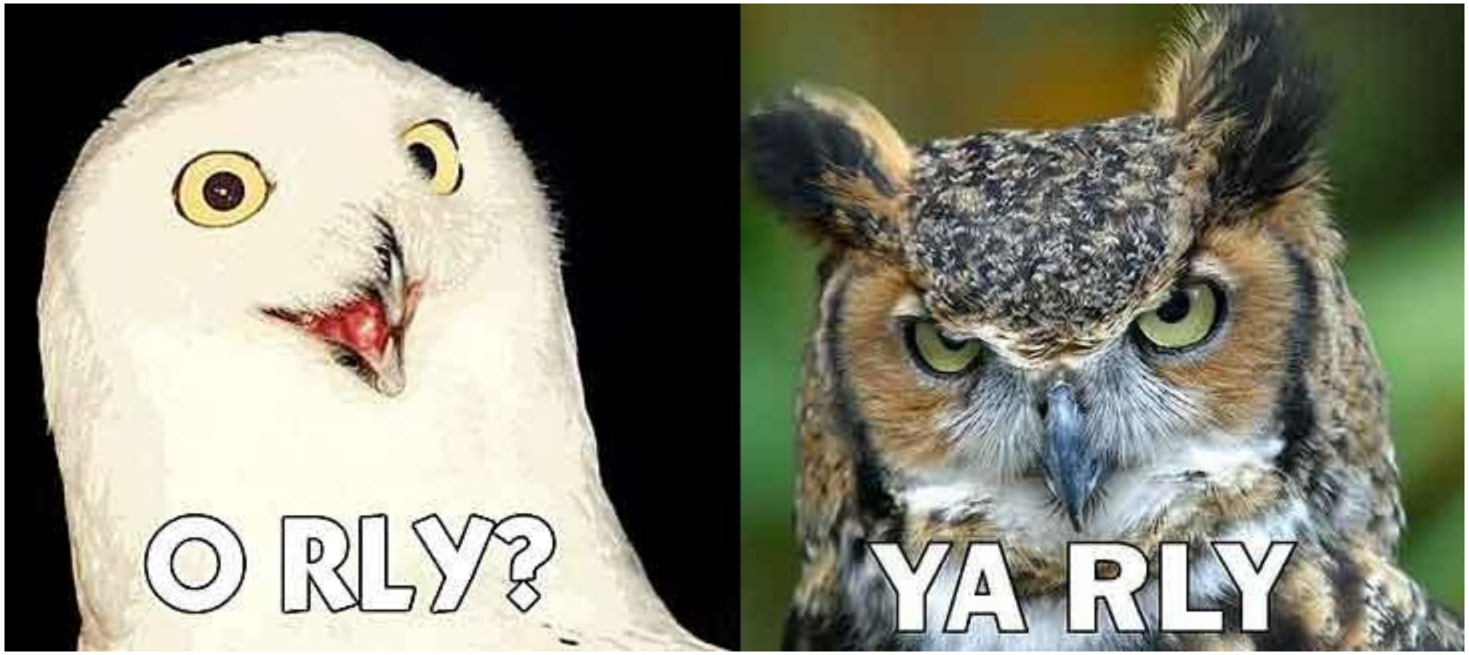
Features



Paradigms

- Procedural
- Object Oriented
- Functional

Everything is an object



Everything is an object

```
irb(main):001:0> 42.methods
=> ["%", "odd?", "inspect", "prec_i", "<<", "tap", "div", "&", "clone", ">>", "p
ublic_methods", "__send__", "instance_variable_defined?", "equal?", "freeze",
„to_sym", "*", "ord", "+", "extend", "next", "send", "round", "methods",
"prec_f„, "-", "even?", "singleton_method_added", "divmod", "hash", "/",
"integer?", "downto", "dup", "instance_variables", "|", "eql?", "size",
"object_id", "instance_eval", "truncate", "~", "id", "to_i", "singleton_methods",
[…]
```

```
irb(main):005:0> nil.class
=> NilClass
```

```
irb(main):002:0> nil.hallo_hdm
NoMethodError: undefined method `hallo_hdm' for nil:NilClass
        from (irb):2
```

Typing: strong / weak

- Strong typing
  - " 5 " / 2 ➔ „NoMethodError"
- Weak typing
  - " 16 " / 2 ➔ 8 (e.g. in Perl)

Ruby is strongly typed! (Java too)

Typing: explicit/implicit

- **Explicit:** int a = 5
- **Implicit:** a = 5

Ruby is implicitly typed! (Java explicitly)

Typing: static / dynamic

- Static typing
  - The compiler checks types during compilation
- Dynamic typing
  - The compiler doesn‘t check types during compilation

Ruby uses dynamic typing (Java uses static typing)

Blocks

„Blocks are unnamed functions“

Blocks

Define:

```
def foo &proc
  proc.call 2
  proc.call 4
  proc.call 6
end
```

```
def foo
  yield 2
  yield 4
  yield 6
end
```

```

-------------------------------

```

Call:

```
foo{|some_number|
  puts some_number * 3
}

-------------------------------
```

Result:

```
6
12
18
```

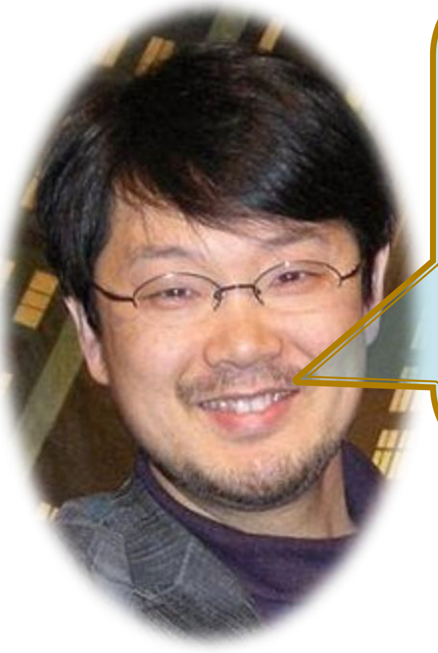
Blocks Example: Iterators

The current piece of the collection we are working with

What we are going to do with it

```
some_collection.each { |item| puts item }

some_collection.select { |item| item =~ /[xz]/ }
some_collection.reject { |item| item =~ /[xz]/ }
```

Closures



A closure object has:

•**code** to run (the executable)

•**state** around the code (the scope)

So you capture the environment, namely the local variables, in the closure. As a result, you can refer to the local variables inside a closure

```
def method_that_returns_a_block( x )
  some_value = x * 12

  return Proc.new { puts "The value of X *was* #{x}, causing some_value to be #{some_value}"}

end

block = method_that_returns_a_block(5)
block.call
```

