

MacRuby on Rails

Abstract

MacRuby is an implementation of Ruby 1.9 that is built directly on top of Mac OS X core technologies. Recently, MacRuby has become viable as a tool for developing useful desktop applications for Mac OS X. However, as of March 2011, MacRuby is still missing some functionality that is present in cRuby. Therefore, MacRuby is not able to run Ruby on Rails. In my presentation, I will explain how I modified MacRuby to make it a suitable foundation for running Rails. I would also like to explain some of the technical intricacies that I discovered along the way.



RubyConf 2011 - 2011/09/30
Network Applied Communication Laboratory Ltd.
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Illustrator: Yuki Morohoshi <morohoshi@netlab.jp>

This presentation was made possible by **NaCl**



Kouji Takao
宏治 高尾



Work

- Network Applied Communication Laboratory Ltd.
- System design, programming, planning and meeting



Spare Time

- MacRuby committer

→ Core

- cRuby committer

→ Readline module



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- <http://facebook.com/takaokouji>
(mainly in Japanese)

My Company

My Company

- Network Applied Communication
Laboratory Ltd.

My Company

- Network Applied Communication Laboratory Ltd.
- a.k.a NaCl

My Company

- Network Applied Communication Laboratory Ltd.
- a.k.a NaCl
→ means salt

My Company

My Company

- <http://www.netlab.jp/>

My Company

- <http://www.netlab.jp/>
- Shimane, Japan

My Company

- <http://www.netlab.jp/>
- Shimane, Japan
- Since 2001

My Company

- <http://www.netlab.jp/>
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- 57 people
 - ➡ 6 people are cRuby committers
- SI, Training, etc...

NaCI

Network Applied Communication Laboratory

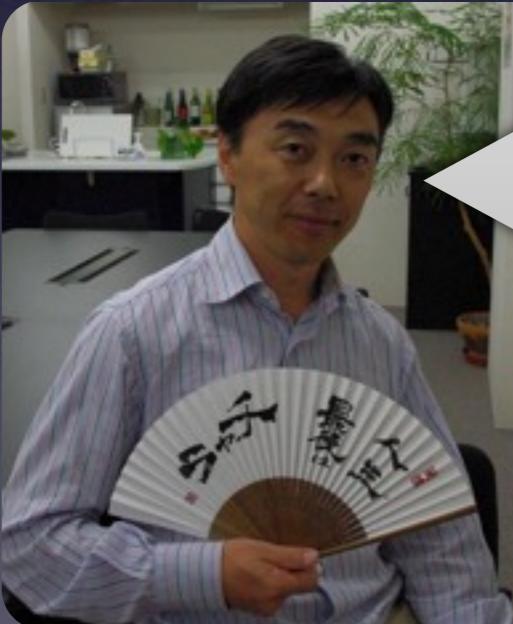
オースンソース・フロンティア
株式会社ネットワーク応用通信研究所

The NaCI Way

The NaCl Way



The NaCI Way



The NaCI Way

First, I want **You** to be happy.



The NaCI Way

First, I want **You** to be happy.

Next, I want you to make **Your
Family** happy.



The NaCI Way

First, I want **You** to be happy.

Next, I want you to make **Your Family** happy.

Finally, if you have more happiness left, then please share it with **Our Company** :)



The NaCI Way

(as I see it)

The NaCI Way

(as I see it)

Employee

- First: Employee

The NaCI Way

(as I see it)

Employee

>

Employee's
Family

- First: Employee
- Next: Employee's Family

The NaCI Way

(as I see it)

Employee

>

Employee's
Family

>>

Company

- First: Employee
- Next: Employee's Family
- Finally: Company

The NaCI Way

(as I see it)

Employee

>

Employee's
Family

>>

Company

- First: Employee
- Next: Employee Family
- Finally: Company

The NaCI Way

(as I see it)

Employee

I love my
company!!

.

.

.



MacRuby on Rails

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MacRuby Unofficial Character
Ruby Ninja @lrz

MacRuby on Rails

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MacRuby

Ruby customized for Mac OS X



MacRuby



MacRuby

- MacRuby is a unique **blend of Ruby 1.9 and Objective-C.**



MacRuby

- MacRuby is a unique **blend of Ruby 1.9 and Objective-C.**
- The goal of the MacRuby project is to be **100% compatible** syntactically and behaviorally with Ruby 1.9.



Ruby 1.9

Application

Ruby 1.9

Ruby VM

**Built-in
GC**

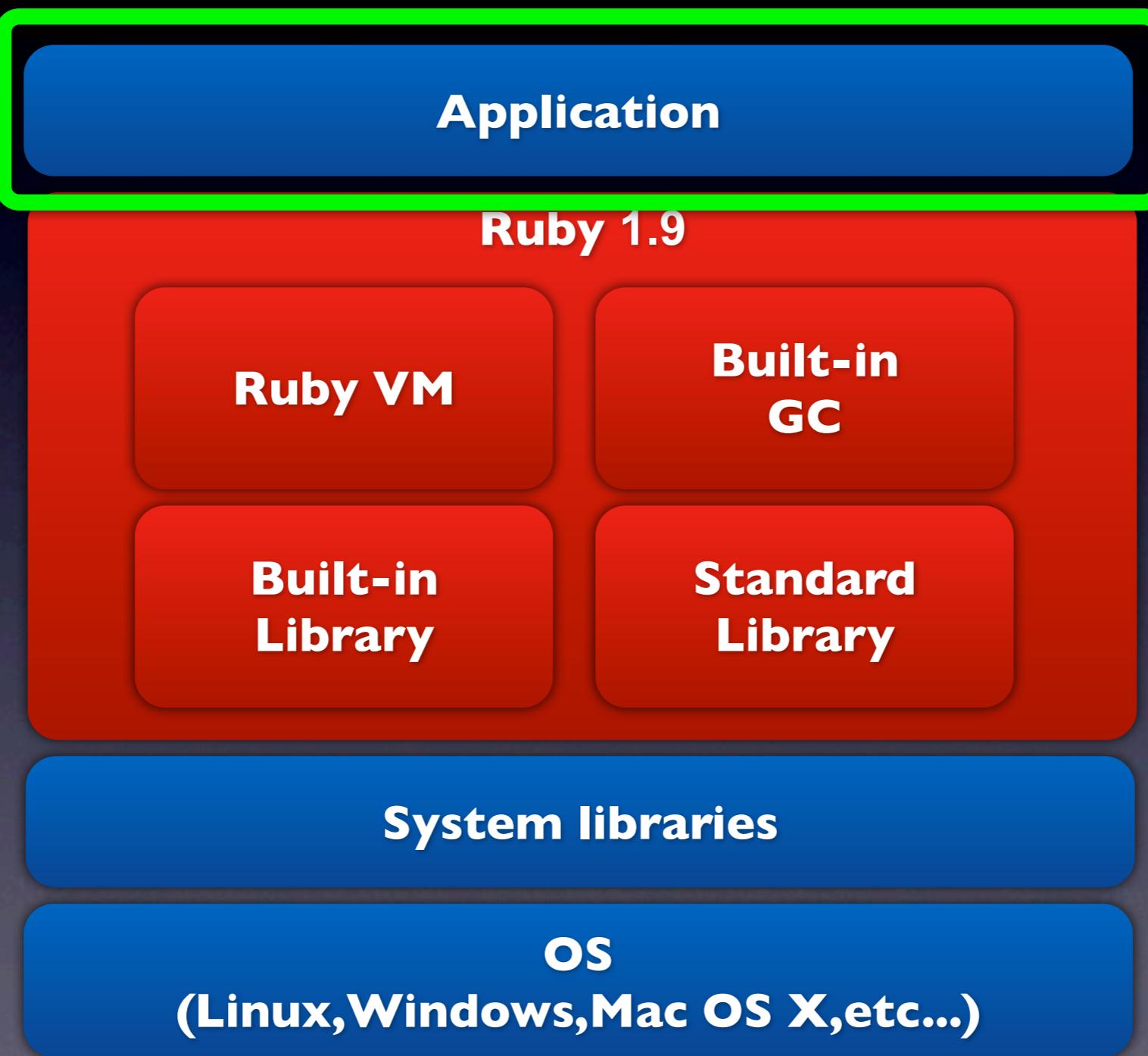
**Built-in
Library**

**Standard
Library**

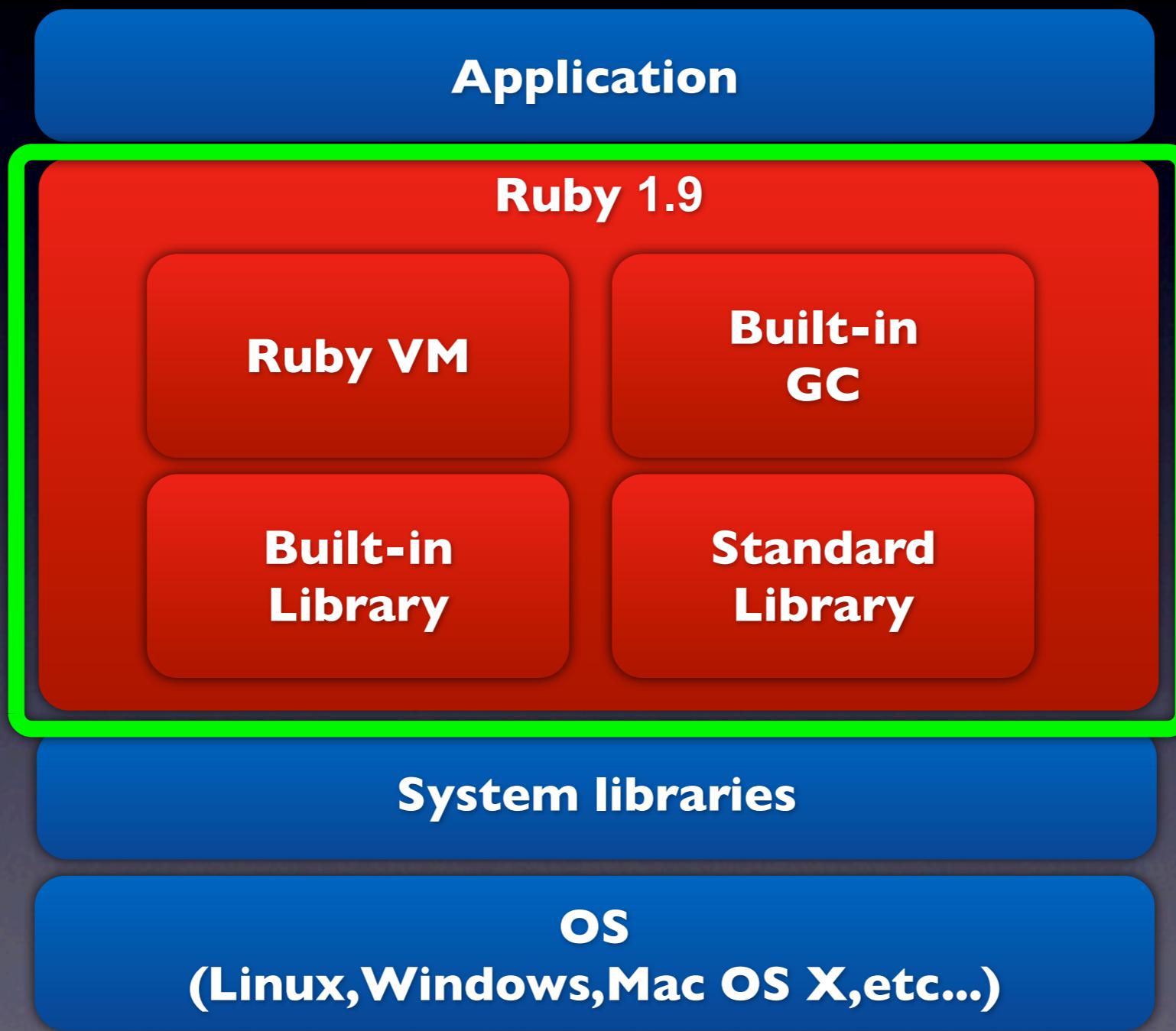
System libraries

**OS
(Linux, Windows, Mac OS X, etc...)**

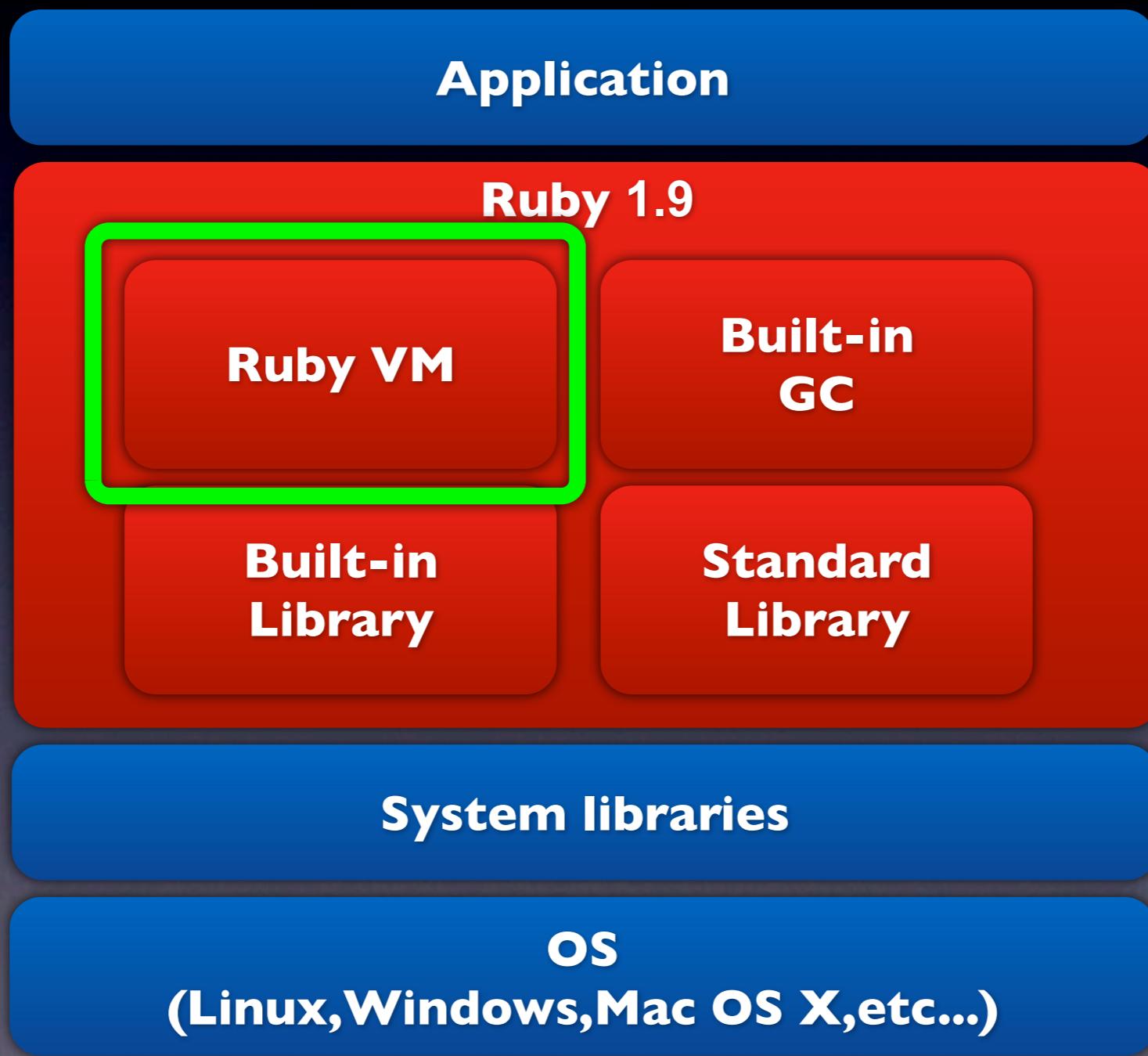
Ruby 1.9



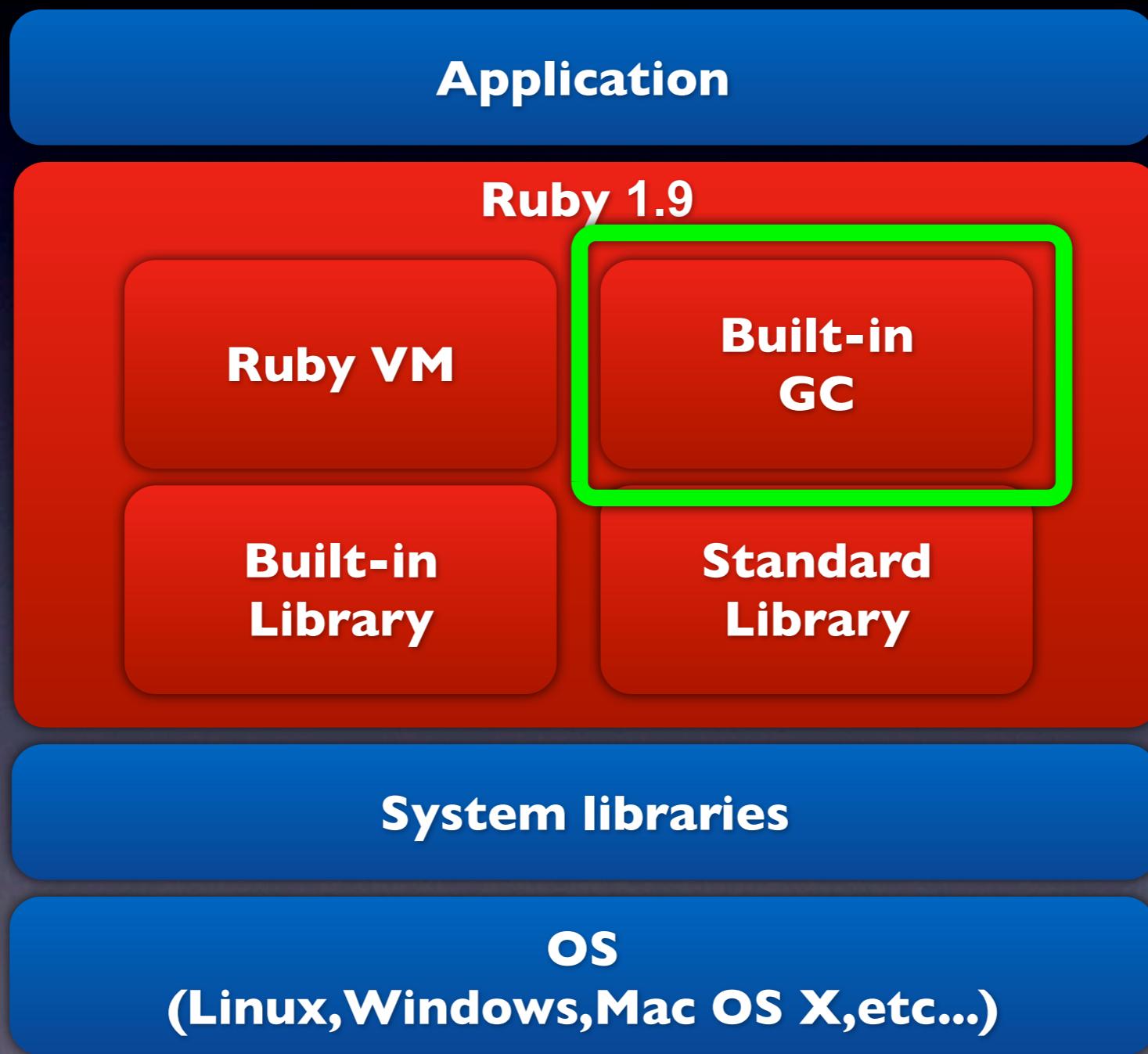