Closures: Examples

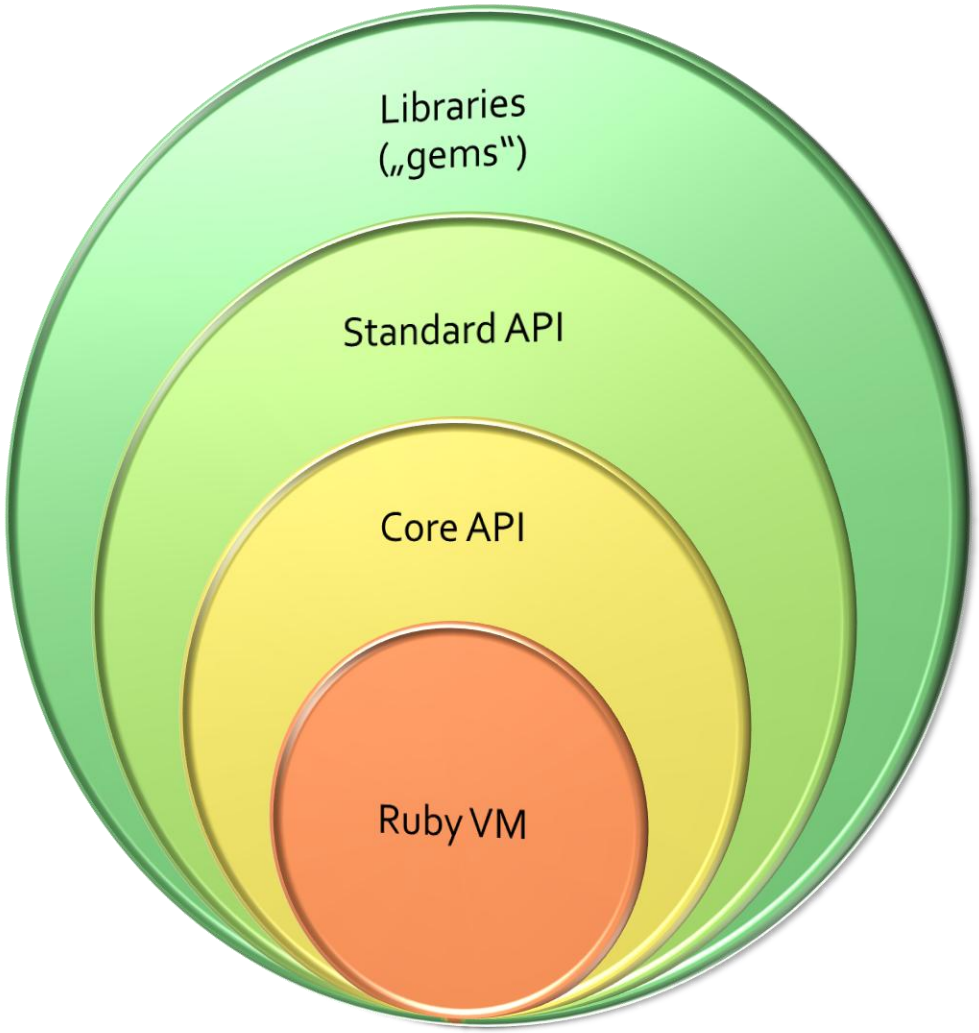
Idea: Function returning a function

```
# Builds a function that returns true
# when 'f' returns false, and vice versa.
def complement f
  lambda {|*args| not f.call(*args) }
end
```

In action:

```
is_even = lambda {|n| n % 2 == 0 }
is_odd  = complement(is_even)

is_odd.call(1) # true
is_odd.call(2) # false
```

Parts of Ruby

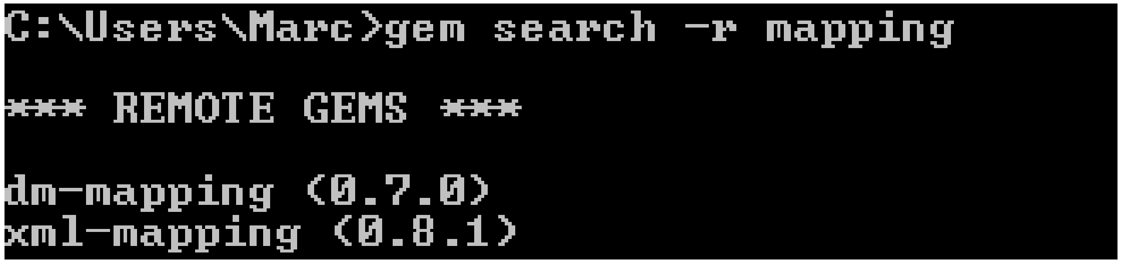


Execution Environments

- Ruby VM (Ruby 1.8)
- YARV (aka Ruby 1.9)
- Rubinius
- MacRuby
- Jruby
- IronRuby
- Hotruby

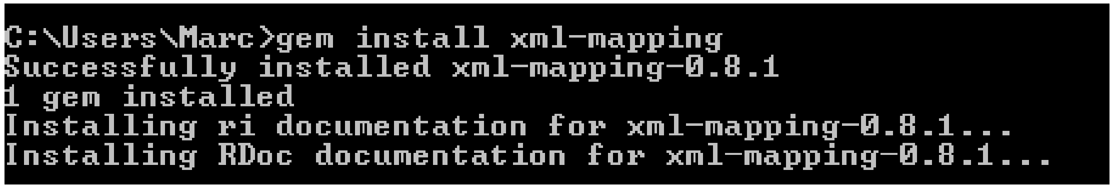
Package Management

- Gem:
  - Search:



```
C:\Users\Marc>gem search -r mapping

*** REMOTE GEMS ***

dm-mapping (0.7.0)
xml-mapping (0.8.1)
```

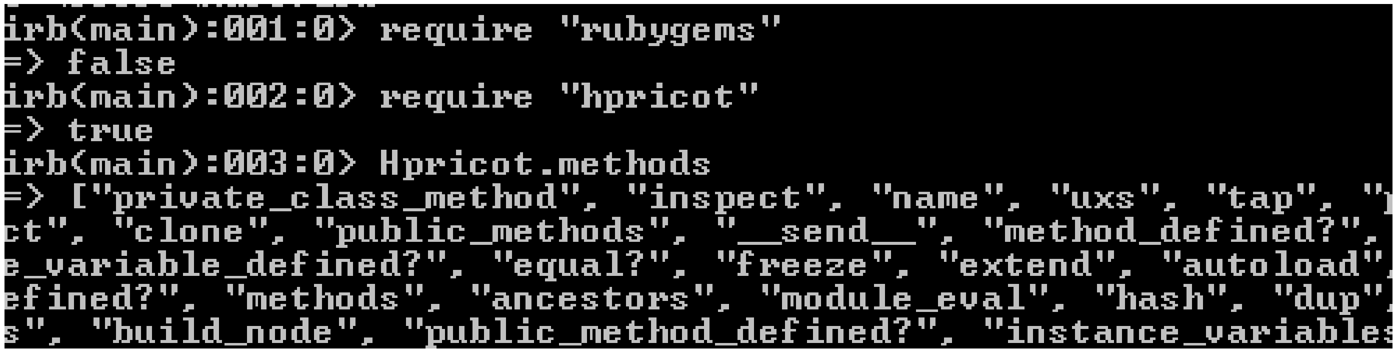
  - Installing:



```
C:\Users\Marc>gem install xml-mapping
Successfully installed xml-mapping-0.8.1
1 gem installed
Installing ri documentation for xml-mapping-0.8.1...
Installing RDoc documentation for xml-mapping-0.8.1...
```

Package Management

- Gem:
  - Usage:



```
irb(main):001:0> require "rubygems"
=> false
irb(main):002:0> require "hpricot"
=> true
irb(main):003:0> Hpricot.methods
=> ["private_class_method", "inspect", "name", "uxs", "tap", "
ct", "clone", "public_methods", "__send__", "method_defined?",
e_variable_defined?", "equal?", "freeze", "extend", "autoload",
efined?", "methods", "ancestors", "module_eval", "hash", "dup",
s", "build_node", "public_method_defined?", "instance_variables
```

Enough with the Jibber-Jabber

Mapping Libraries

- XML → Object
  - XML-Object
  - XmlSimple
- XML ←→ Object
  - ROXML
  - XML::MAPPING
  - HappyMapper

XML-Object

http://xml-object.rubyforge.org/

„Tools like JSON or YAML are a much better fit for this kind of job, but one doesn’t always have that luxury.“

XML-Object

… attempts to make the accessing of small, well-formed XML structures convenient, by providing a syntax that fits well in most Ruby programs.

XML-Object: Usage

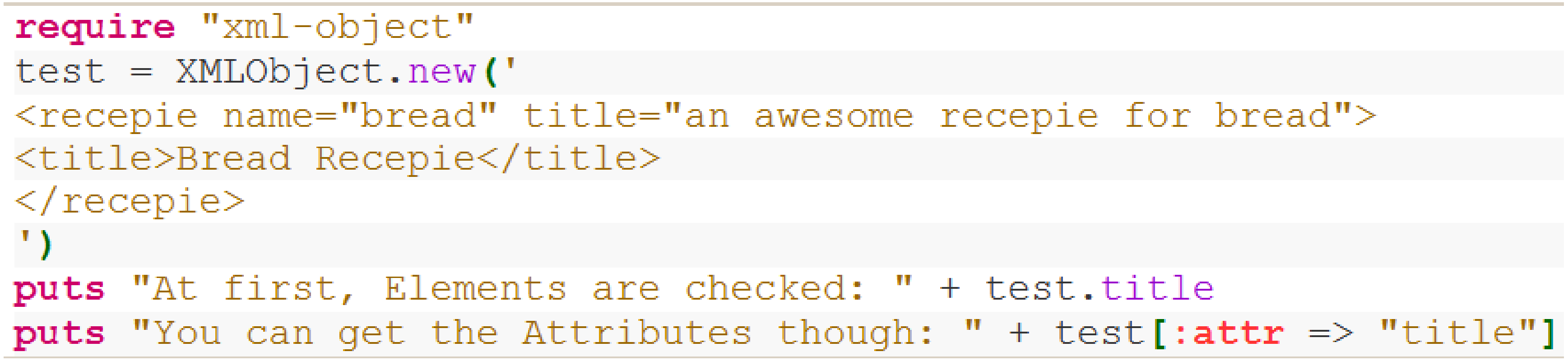
```xml
<recipe name="bread" prep_time="5 mins" cook_time="3 hours">
    <title>Basic bread</title>
    <ingredient amount="8" unit="dL">Flour</ingredient>
    <ingredient amount="10" unit="grams">Yeast</ingredient>
    <ingredient amount="4" unit="dL" state="warm">Water</ingredient>
    <ingredient amount="1" unit="teaspoon">Salt</ingredient>
    <instructions easy="yes" hard="false">
      <step>Mix all ingredients together.</step>
      <step>Knead thoroughly.</step>
      <step>Cover with a cloth, and leave for one hour in warm room.</step>
      <step>Knead again.</step>
      <step>Place in a bread baking tin.</step>
      <step>Cover with a cloth, and leave for one hour in warm room.</step>
      <step>Bake in the oven at 180(degrees)C for 30 minutes.</step>
    </instructions>
  </recipe>
```

XML

```ruby
require 'xml-object'
  recipe = XMLObject.new(File.open('recipe.xml'))

  recipe.name                        => "bread"
  recipe.title                       => "Basic bread"

  recipe.ingredients.is_a?(Array)    => true
  recipe.ingredients.first.amount    => "8" # Not a Fixnum. Too hard. :(

  recipe.instructions.easy?          => true

  recipe.instructions.first.upcase => "MIX ALL INGREDIENTS TOGETHER."
  recipe.instructions.steps.size     => 7
```

Ruby

Ò_ó Ambiguities?



```ruby
require "xml-object"
test = XMLObject.new('
<recepie name="bread" title="an awesome recepie for bread">
<title>Bread Recepie</title>
</recepie>
')
puts "At first, Elements are checked: " + test.title
puts "You can get the Attributes though: " + test[:attr => "title"]
```

```
>ruby test.rb
At first, Elements are checked: Bread Recepie
You can get the Attributes though: an awesome recepie for bread
```

Features: Adapter

```ruby
require 'xml-object'     # REXML
require 'xml-object/adapters/hpricot'    #hpricot
require 'xml-object/adapters/libxml'     #libxml
```

Features: Question notation

```
<admin>true</admin>
```

XML

```
XMLFile.admin?          => true
```

Ruby

Features: Collection auto folding

```xml
<student>
    <name>Bob</name>
    <course>Math</course>
    <course>German</course>
    <course>Biology</course>
</student>
```

XML

```ruby
  student = XMLObject.new(xml_file)

  student.course.is_a?(Array)          => true
  student.course.first == 'Math'       => true
  student.course.last  == 'Biology'    => true
```

Ruby

Features: Collection pluralization

```xml
<student>
    <name>Bob</name>
    <course>Math</course>
    <course>German</course>
    <course>Biology</course>
</student>
```

XML

```ruby
student = XMLObject.new(xml_file)

student.courses.first == student.course.first => true
```

Ruby

Features: Collection proxy

```xml
<author>
    <name>John</name>
    <publications>
        <book>Math 101</book>
        <book>Biology 101</book>
    </publications>
</author>
```

XML

```ruby
author.publications == author.publications.books => true

author.publications.map { |b| b.downcase } => ['math 101', 'biology 101']
```