Ruby 1.9



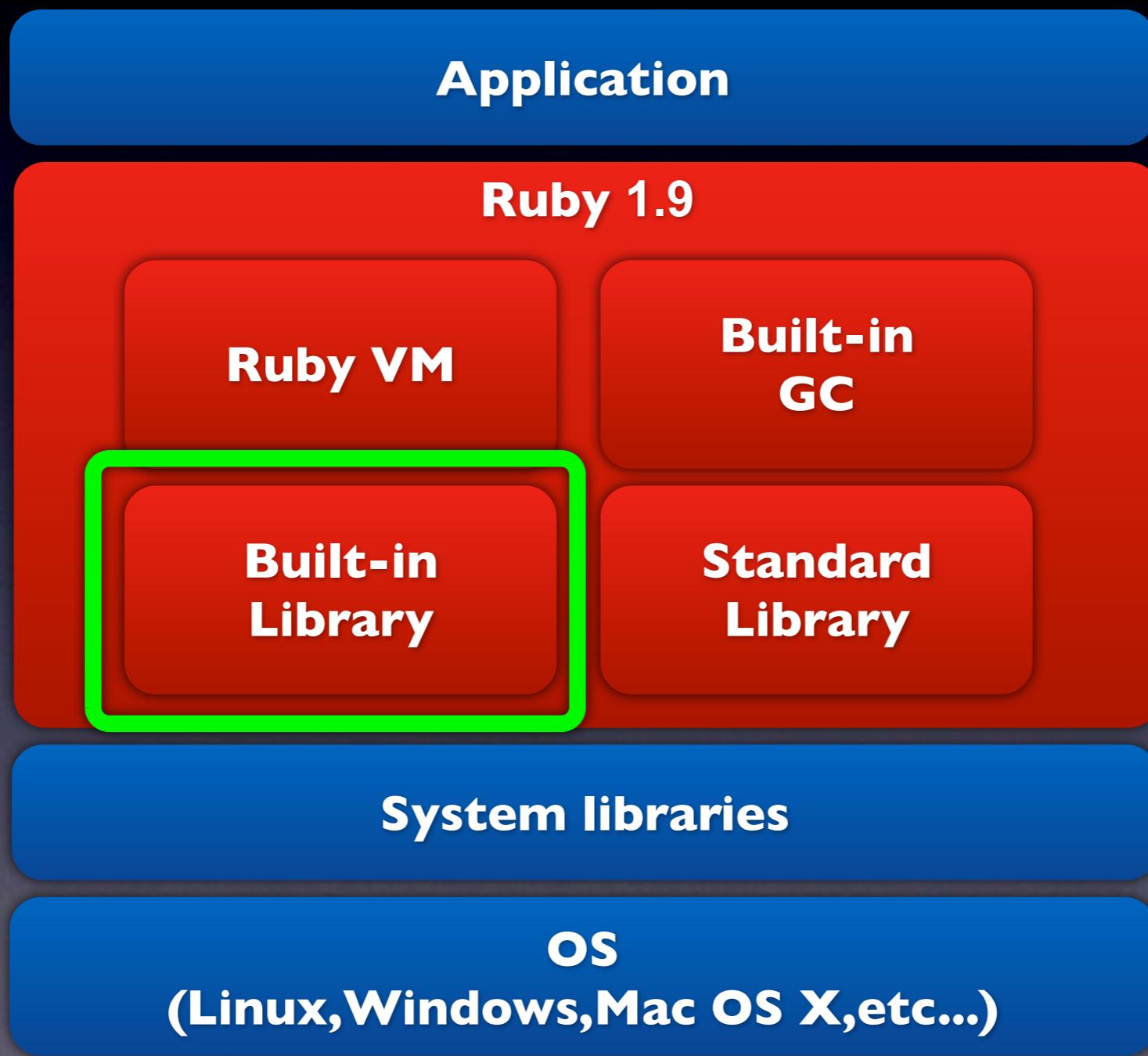
Ruby 1.9



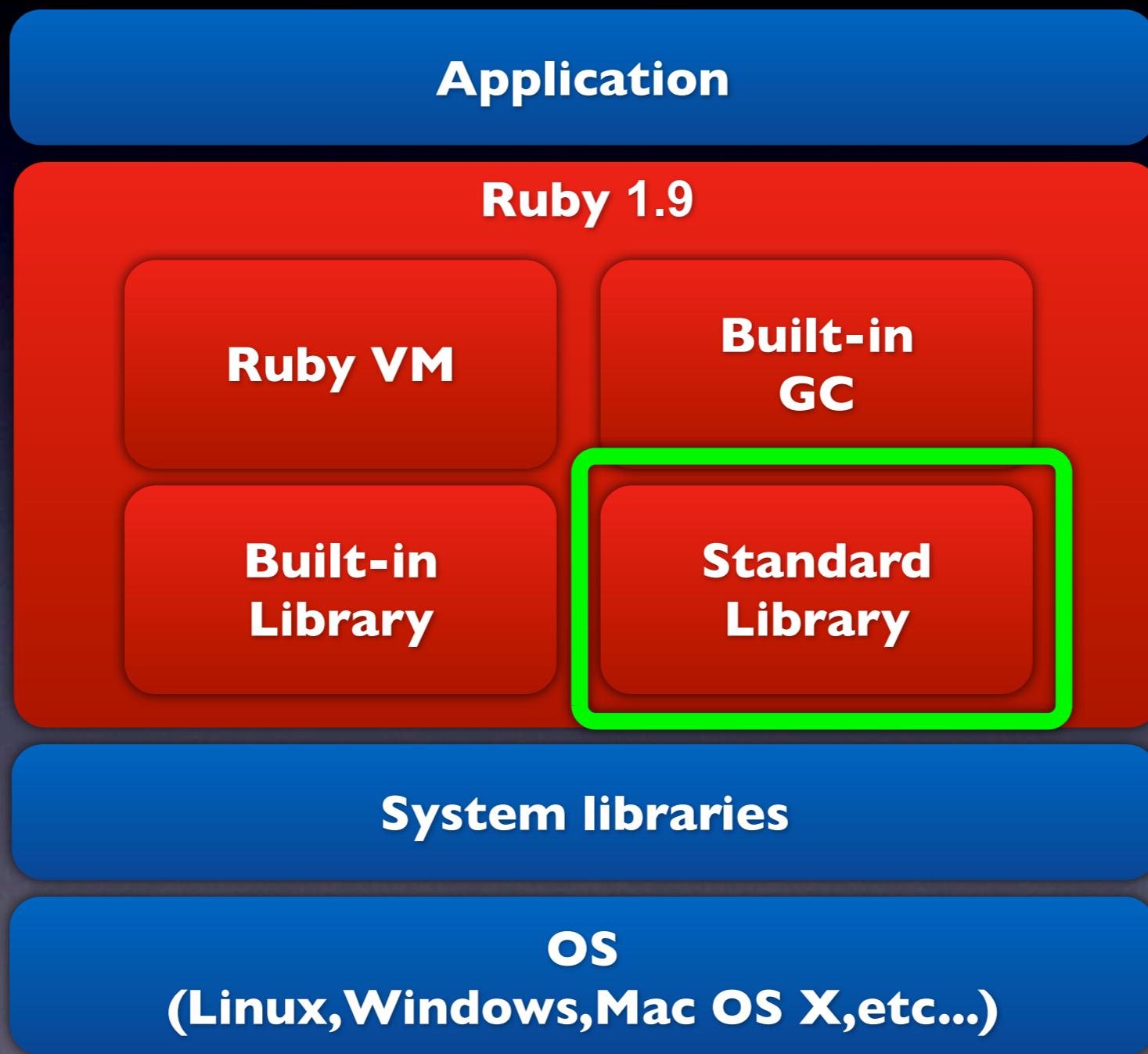
Ruby 1.9



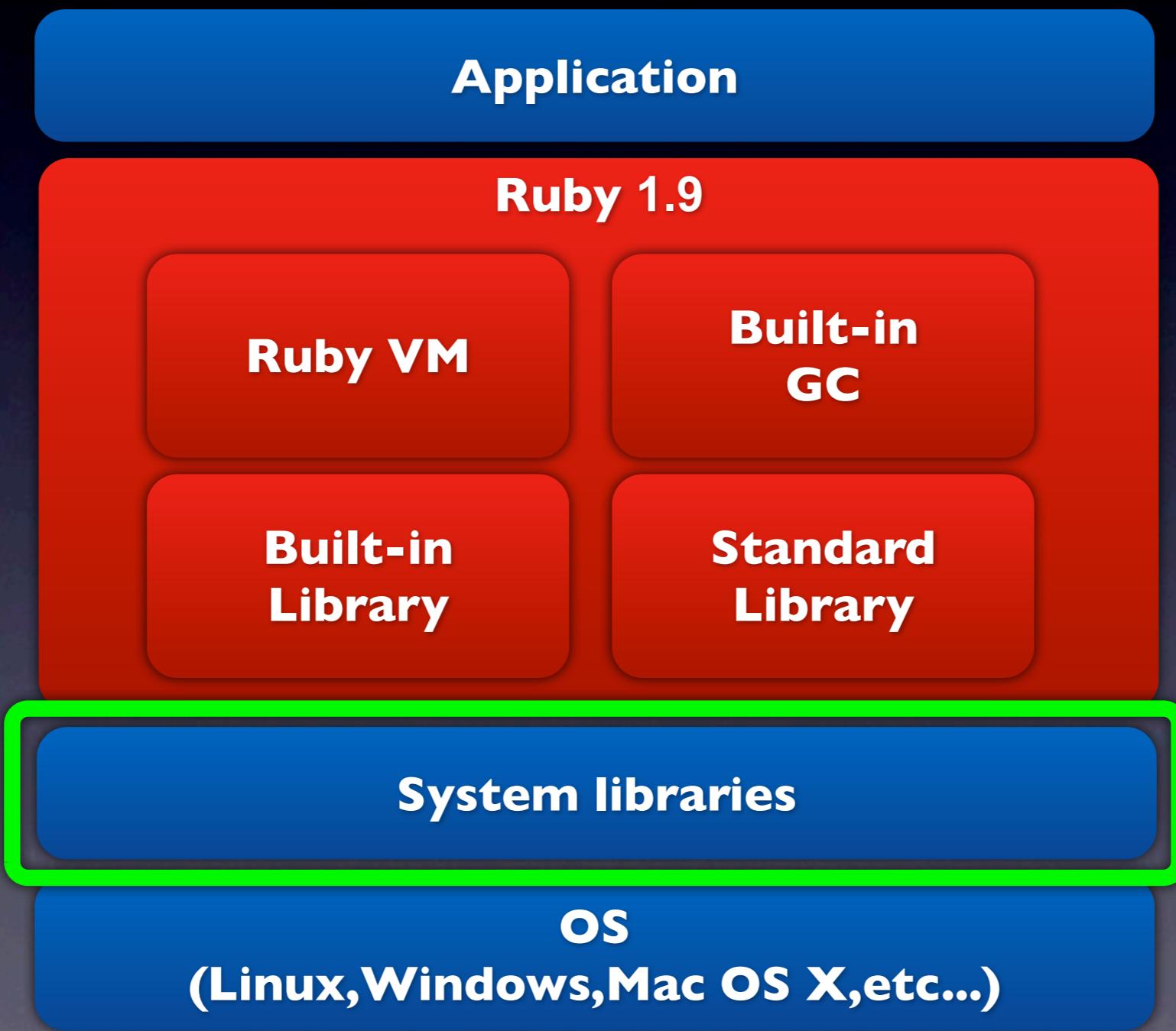
Ruby 1.9



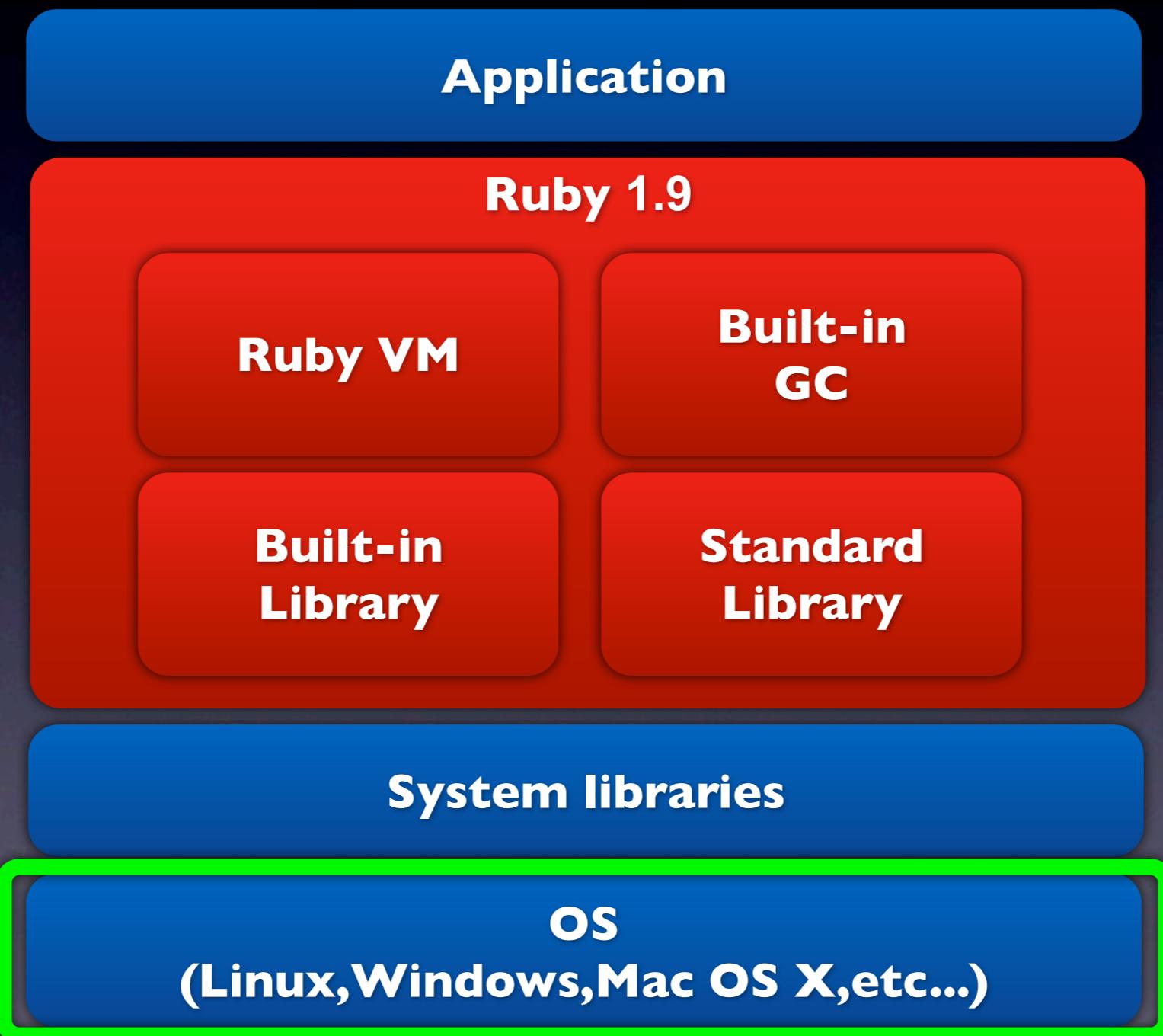
Ruby 1.9



Ruby 1.9



Ruby 1.9



Ruby 1.9

Application

Ruby 1.9

Ruby VM

**Built-in
GC**

**Built-in
Library**