Ruby

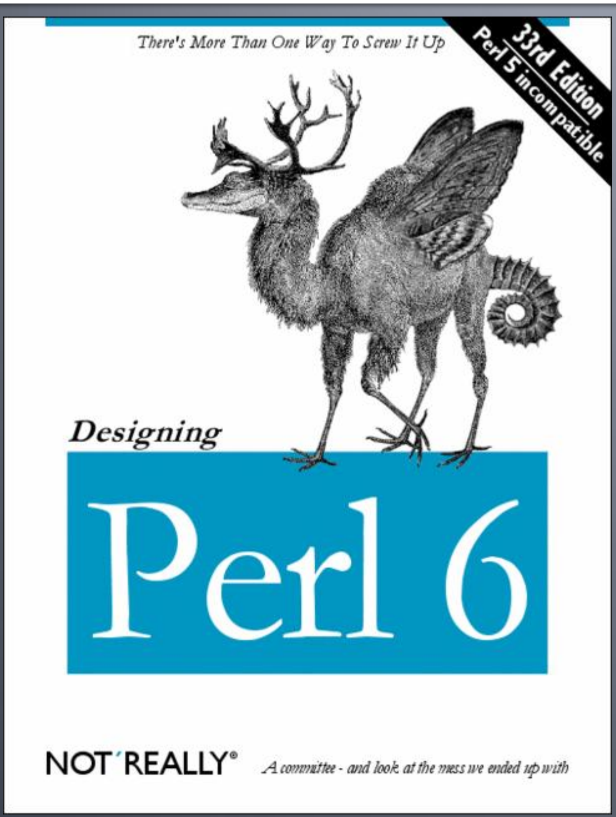
ò_Ó

```
irb(main):002:0> test = XMLObject.new("2008-12-07_17-36-57.gpx")
[FATAL] failed to allocate memory
```

Recursive
The design of the adapters assumes parsing of the objects recursively. Deep files are bound to throw SystemStackError, but for the kinds of files I need to read, things are working fine so far. In any case, stream parsing is on the TODO list.

XmlSimple

http://xml-simple.rubyforge.org/


There's More Than One Way To Screw It Up
33rd Edition
Perl 5 incompatible
Designing
Perl 6
NOT REALLY®
A committee - and look at the mess we ended up with

a Ruby translation of Grant McLean's Perl module XML::Simple

XmlSimple = Rexml + …

- xml_in()
- xml_out()

Our source

```
<config logdir="/var/log/foo/" debugfile="/tmp/foo.debug">
  <server name="sahara" osname="solaris" osversion="2.6">
   <address>10.0.0.101</address>
   <address>10.0.1.101</address>
  </server>
  <server name="gobi" osname="irix" osversion="6.5">
   <address>10.0.0.102</address>
  </server>
  <server name="kalahari" osname="linux" osversion="2.0.34">
   <address>10.0.0.103</address>
   <address>10.0.1.103</address>
  </server>
 </config>
```

Our code

The input file

A hash containing options

```
require 'xmlsimple'
 config = XmlSimple.xml_in('foo.xml', { 'KeyAttr' => 'name' })
```

Our result: Hash.new

```
{
  'logdir'          => '/var/log/foo/',
  'debugfile'       => '/tmp/foo.debug',
  'server'          => {
    'sahara'          => {
      'osversion'       => '2.6',
      'osname'          => 'solaris',
      'address'         => [ '10.0.0.101', '10.0.1.101' ]
    },
    'gobi'            => {
      'osversion'       => '6.5',
      'osname'          => 'irix',
      'address'         => [ '10.0.0.102' ]
    },
    'kalahari'        => {
      'osversion'       => '2.0.34',
      'osname'          => 'linux',
      'address'         => [ '10.0.0.103', '10.0.1.103' ]
    }
  }
}
```

Usage: `puts config['server']['kalahari']['address'][1]`

my personal opinion

ONE DAY IN THE LIFE OF A PERL PROGRAMER
WHAT THE HACK IS THIS?
geek and poke
09:45 AM
READING THE CODE FROM THE PREVIOUS DAY

ROXML

http://roxml.rubyforge.org/

```
<level2_1 label="Einko
    <level3_1 label="P
    <level3_2 label="V
    <level3_3 label="V
    <level3_4 label="
</level2_1>
<level2_2 label="Gesu
    <level3_1 label=
    <level3_2 label=
```

Is it alive?

roxml_1.0_beta	roxml-1.0_beta	June 28, 2006
ROXML 1.0	roxml-1.0.zip	July 1, 2006
ROXML 1.1 Beta	ROXML 1.1 Beta	September 24, 2006
ROXML 1.2	ROXML 1.2	November 10, 2007
ROXML	2.2.0	November 3, 2008 ✓

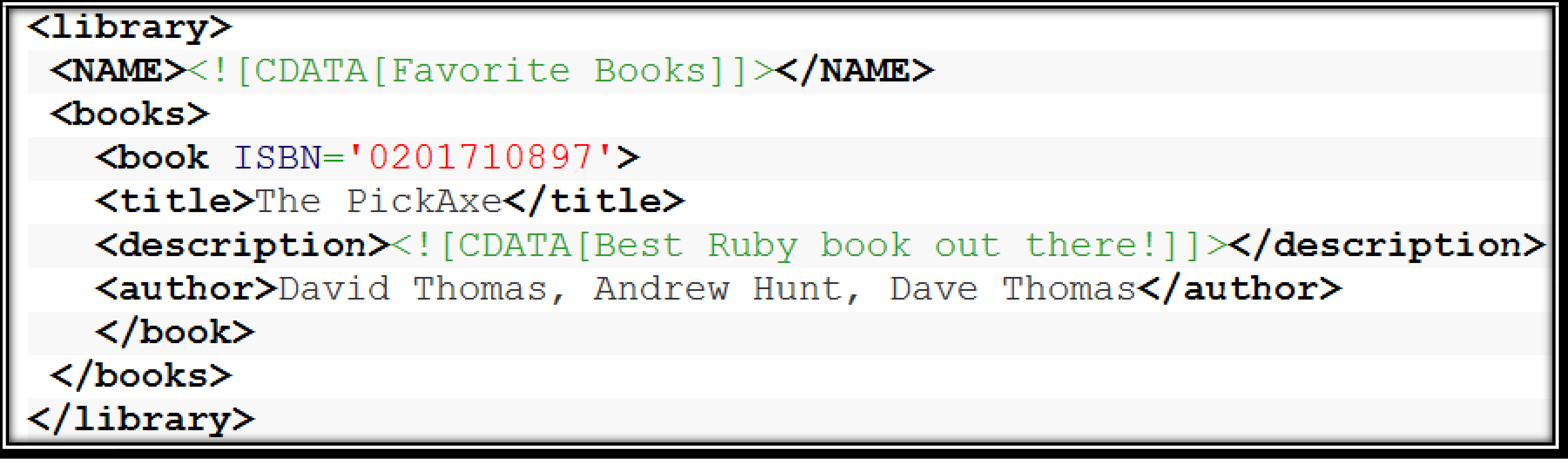
ROXML

ROXML Features

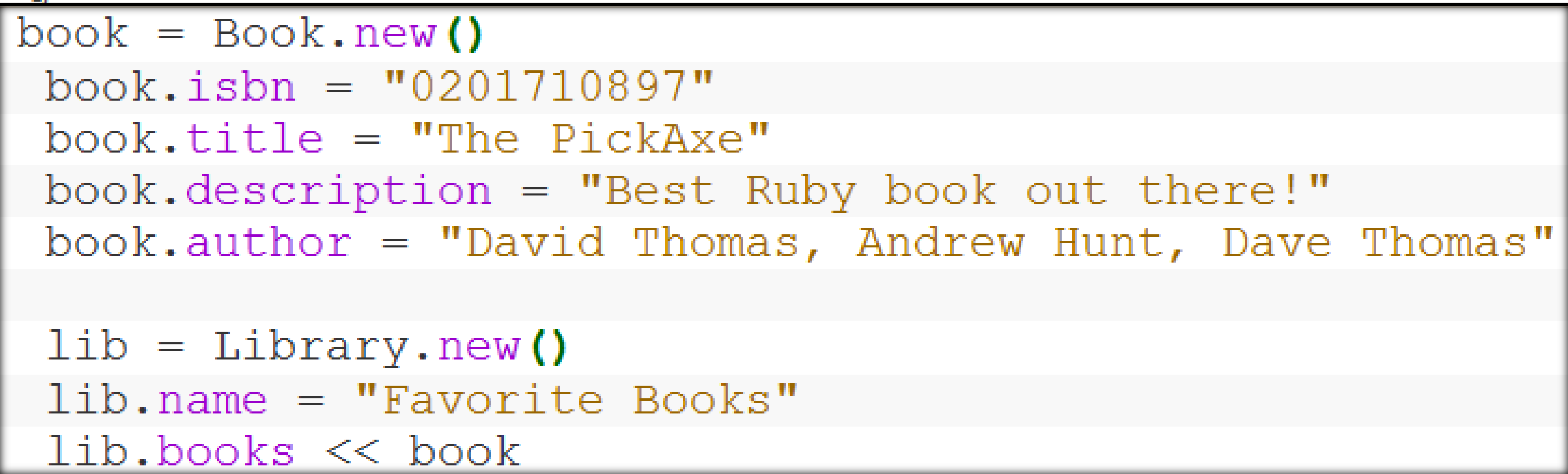
- Read Ruby objects from XML
- Write Ruby objects to XML
- Annotation-style methods for XML mapping
- One-to-one (composition) Ruby to XML
- One-to-many (aggregation) Ruby with array to XML

Source: http://roxml.rubyforge.org

It‛s all about annotations



```
<library>
 <NAME><![CDATA[Favorite Books]]></NAME>
 <books>
   <book ISBN='0201710897'>
   <title>The PickAxe</title>
   <description><![CDATA[Best Ruby book out there!]]></description>
   <author>David Thomas, Andrew Hunt, Dave Thomas</author>
   </book>
 </books>
</library>
```



```
book = Book.new()
 book.isbn = "0201710897"
 book.title = "The PickAxe"
 book.description = "Best Ruby book out there!"
 book.author = "David Thomas, Andrew Hunt, Dave Thomas"

 lib = Library.new()
 lib.name = "Favorite Books"
 lib.books << book
```

I/O

```
#SAVE
File.open("library.xml", "w") do |f|
 lib.to_xml.write(f, 0)
end

#LOAD
lib = Library.parse(File.read("library.xml"))
```

XML::MAPPING

http://xml-mapping.rubyforge.org/

≈ROXML

code, code, code

```
class Client
  include XML::Mapping

  text_node :name, "Name"
  object_node :home_address, "Address[@where='home']", :class=>Address
  object_node :work_address, "Address[@where='work']", :class=>Address, :default_value=>nil
 end
```

XML::Mapping::ArrayNode
XML::Mapping::BooleanNode
XML::Mapping::HashNode
XML::Mapping::NumericNode
XML::Mapping::ObjectNode
XML::Mapping::SingleAttributeNode
XML::Mapping::SubObjectBaseNode
XML::Mapping::TextNode

XML::Mapping::ChoiceNode

} single-attribute nodes

choice node example

```
class Publication
   include XML::Mapping

   choice_node :if,    '@author', :then, (text_node :author, '@author'),
               :elsif, 'contr',   :then, (array_node :contributors, 'contr', :class=>String)
 end

 ## usage

 p1 = Publication.load_from_xml(REXML::Document.new('<publication author="Jim"/>').root)
 => #<Publication:0xb7ad3f38 @author="Jim">

 p2 = Publication.load_from_xml(REXML::Document.new('
<publication>
  <contr>Chris</contr>
  <contr>Mel</contr>
  <contr>Toby</contr>
</publication>').root)
 => #<Publication:0xb7ac7ee0 @contributors=["Chris", "Mel", "Toby"]>
```

HappyMapper

http://happymapper.rubyforge.org/

„Making XML fun again"

code, code, code

```
xml = <<EOF
<products>
  <product>
    <title> A Title</title>
    <features_bullets>
      <feature>This is feature text</feature>
      <feature>This is feature text</feature>
    </features_bullets>
  </product>
</products>
EOF

class FeatureBullet
  include HappyMapper

  tag 'features_bullets'
  element :feature, String
end
```

typecasts

```
class Product
  include HappyMapper

  element :title, String
  has_many :features_bullets, FeatureBullet
end
```

has many

```
Product.parse(xml).each do |product|
  puts product.title
  product.features_bullets.each { |fb| puts "  - #{fb.feature}" }
end

# outputs:
#  A Title
#   - This is feature text
```

noteworthy:

Camel Case XML Tags to Ruby method names

```
element :total_pages, Integer, :tag => 'TotalPages'
```

twitter

```xml
<statuses type="array">
  <status>
    <created_at>Sat Aug 09 05:38:12 +0000 2008</created
    <id>882281424</id>
    <text>I so just thought the guy lighting the Olympi
the wall. Wow that would have been catastrophic.</text>
    <source>web</source>
    <truncated>false</truncated>
    <in_reply_to_status_id>1234</in_reply_to_status_id>
    <in_reply_to_user_id>12345</in_reply_to_user_id>
    <favorited></favorited>
    <user>
      <id>4243</id>
      <name>John Nunemaker</name>
      <screen_name>jnunemaker</screen_name>
      <location>Mishawaka, IN, US</location>
      <description>Loves his wife, ruby, notre dame foo
      <profile_image_url>http://s3.amazonaws.com/twitte
/Photo_75_normal.jpg</profile_image_url>
      <url>http://addictedtonew.com</url>
      <protected>false</protected>
      <followers_count>486</followers_count>
    </user>
  </status>
</statuses>
```

```ruby
class User
  include HappyMapper

  element :id, Integer
  element :name, String
  element :screen_name, String
  element :location, String
  element :description, String
  element :profile_image_url, String
  element :url, String
  element :protected, Boolean
  element :followers_count, Integer
end

class Status
  include HappyMapper

  element :id, Integer
  element :text, String
  element :created_at, Time
  element :source, String
  element :truncated, Boolean
  element :in_reply_to_status_id, Integer
  element :in_reply_to_user_id, Integer
  element :favorited, Boolean
  has_one :user, User
end

statuses = Status.parse(xml_string)
statuses.each do |status|
  puts status.user.name, status.user.scree
end
```