**Standard
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System libraries

**OS
(Linux, Windows, Mac OS X, etc...)**

MacRuby

Application

MacRuby

Ruby VM

Built-in
GC

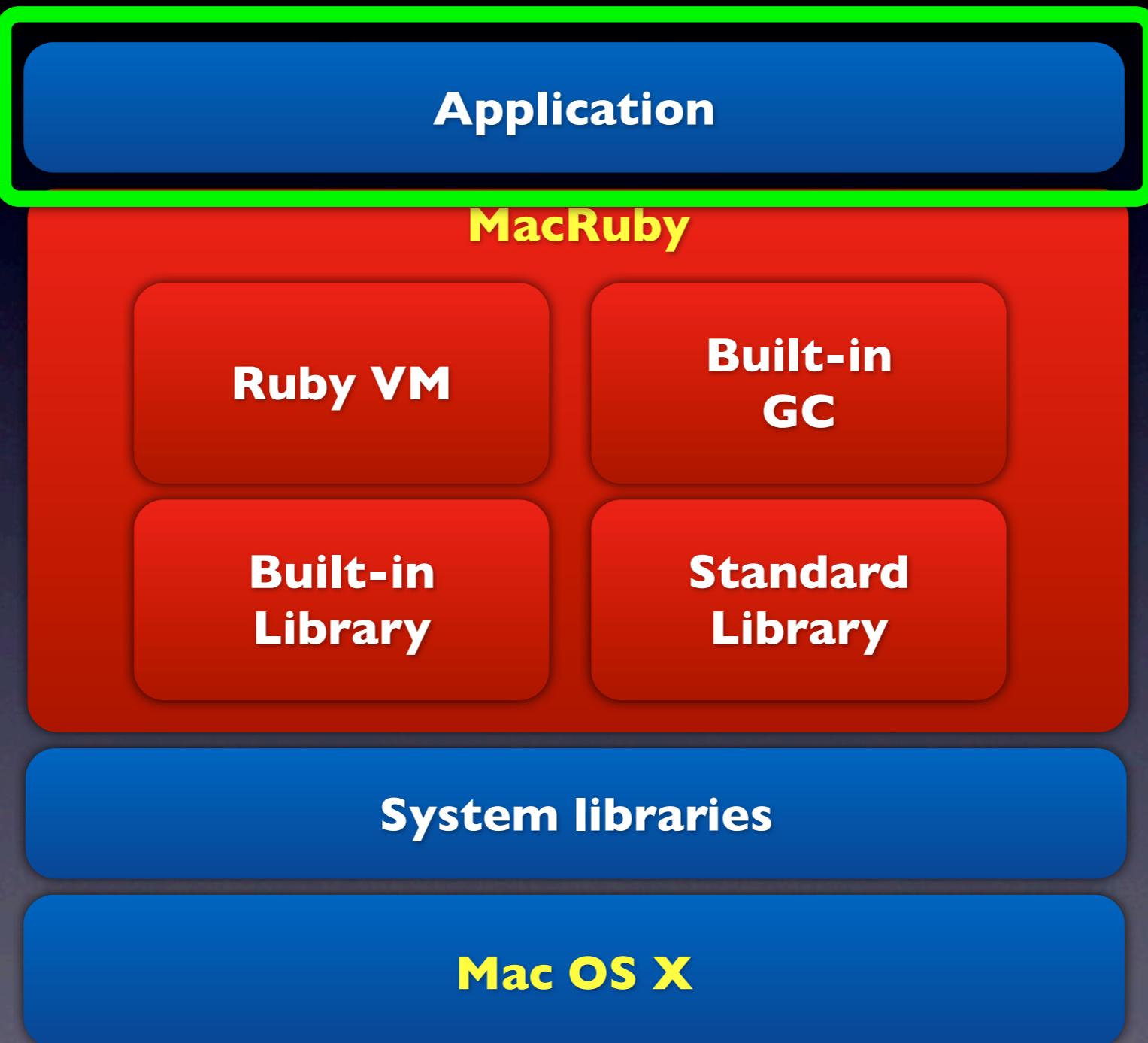
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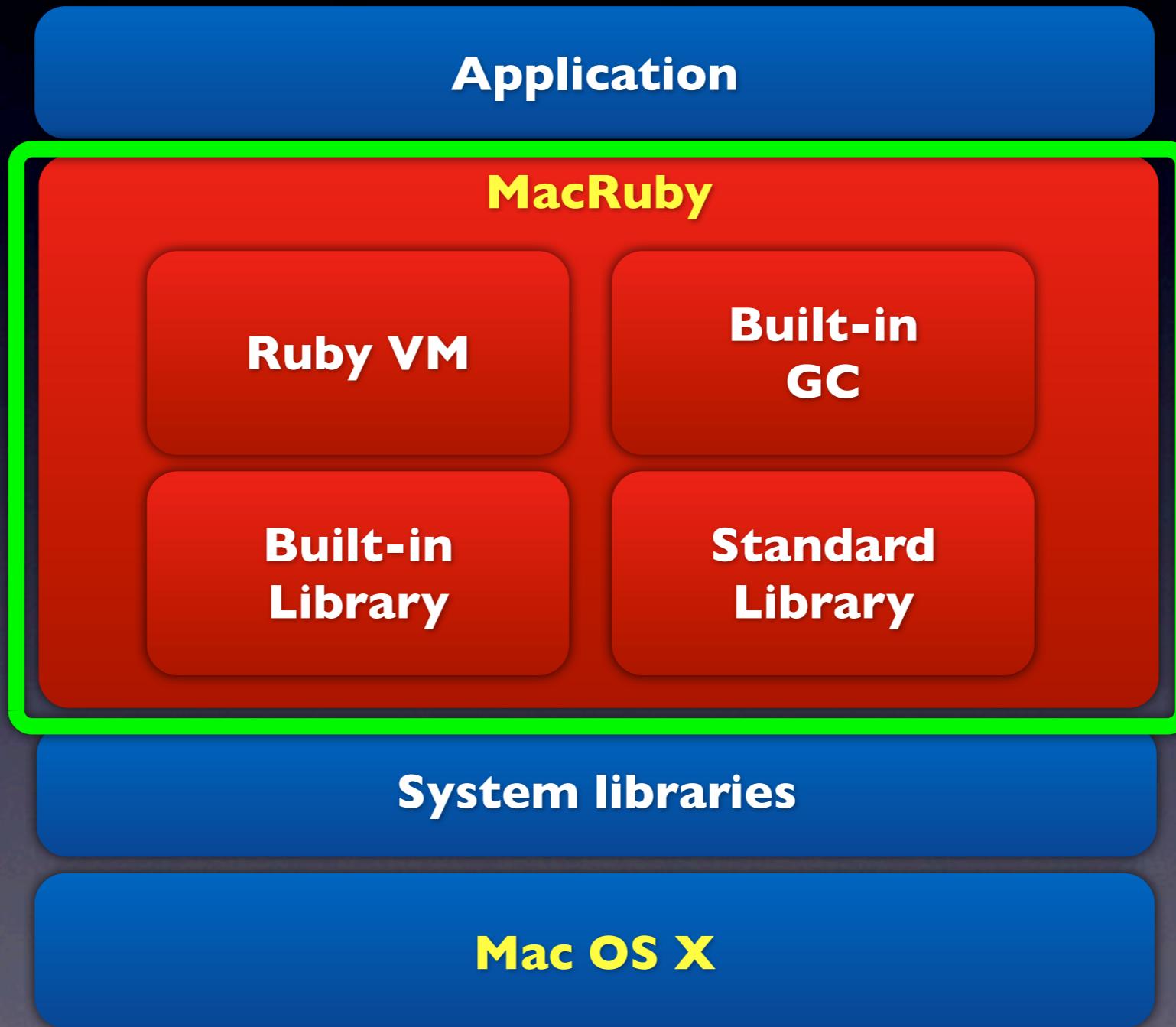
System libraries