YAML

(rhymes with "camel")

Design Goals

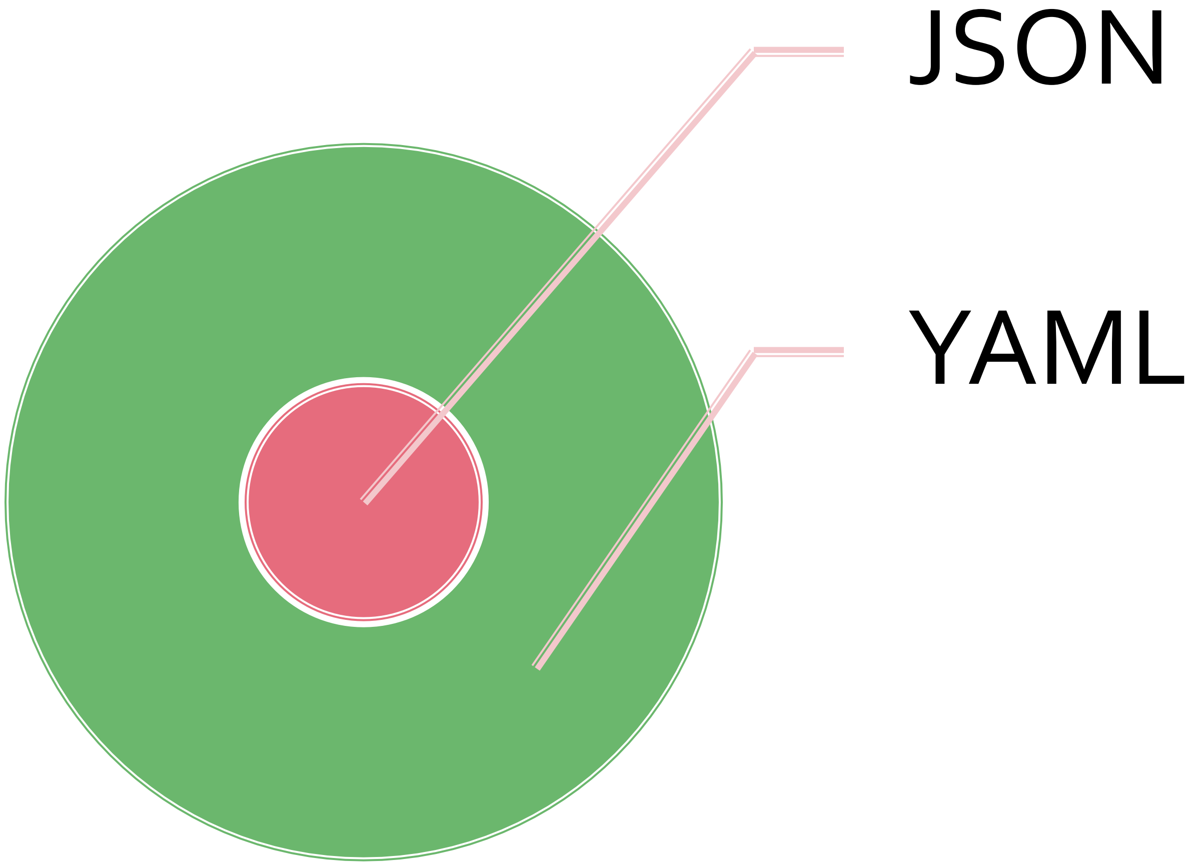
1. easily readable by humans.
2. matches the native data structures of agile languages.
3. portable between programming languages.
4. consistent model to support generic tools.
5. supports one-pass processing.
6. expressive and extensible.
7. easy to implement and use.

JSON ←→ YAML

- JSON/YAML = human readable data interchange format

- JSON == simplicity + universality
  - trivial to generate and parse
  - reduced human readability
- YAML == human readability + serializing native data structures
  - harder to generate and parse
  - easy to read

JSON ←→YAML



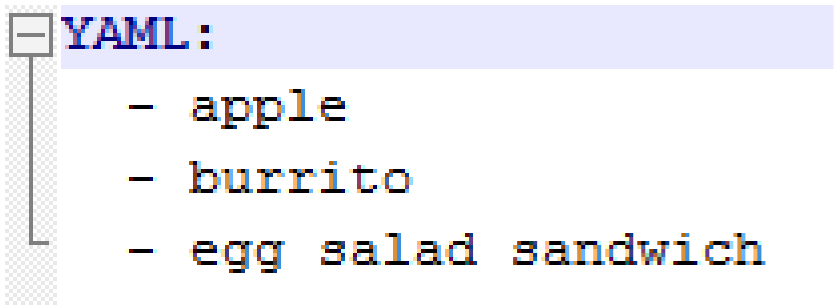
JSON.valid? ➔YAML.valid!

YAML

- **…is Sequences, Maps, Scalars**
  - Seq = Array
  - Map = Hash
  - Scalars = String, Integer, Float, Time, NilClass

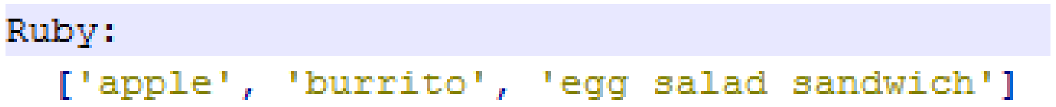
Sequences

Sequence:



```
YAML:
  - apple
  - burrito
  - egg salad sandwich
```

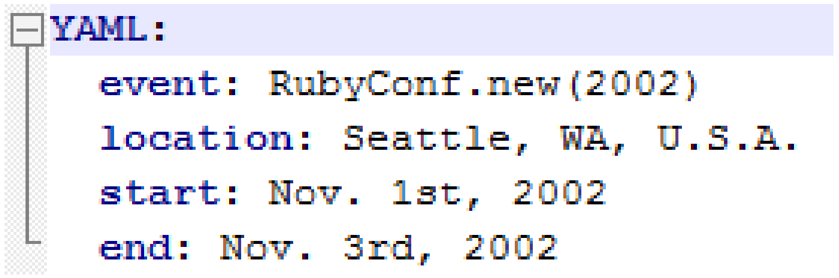
Array:



```
Ruby:
  ['apple', 'burrito', 'egg salad sandwich']
```

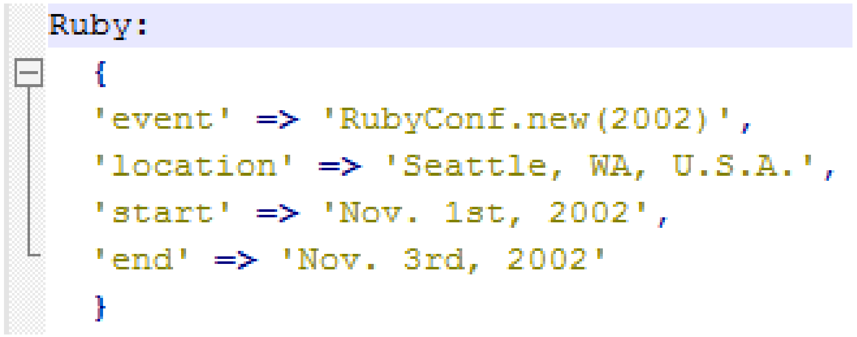
Maps

Map:



```
YAML:
   event: RubyConf.new(2002)
   location: Seattle, WA, U.S.A.
   start: Nov. 1st, 2002
   end: Nov. 3rd, 2002
```

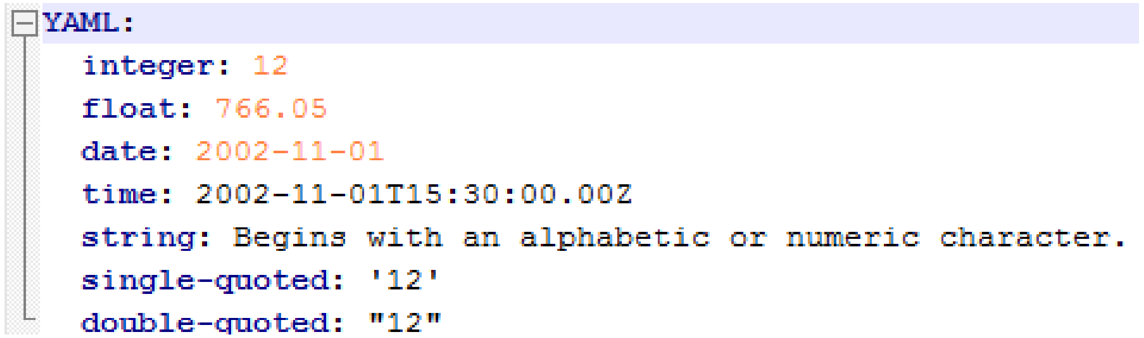
Hash:



```
Ruby:
   {
   'event' => 'RubyConf.new(2002)',
   'location' => 'Seattle, WA, U.S.A.',
   'start' => 'Nov. 1st, 2002',
   'end' => 'Nov. 3rd, 2002'
   }
```

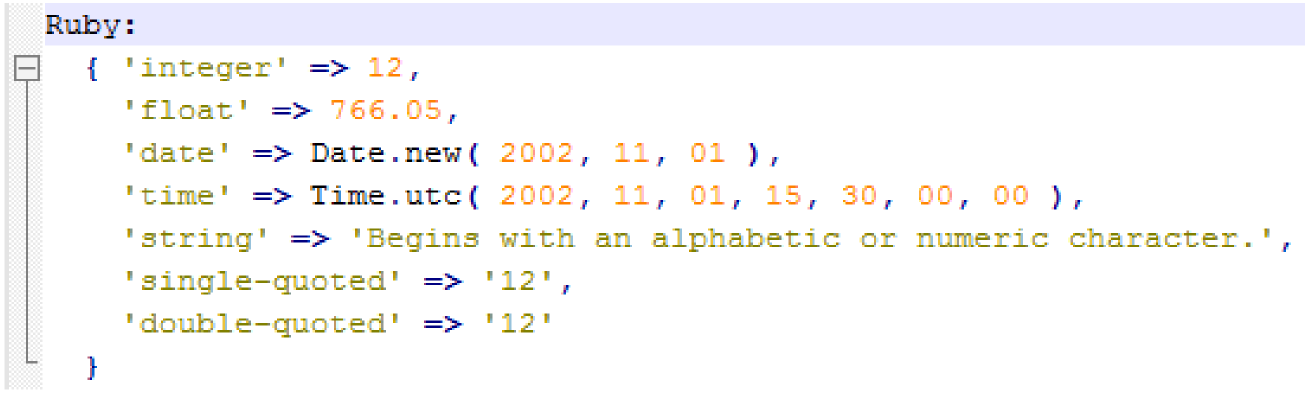
Scalars

Map of Scalars:



```
YAML:
  integer: 12
  float: 766.05
  date: 2002-11-01
  time: 2002-11-01T15:30:00.00Z
  string: Begins with an alphabetic or numeric character.
  single-quoted: '12'
  double-quoted: "12"
```

Hash of Objects:



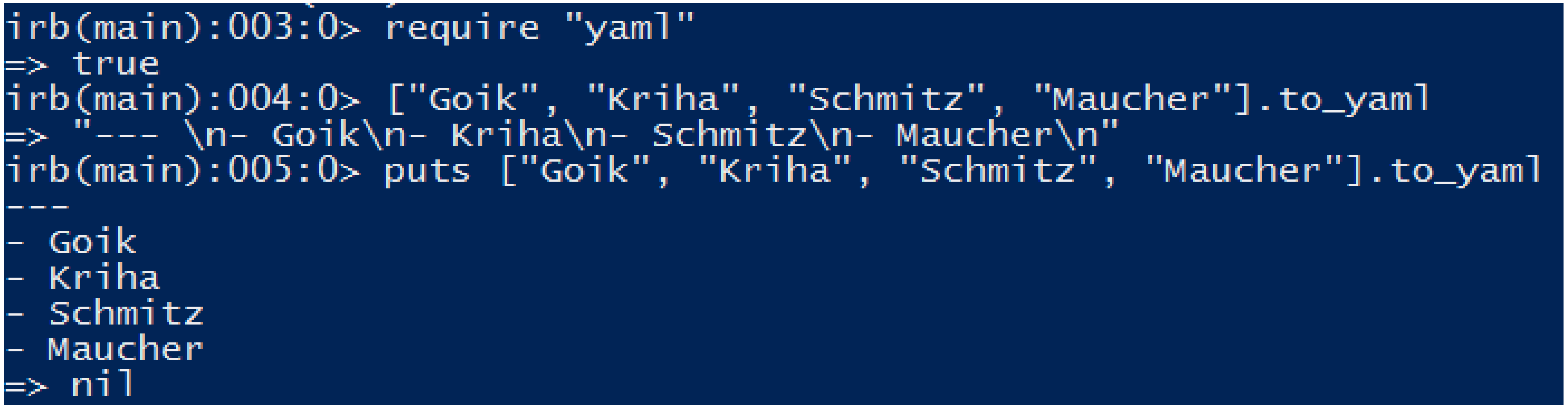
```
Ruby:
  { 'integer' => 12,
    'float' => 766.05,
    'date' => Date.new( 2002, 11, 01 ),
    'time' => Time.utc( 2002, 11, 01, 15, 30, 00, 00 ),
    'string' => 'Begins with an alphabetic or numeric character.',
    'single-quoted' => '12',
    'double-quoted' => '12'
  }
```

Native typing is implicity determined in plain scalars.