Mac OS X

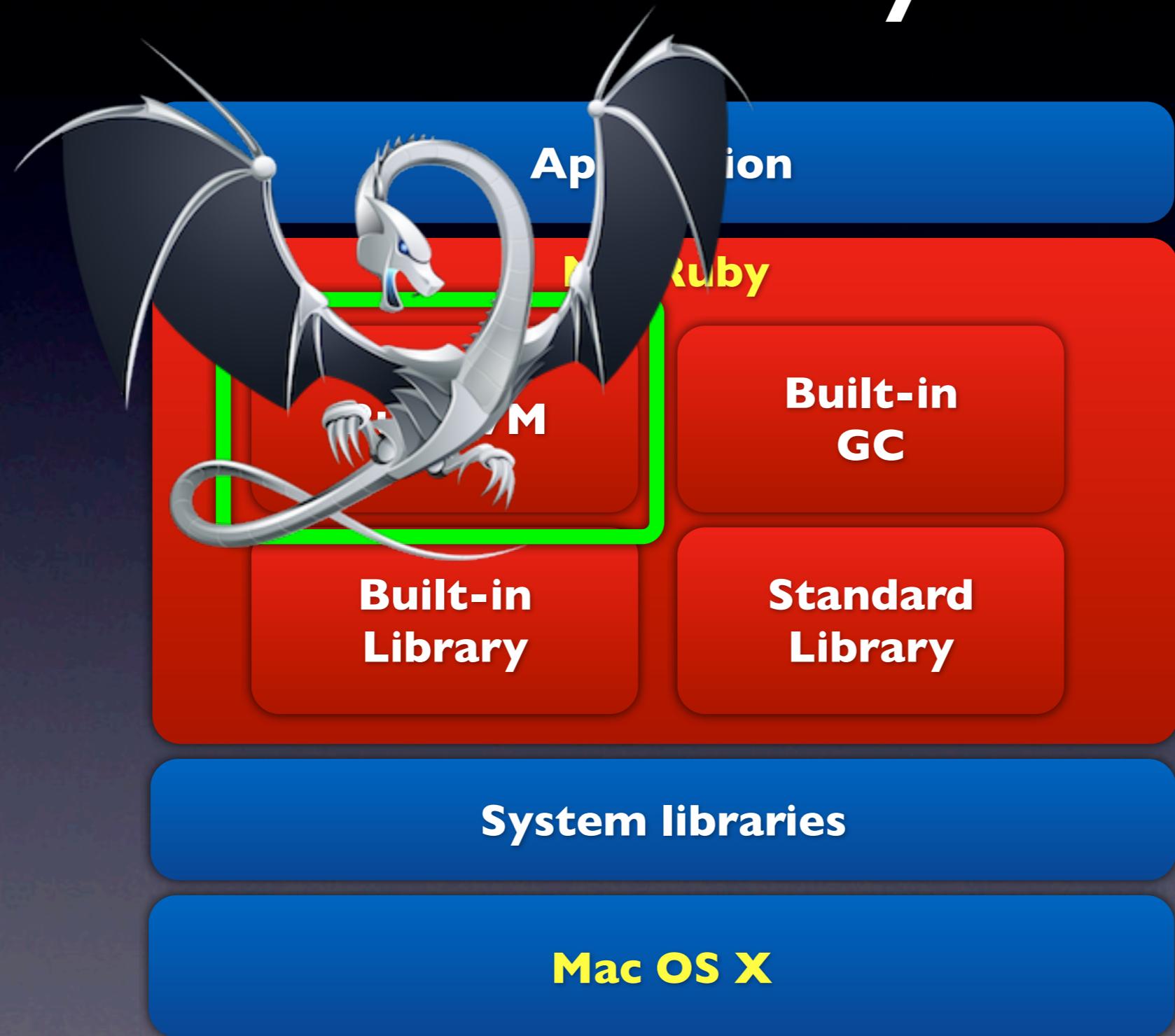
MacRuby



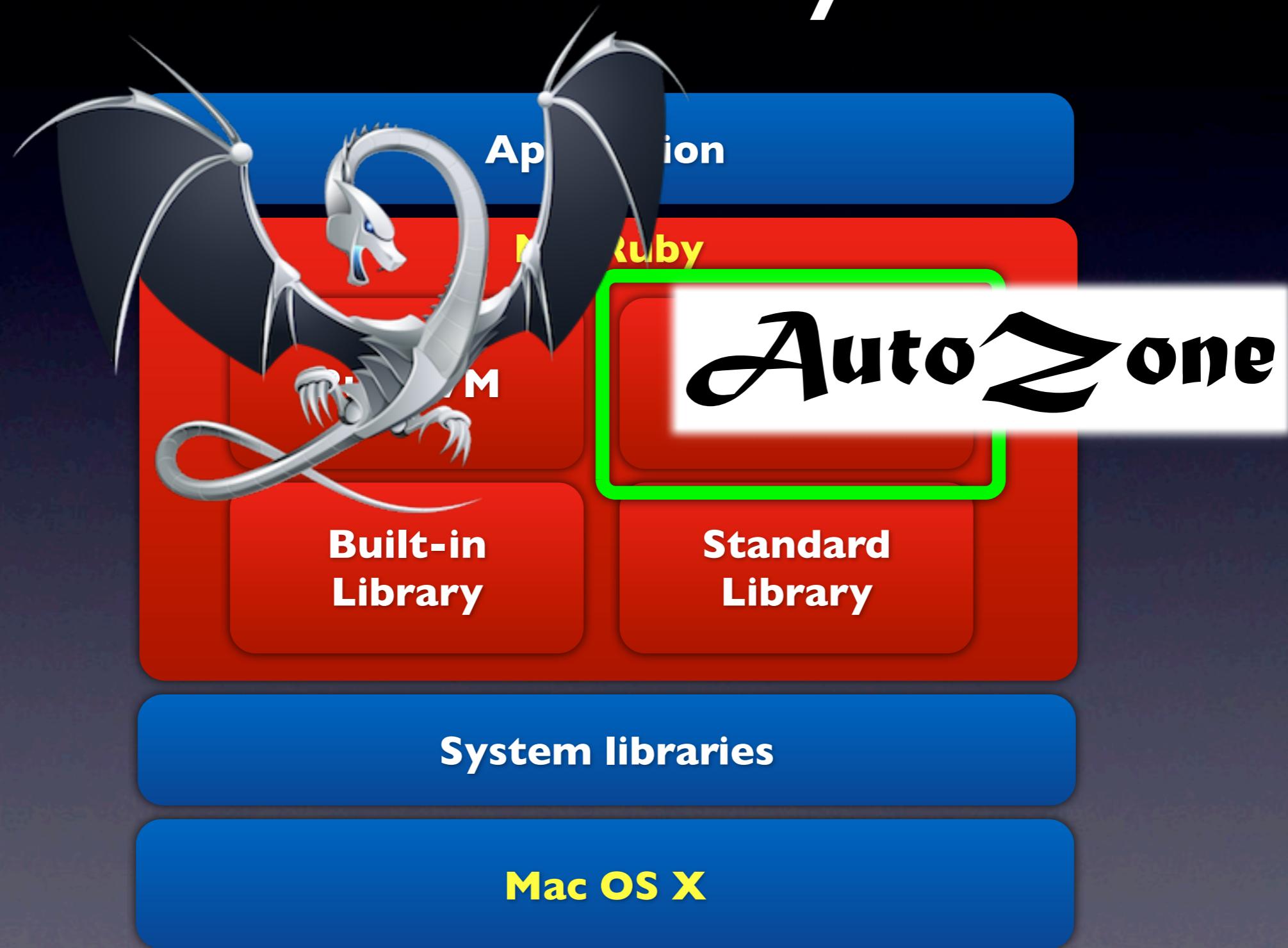
MacRuby



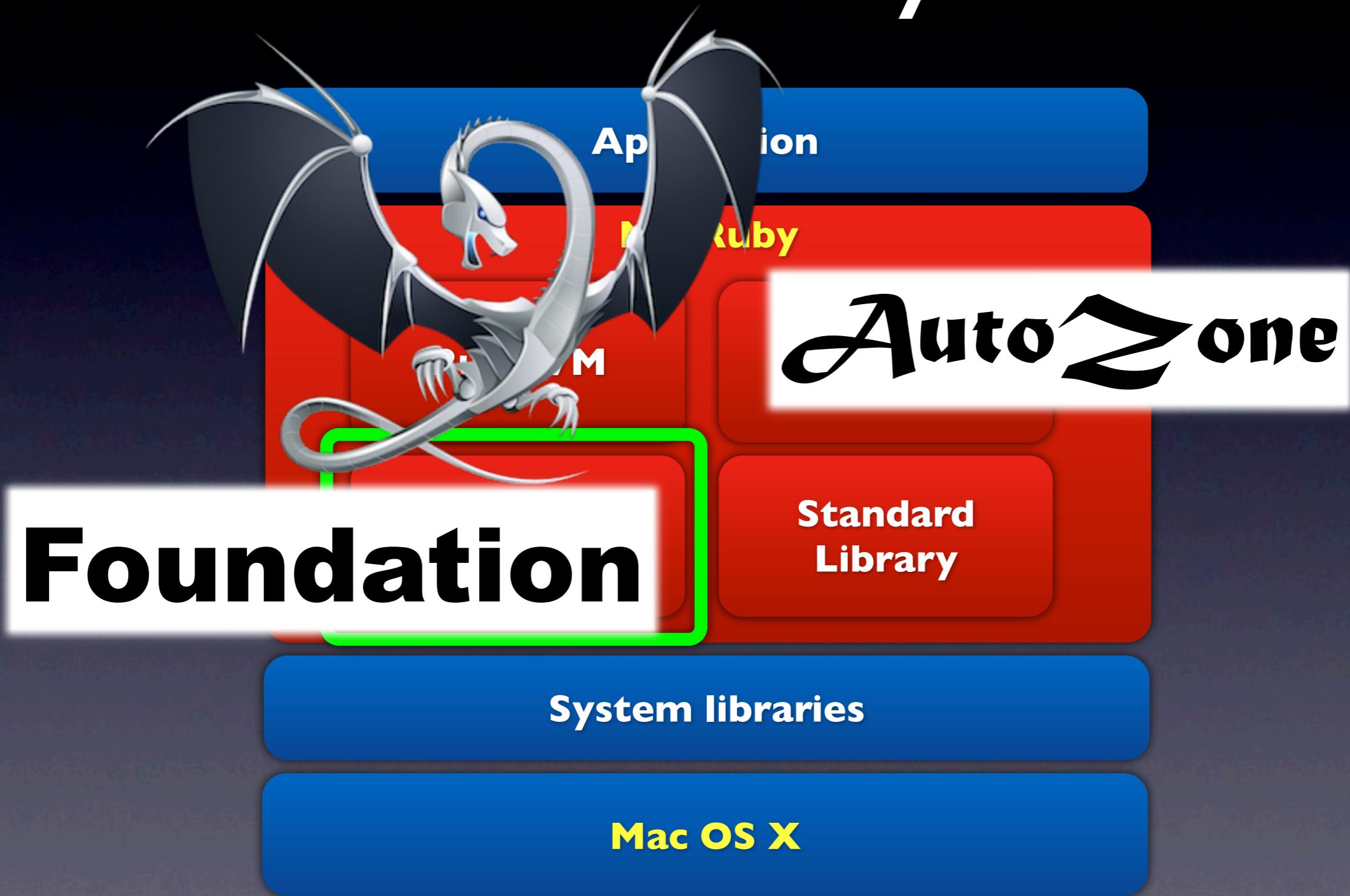
MacRuby



MacRuby



MacRuby

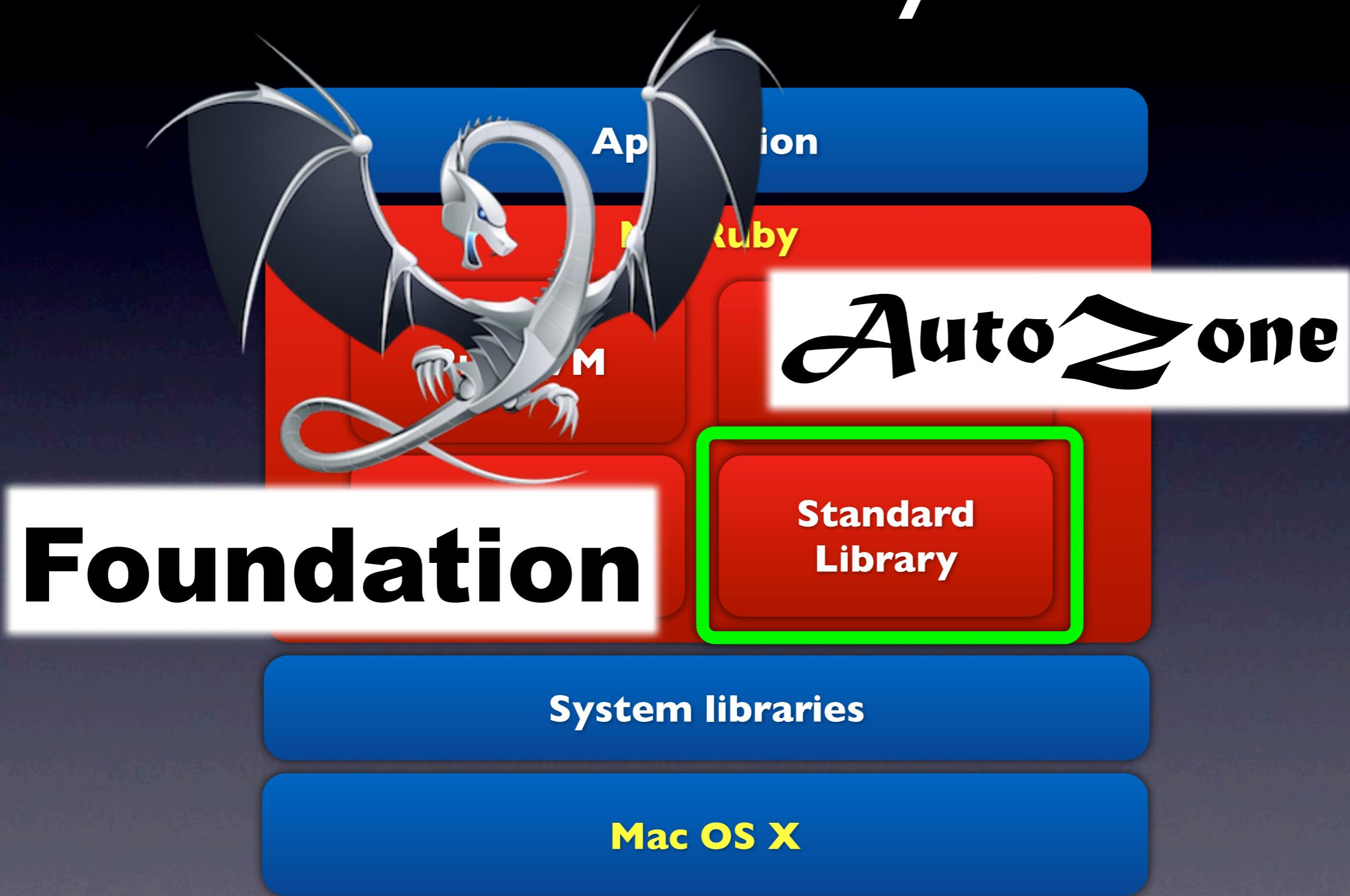


MacRuby

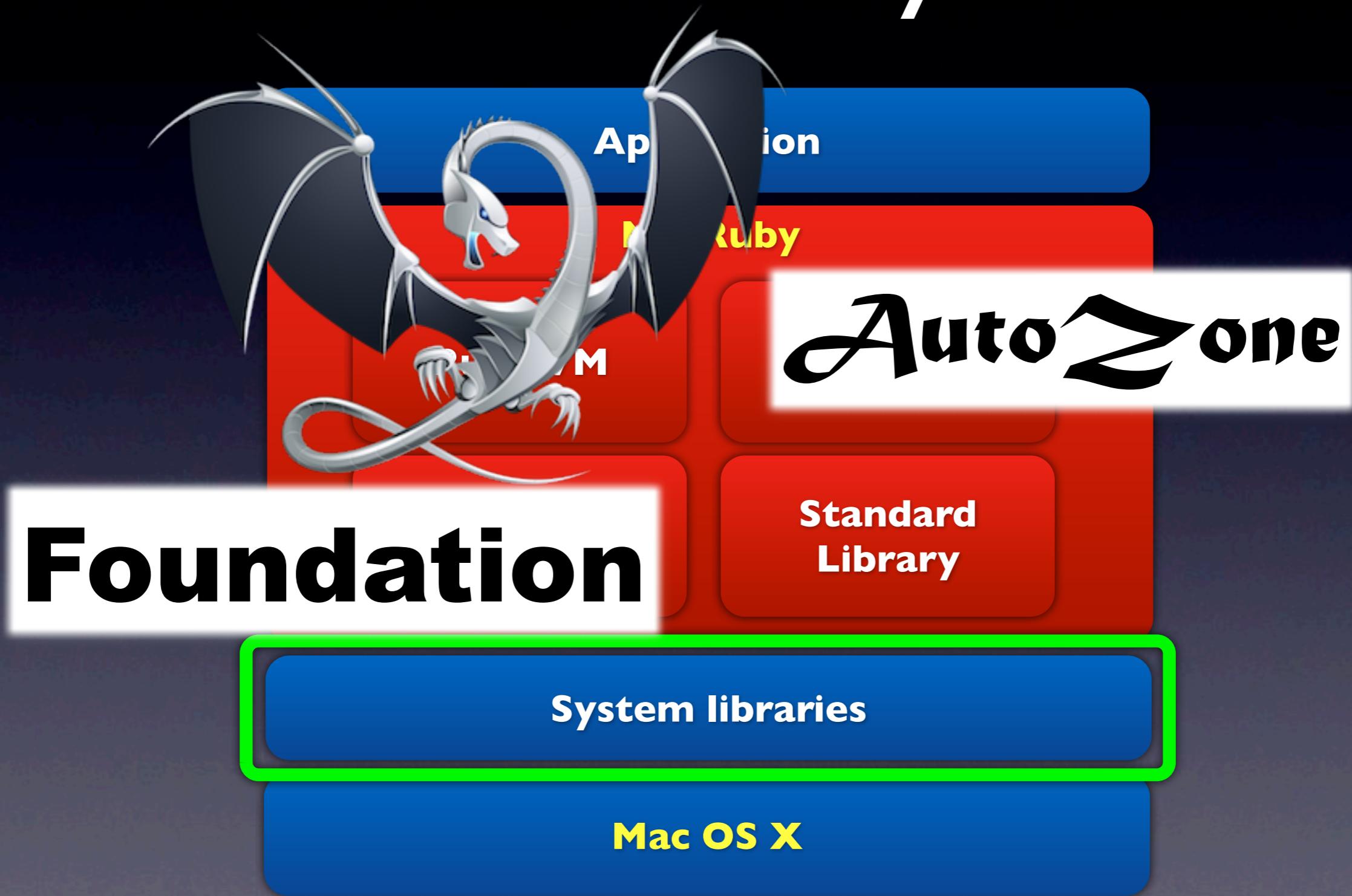


```
"kouji".transform("latin-hiragana")  
#=> こうじ
```

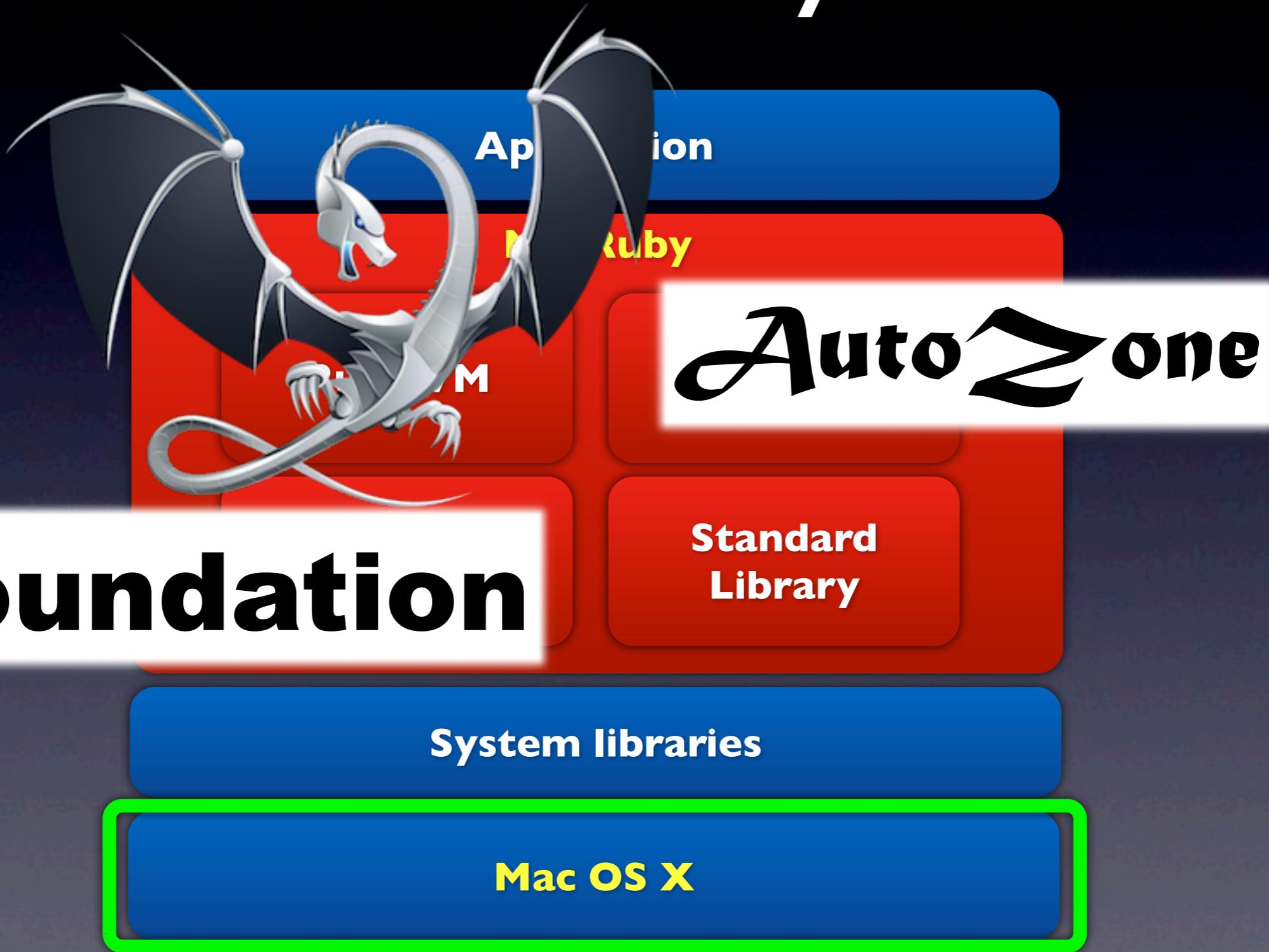
MacRuby



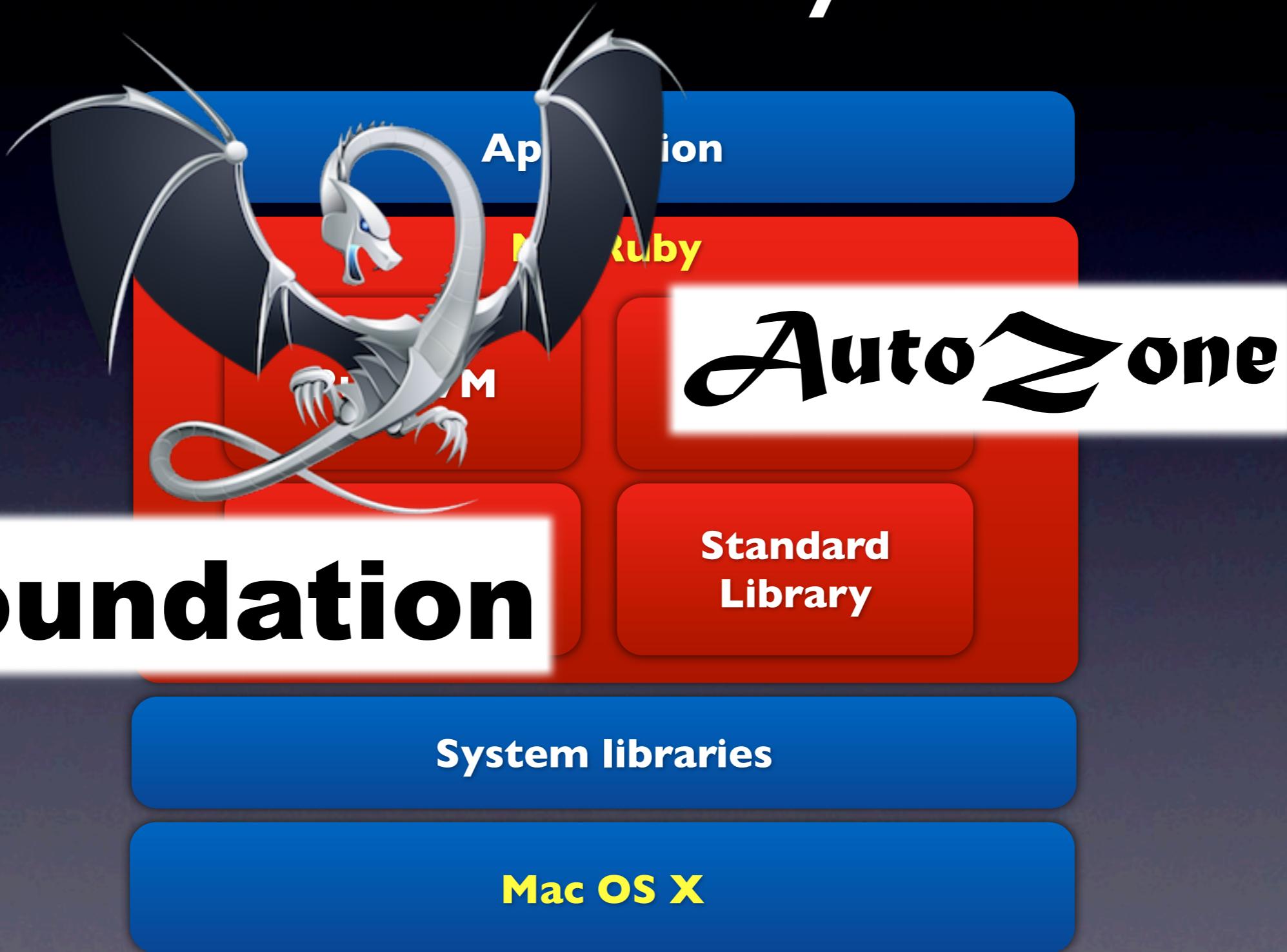
MacRuby



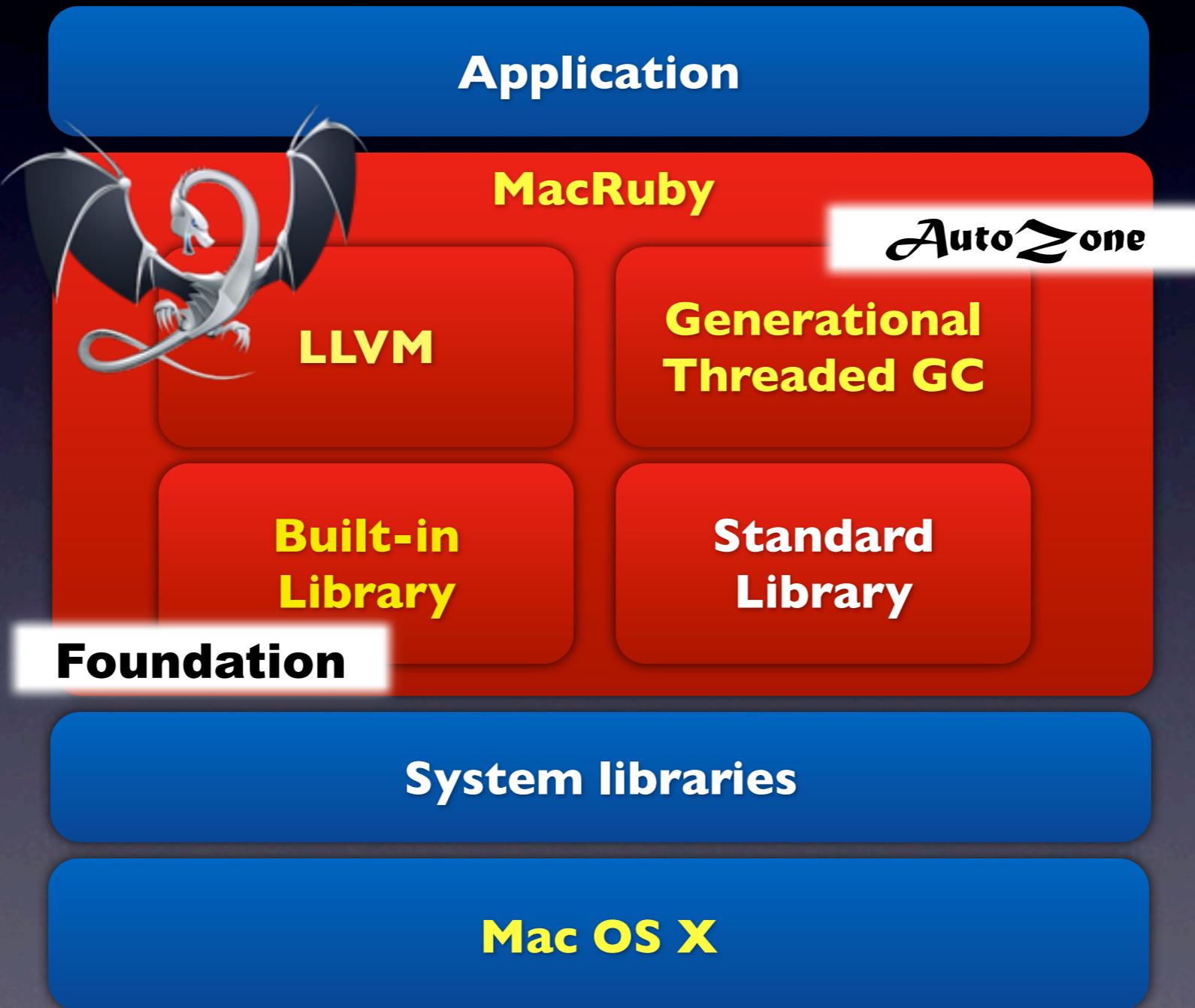
MacRuby



MacRuby



MacRuby



MacRuby on Rails

Making Ruby on Rails work on MacRuby



Current Status



Current Status

```
$ rails new demo
kouji:/Users/kouji/work/MacRuby/MacRuby/issues/work:0
dhcp219$ env VM_DISABLE_RBO=1 macruby -S rails new demo
  create
  create README
  create Rakefile
  create config.ru
  create .gitignore
  create Gemfile
  create app
  create app/controllers/application_controller.rb
  create app/helpers/application_helper.rb
  create app/mailers
  create app/models
  create app/views/layouts/application.html.erb
  create config
  create config/routes.rb
  create config/application.rb
  create config/environment.rb
  create config/environments
  create config/environments/development.rb
  create config/environments/production.rb
  create config/environments/test.rb
  create config/initializers
  create config/initializers/backtrace_silencers.rb
```



Current Status

\$ rails new demo

```
kouji:/Users/kouji/work/MacRuby/MacRuby/issues/work:0
dhcp219$ env VM_DISABLE_RBO=1 macruby -S rails new demo
create
create README
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create config.ru
create .gitignore
create Gemfile
create app
create app/controllers
create app/models
create app/views
create app/config.ru
create app/jobs
create app/controllers/bookmarks_controller.rb
create config/routes.rb
create config/application.rb
create config/environments
create config/boot.rb
create config/database.yml
create config/initializers
create config/locales
create db
create lib
create test
create spec
```

\$ rails generate scaffold ...

```
kouji:/Users/kouji/work/MacRuby/MacRuby/issues/work/demo:0
dhcp219$ env VM_DISABLE_RBO=1 macruby -S rails generate scaffold Bookmark title:
string description:text url:string
  invoke active_record
    create db/migrate/20110714234202_create_bookmarks.rb
    create app/models/bookmark.rb
    invoke test_unit
      create test/unit/bookmark_test.rb
    create test/fixtures/bookmarks.yml
    route resources :bookmarks
  invoke scaffold_controller
    create app/controllers/bookmarks_controller.rb
    invoke erb
      create app/views/bookmarks
      create app/views/bookmarks/index.html.erb
      create app/views/bookmarks/edit.html.erb
      create app/views/bookmarks/show.html.erb
      create app/views/bookmarks/new.html.erb
      create app/views/bookmarks/_form.html.erb
    invoke test_unit
      create test/functional/bookmarks_controller_test.rb
    invoke helper
      create app/helpers/bookmarks_helper.rb
    invoke test_unit
```



Current Status

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$ rails new demo  
kouji:/Users/kouji/work/MacRuby/MacRuby/issues/work:0  
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create  
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create app  
create app/controllers  
create app/models  
create app/views  
create config  
create config/initializers  
create config/routes.rb  
create config/application.rb  
create config/environments  
create config/locales  
create config/timer.rb  
create config/validations  
create config/validations.rb  
create db/migrate  
create db/migrate/20110714234202_create_bookmarks.rb  
create app/models/bookmark.rb  
create test/unit/bookmark_test.rb  
$ rails generate scaffold Bookmark title:  
string description:text url:string  
invoke active_record  
create db/migrate/20110714234202_create_bookmarks.rb  
create app/models/bookmark.rb  
test/unit  
$ rails server  
uby - 80x24  
Last login: Wed Jul 13 10:42:18 on ttys011  
kouji:/Users/kouji:0  
dhcp219$ cd /Users/kouji/work/MacRuby/MacRuby/issues/work/demo  
kouji:/Users/kouji/work/MacRuby/MacRuby/issues/work/demo:0  
dhcp219$ env VM_DISABLE_RBO=1 macruby -S rails server  
=> Booting WEBrick  
=> Rails 3.0.7 application starting in development on http://0.0.0.0:3000  
=> Call with -d to detach  
=> Ctrl-C to shutdown server  
[2011-07-15 08:32:52] INFO  WEBrick 1.3.1  
[2011-07-15 08:32:52] INFO  ruby 1.9.2 (2008-06-03) [universal-darwin10.0]  
[2011-07-15 08:32:52] INFO  WEBrick::HTTPServer#start: pid=20943 port=3000
```



7 months ago...



7 months ago...

March 2011 in Japan



7 months ago...

March 2011 in Japan

- I thought, "Does Rails work on MacRuby?".



7 months ago...

March 2011 in Japan

- I thought, "Does Rails work on MacRuby?".
- I managed to **install** Rails.

```
$ sudo macgem install rails  
7 gems installed
```

```
$ sudo macgem install sqlite3-ruby  
2 gems installed
```



Perhaps...



Perhaps...

- I thought, "OK, it's installed, but surely the Rails generators won't work...".



Perhaps...

- I thought, "OK, it's installed, but surely the Rails generators won't work...".
- However, I managed to **create a Rails project!?**

```
$ macruby -S rails new demo
      create
      create  README
...
      create  vendor/plugins
      create  vendor/plugins/.gitkeep
```



Are you kidding me?



Are you kidding me?

- I tried to generate a scaffold...



Are you kidding me?

- I tried to generate a scaffold...
- It failed. After all Rails didn't work on MacRuby.

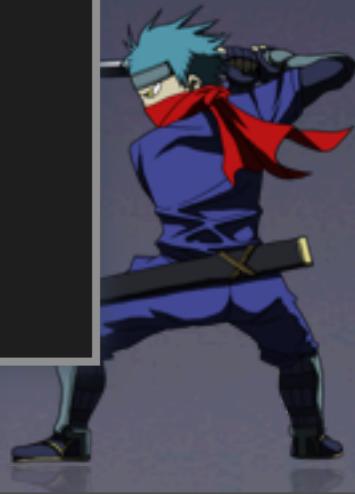
```
$ macruby -S rails generate scaffold Bookmark  
title:string description:text url:string  
...  
Assertion failed: ((size_t)pos <  
current_exceptions.size()), function  
pop_current_exception, file vm.cpp, line 3434.  
zsh: abort    macruby -S rails generate scaffold  
Bookmark title:string description:text
```



Are you kidding me?

- I tried to generate a scaffold...
- It failed. After all Rails didn't work on MacRuby.

```
$ macruby -S rails generate scaffold Bookmark  
titl $ macruby -S rails server  
...  
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cur current_exceptions.size()), function  
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zsh zsh: abort    macruby -S rails server  
Bookmark title:string description:text
```



My approach

Run Rails

SEGV or abort

Research

Coding

Run RubySpec

Run Rails



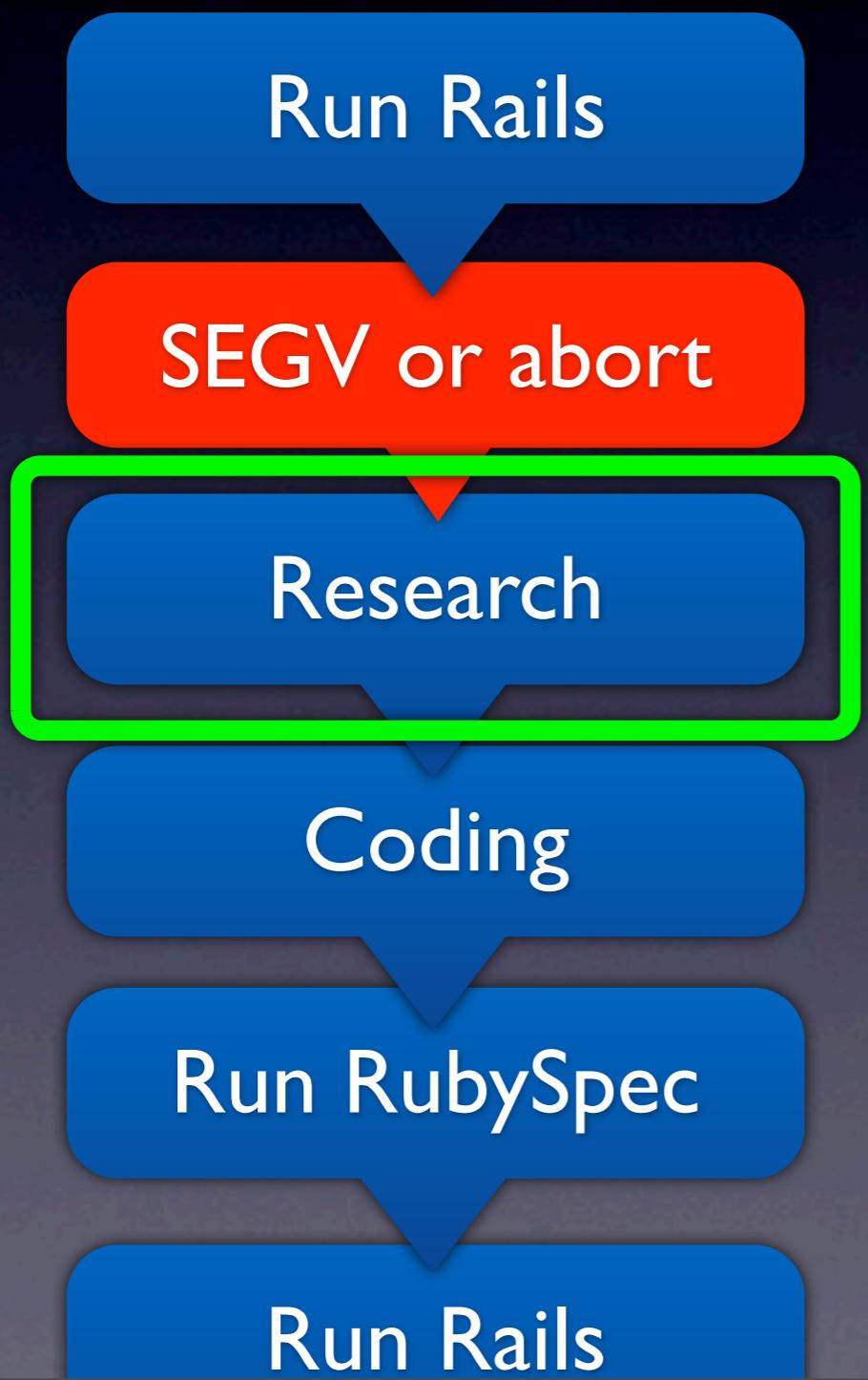
My approach



My approach



My approach



My approach

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My approach

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Coding

Run RubySpec

Run Rails

SEGV or abort

Research

Coding

Run RubySpec

IV approach



- Coding
- Run RubySpec
- Run Rails
- SEGV or abort
- Research
- Coding
- Run RubySpec

Required knowledge and technology

- cRuby
- Objective-C
- C++
- LLVM



A couple of examples of
what I have fixed so far



#860 catch/throw

(in "old" MacRuby)

- MacRuby aborts if you use catch and throw inside a rescue clause.



#860 catch/throw

(in "old" MacRuby)

- MacRuby aborts if you use catch and throw inside a rescue clause.