Code Sample?

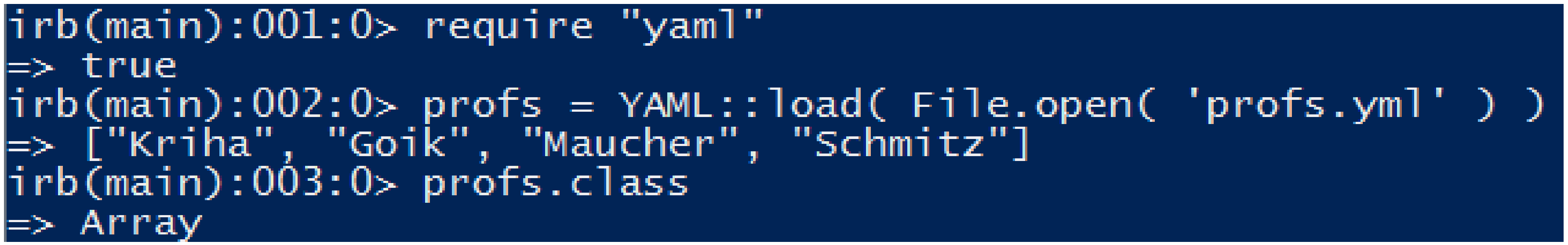
Input/Output

- YAML output:



```
irb(main):003:0> require "yaml"
=> true
irb(main):004:0> ["Goik", "Kriha", "Schmitz", "Maucher"].to_yaml
=> "--- \n- Goik\n- Kriha\n- Schmitz\n- Maucher\n"
irb(main):005:0> puts ["Goik", "Kriha", "Schmitz", "Maucher"].to_yaml
---
- Goik
- Kriha
- Schmitz
- Maucher
=> nil
```

- YAML input:

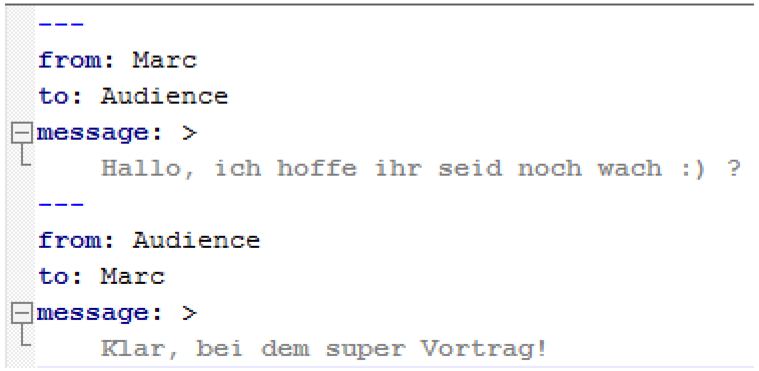


```
irb(main):001:0> require "yaml"
=> true
irb(main):002:0> profs = YAML::load( File.open( 'profs.yml' ) )
=> ["Kriha", "Goik", "Maucher", "Schmitz"]
irb(main):003:0> profs.class
=> Array
```

>1?

Ruby and YAML

- More than 1 document

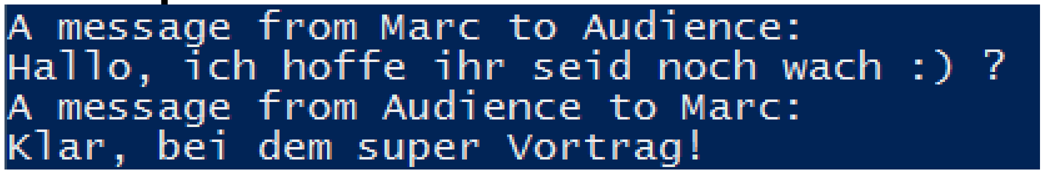


```yaml
---
from: Marc
to: Audience
message: >
    Hallo, ich hoffe ihr seid noch wach :) ?
---
from: Audience
to: Marc
message: >
    Klar, bei dem super Vortrag!
```

- Ruby code

```ruby
YAML::load_documents( File.open( 'message.yml' ) ) { |msg|
  puts "A message from #{msg['from']} to #{msg['to']}:"
  puts msg['message']
}
```

- Output



```
A message from Marc to Audience:
Hallo, ich hoffe ihr seid noch wach :) ?
A message from Audience to Marc:
Klar, bei dem super Vortrag!
```

But what about objects?

Won't somebody please think of the ~~children~~ objects!

Too much text!

- Live Demo :D

Namespace

Problem: The !ruby/object type is only understood by YAML.rb.

Solution:

```
require 'yaml'
require 'bigdecimal'

#Marshal
class BigDecimal
  def to_yaml(opts={})
    YAML::quick_emit(object_id, opts) do |out|
      out.scalar("tag:induktiv.at,2007:BigDecimal", self.to_s)
    end
  end
end

#Unmarshal
YAML.add_domain_type("induktiv.at,2007", "BigDecimal") { |type, val|
  BigDecimal.new(val)
}
```

Are they allowed to do that?

- http://www.kuwata-lab.com/kwalify/
- YAML and JSON are simple and nice format for structured data and easier for human to read and write than XML. But there have been no schema for YAML such as RelaxNG or DTD. Kwalify gets over this situation.

Fragen?

KTHXBYE

Sources

- Each project‘s website
- Some useful closures in Ruby
  http://www.randomhacks.net/articles/2007/02/01/some-useful-closures-in-ruby
- Kai Jäger: Ajax in der Praxis Grundlagen, Konzepte, Lösungen
  ISBN-10: 3-540-69333-5
- Using Ruby - An Introduction to Ruby for Java Programmers
  http://onestepback.org/articles/usingruby/index.html
- Ruby for Java Programmers
  http://www.softwaresummit.com/2006/speakers/BowlerRubyForJavaProgrammers.pdf
- Happy Mapper: Making XML fun again:
  http://railstips.org/2008/11/17/happymapper-making-xml-fun-again
- YAML Working draft 1.2
  http://yaml.org/spec/1.2/
- YAML Cookbook:
  http://www.nt.ntnu.no/users/haugwarb/Programming/YAML/YAML_for_ruby.html