```
01: begin
02:   raise "A"
03: rescue
04:   catch(:foo) { throw :foo }
05: end
```



#860 catch/throw

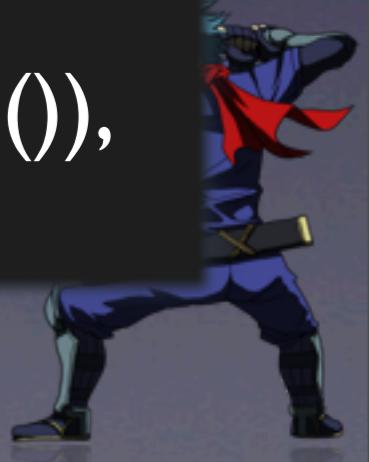
(in "old" MacRuby)

- MacRuby aborts if you use catch and throw inside a rescue clause.

```
01: begin
02:   raise "A"
03: rescue
04:   catch(:foo) { throw :foo }
05: end
```

:ok

Assertion failed: ((size_t)pos < current_exceptions.size()),
function pop_current_exception, file vm.cpp, line 3448.



Exception Handling

(in MacRuby)



Exception Handling

(in MacRuby)

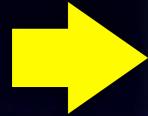
```
01: begin
02:   raise "A"
03: rescue
04:   begin
05:     raise "B"
06:   rescue
07:   end
08: end
```



Exception Handling

(in MacRuby)

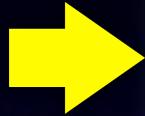
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Exception Handling

(in MacRuby)

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Exception Stack



Exception Handling

(in MacRuby)

```
01: begin  
02:   raise "A" push  
03: rescue  
04:   begin  
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06:   rescue  
07:   end  
08: end
```

"A"

Exception Stack



Exception Handling

(in MacRuby)

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01: begin  
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```

"A"

Exception Stack



Exception Handling

(in MacRuby)

```
01: begin
02:   raise "A" push
03: rescue
04:   begin
05:     raise "B" push
06:   rescue
07:     end
08:   end
```



"B"

"A"

Exception Stack



Exception Handling

(in MacRuby)

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01: begin
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07:   end
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```



Exception Stack



Exception Handling

(in MacRuby)

```
01: begin
02:   raise "A" push
03: rescue
04:   begin
05:     raise "B" push
06:   rescue
07:     end pop
08:   end
```



"A"

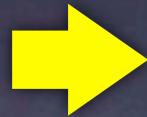
Exception Stack



Exception Handling

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```



Exception Stack



Exception Handling and catch / throw (in MacRuby)

Exception Stack



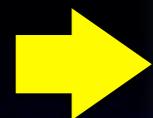
Exception Handling and catch / throw (in MacRuby)

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```

Exception Stack

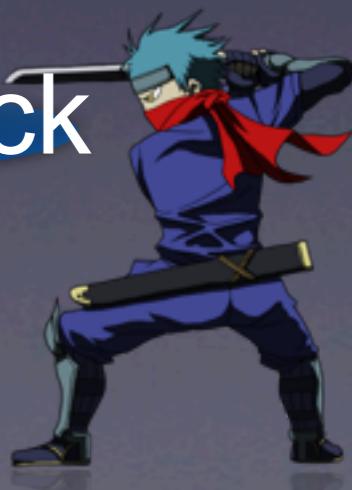


Exception Handling and catch / throw (in MacRuby)



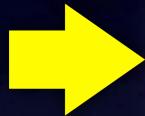
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Exception Stack



Exception Handling and catch / throw (in MacRuby)

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Exception Stack



Exception Handling and catch / throw (in MacRuby)

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Exception Handling and catch / throw (in MacRuby)

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"A"

Exception Stack

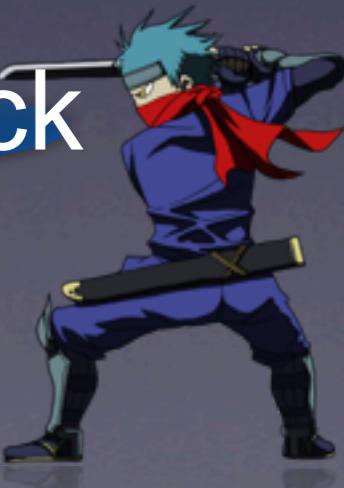


Exception Handling and catch / throw (in MacRuby)

```
01: catch(:foo) {  
02:   begin  
03:     raise "A" push  
04:   rescue  
05:     throw :foo pop  
06:   end  
07: }
```



Exception Stack



throw

(in "old " MacRuby)

Before being fixed(60723bf~), 'throw' always popped the current Exception.

vm.cpp:4321:

```
VALUE
RoxorVM::ruby_throw(VALUE tag, VALUE value)
{
...
    if (current_exception() != Qnil) {
        pop_current_exception();
    }
...
}
```



throw

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#860 catch/throw

(in "old" MacRuby)

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01: begin
02:   raise "A"
03: rescue
04:   catch(:foo) { throw :foo }
05: end
```

Exception Stack



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(in "old" MacRuby)

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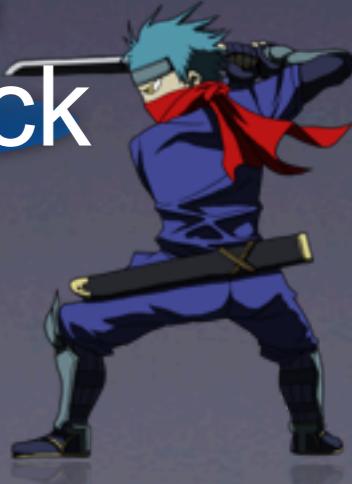
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"A"

Exception Stack

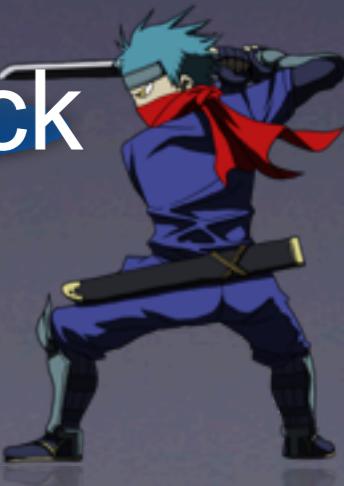


#860 catch/throw

(in "old" MacRuby)

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02:   raise "A" push
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Exception Stack



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(in "old" MacRuby)

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Exception Stack



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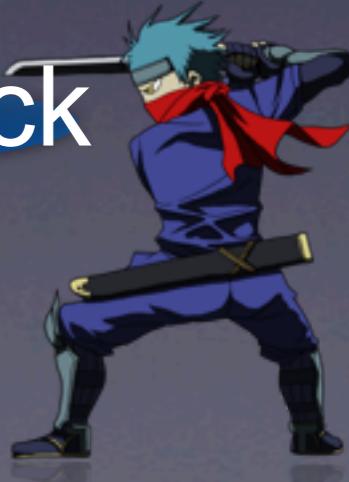
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Abort!!

Exception Stack

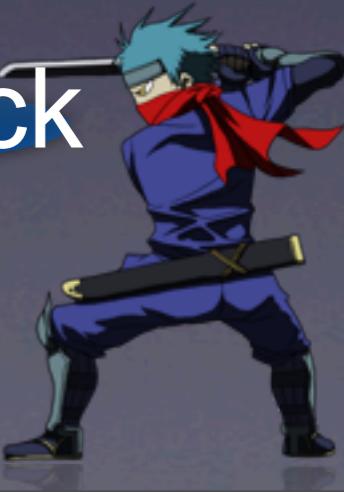


How to fix

(in "new" MacRuby)

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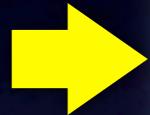
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"A"

Exception Stack



How to fix

(in "new" MacRuby)

```
01: begin
02:   raise "A" push
03: rescue
→ 04:   catch( :foo ) { throw :foo } store
05: end
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"A"

Exception Stack



How to fix

(in "new" MacRuby)

```
01: begin
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03: rescue
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"A"

Exception Stack



How to fix

(in "new" MacRuby)

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04:   catch(:foo) { throw :foo }
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```



Exception Stack



How to fix

(in "new" MacRuby)

In the new implementation, MacRuby only pops exceptions when necessary (60723bf)

vm.cpp:4318:

```
VALUE
RoxorVM::ruby_throw(VALUE tag, VALUE value)
{
...
    while (catch_ptr->current_exception !=  

           current_exception()) {
        pop_current_exception();
    }
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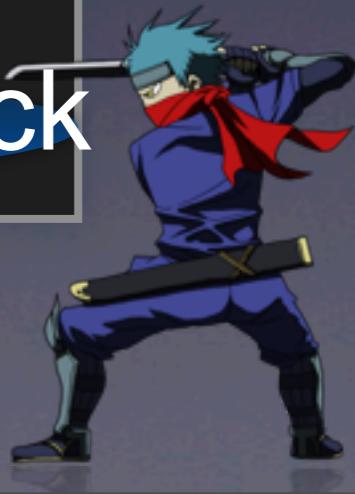


#860 Fixed

(in "new" MacRuby)

```
01: begin
02:   raise "A"
03: rescue
04:   catch(:foo) {
05:     begin
06:       raise "B"
07:     rescue
08:       throw :foo
09:     end
10:   }
11: end
```

Exception Stack



#860 Fixed

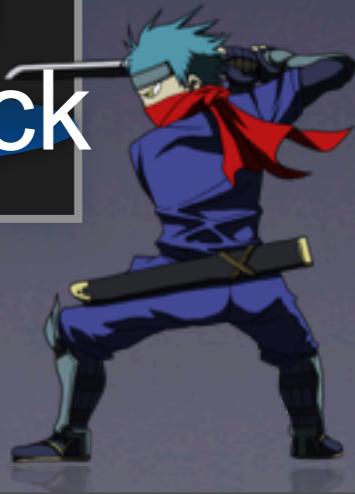
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"A"

Exception Stack



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```



push

store

push

"B"

"A"

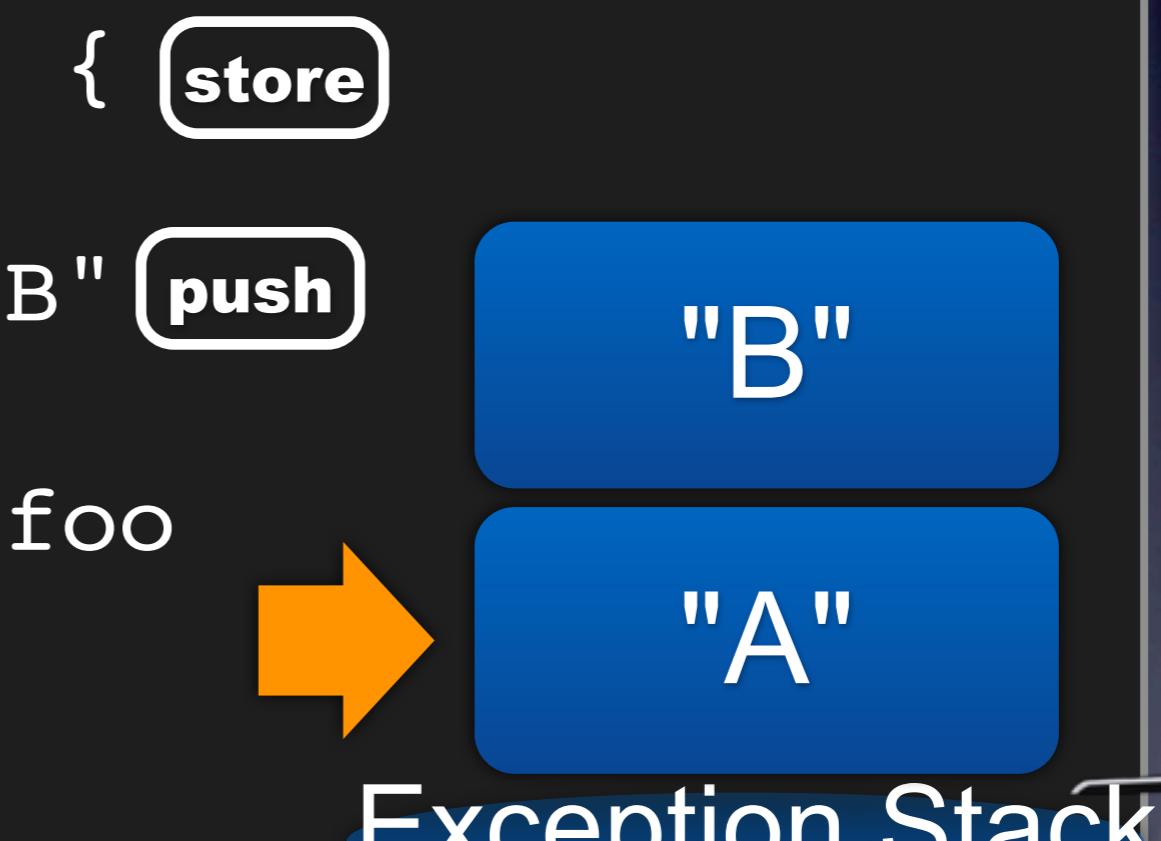
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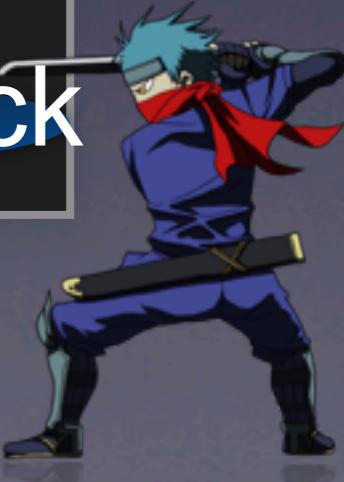
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"A"

Exception Stack



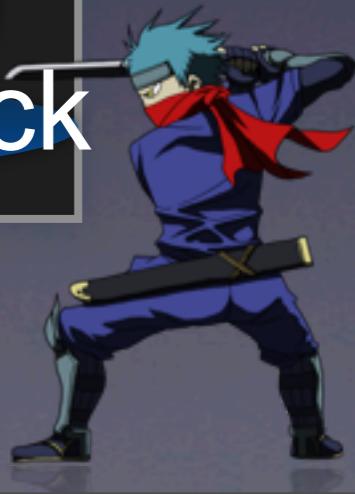
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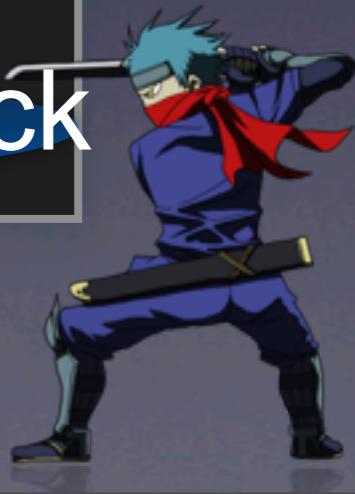
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Exception Stack



#1192 Constant Lookup

→ MacRuby failed to correctly look up constants in a number of situations when you used `module_eval` and `class_eval`.



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module A
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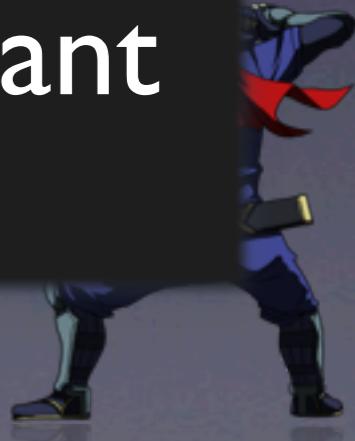


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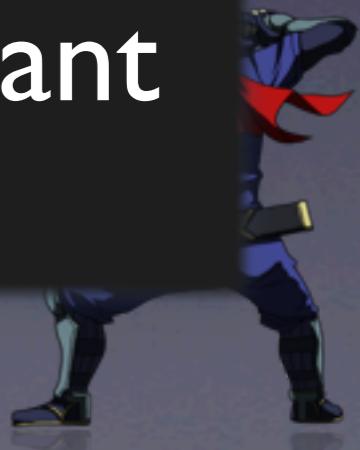


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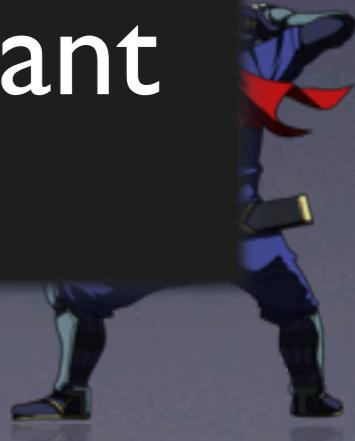


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Constant Lookup

(in cRuby)



Constant Lookup

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```
1: module A
2:   module B
3:     CONST = "B's Const"
4:     module ::A
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Constant Lookup

(in cRuby)

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Lexical Constant Lookup



Constant Lookup

(in "old" MacRuby)

MacRuby had not implemented Lexical
Constant Lookup.

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Constant Lookup

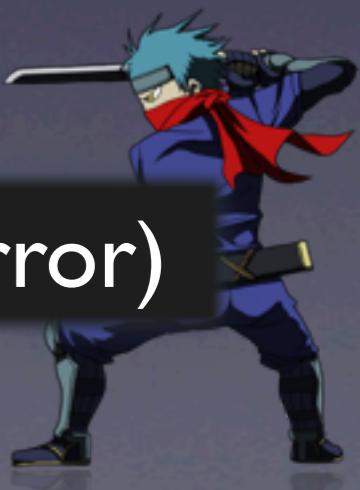
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-e:5:in `block': uninitialized constant A::CONST (NameError)



Constant Lookup is complex (in cRuby)



Constant Lookup is complex

(in cRuby)

class_eval(&Block)

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```

class_eval(String)

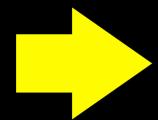
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class_eval(&Block)

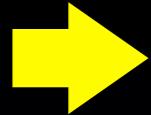


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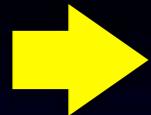
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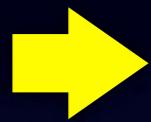
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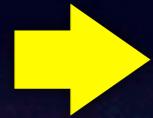
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class_eval(&Block)

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"A's CONST"



class_eval(String)

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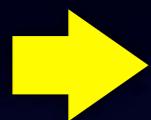


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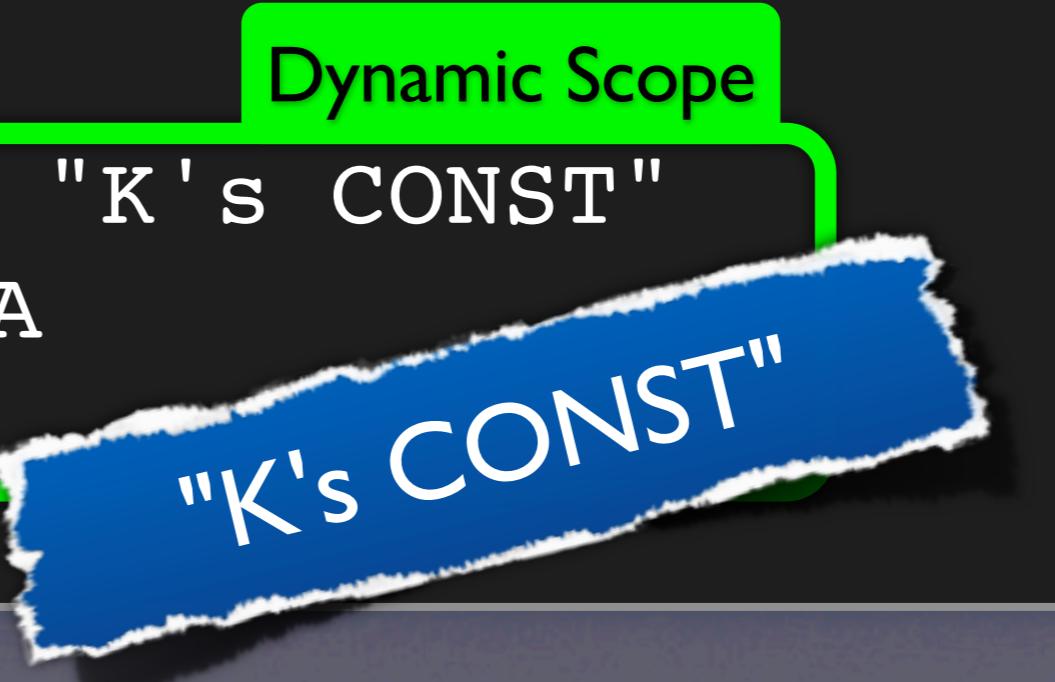
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(in cRuby)

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05:       p CONST
06:     }
07:   end
08: end
09:
10: class K
11:   CONST = "K's CONST"
12:   extend A
13:   f()
14: end
```

class_eval(String)

```
01: module A
02:   CONST = "A's CONST"
03:   def f()
04:     class_eval <<-EOS
05:       p CONST
06:     EOS
07:   end
08: end
09:
10: class K    Dynamic Scope
11:   CONST = "K's CONST"
12:   extend A
13:   f()
14: end
```

I somehow managed to fix this
(in MacRuby)



I somehow managed to fix this (in MacRuby)

- Three attempts to get it right.



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- Three attempts to get it right.
- More than 3000 lines of code changed.



I somehow managed to fix this (in MacRuby)

- Three attempts to get it right.
- More than 3000 lines of code changed.

21 Apr 2011 15:24 Laurent S.

it's official,
kouji is the hero of the day/week/month/...?
his patch seems to fix remaining lexical
const lookup bugs :)



A very complex bug

(in "new" MacRuby)



A very complex bug

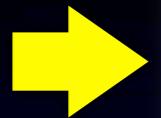
(in "new" MacRuby)

```
01: module A
02:   B = 42
03: end
04:
05: A.class_eval do
06:   def self.f
07:     p B
08:   end
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A very complex bug

(in "new" MacRuby)



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01: module A
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A very complex bug

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A very complex bug

(in "new" MacRuby)

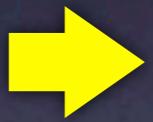
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A very complex bug

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```

Lexical



A very complex bug

CAUTION

'class_eval' does not add it's own receiver
(A) to the constant lookup scope.

```
04:  
05: A.class_eval do  
06:   def self.f  
07:     p B  
08:   end  
09: end  
10:  
11: A.f
```

Lexical



A very complex bug

(in cRuby)

```
01: module A
02:   B = 42
03: end
04:
05: A.class_eval do
06:   def self.f
07:     p B
08:   end
09: end
10:
11: A.f
```



A very complex bug (in cRuby)

```
01: module A
02:
03:   e
04:   Ruby 1.9
05:   →42
06:   A. _eval do
07:     def self.f
08:       p B
09:     end
10:
11:   A.f
```



A very complex bug (in cRuby)

```
01: module A
02:
03:   e
04:     Ruby 1.9
05:     →42
06:   A
07:     eval do
08:       def self.f
09:         s
```

Ruby 1.8.7
→ -e:8:in `f': uninitialized constant B (NameError)



A very complex bug (in cRuby)

A cRuby's Bug

Ruby 1.8.7
→ -e:8:in `f:unin

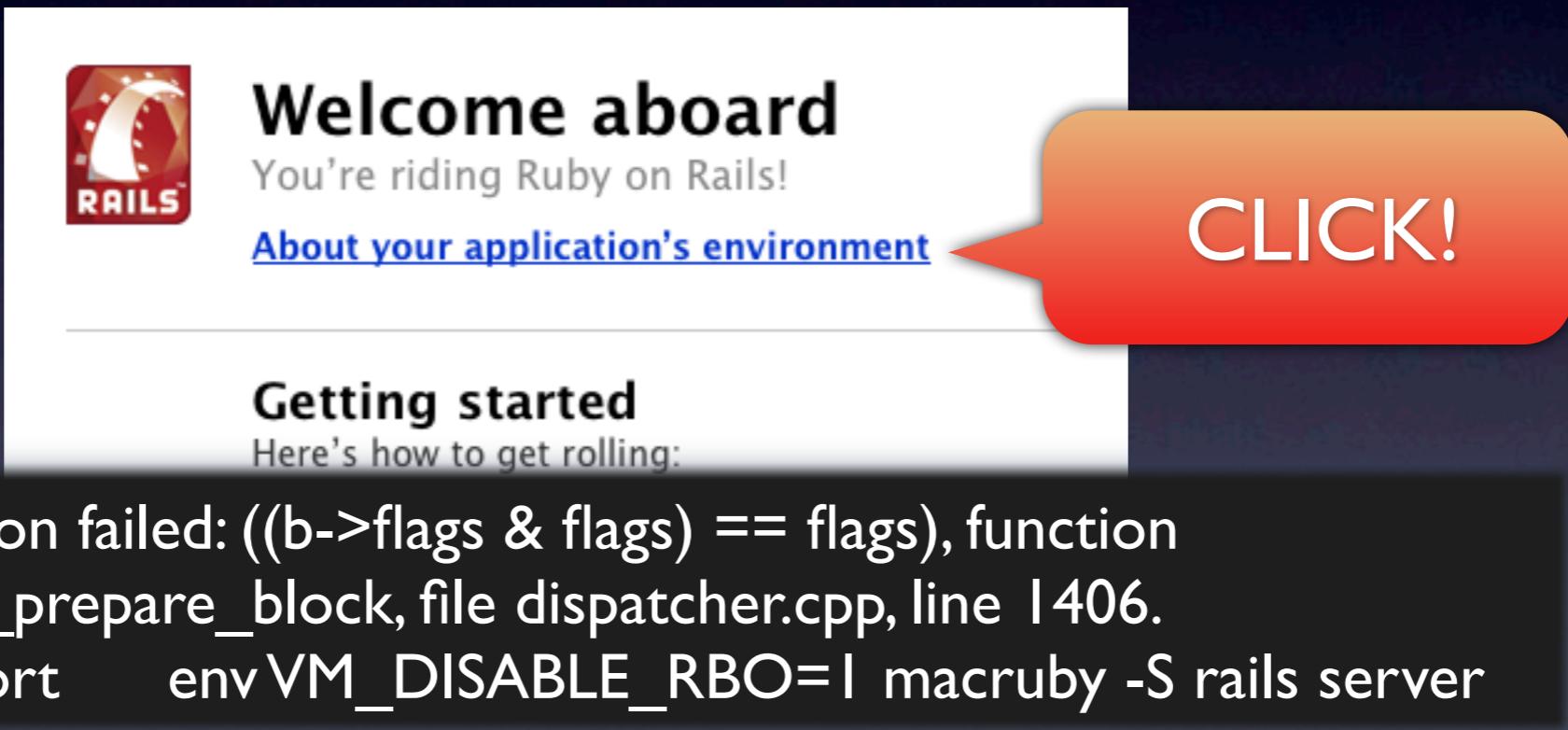
module A

o



#I390 rb_vm_prepare_block

→ Abort if the "About your application's environment" link is clicked.



The MacRuby train trip continues...



The MacRuby train trip continues...

<http://www.macruby.org/>



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@macruby



The MacRuby train trip continues...

<http://www.macruby.org/>

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GitHub:MacRuby/MacRuby

The MacRuby train trip continues...

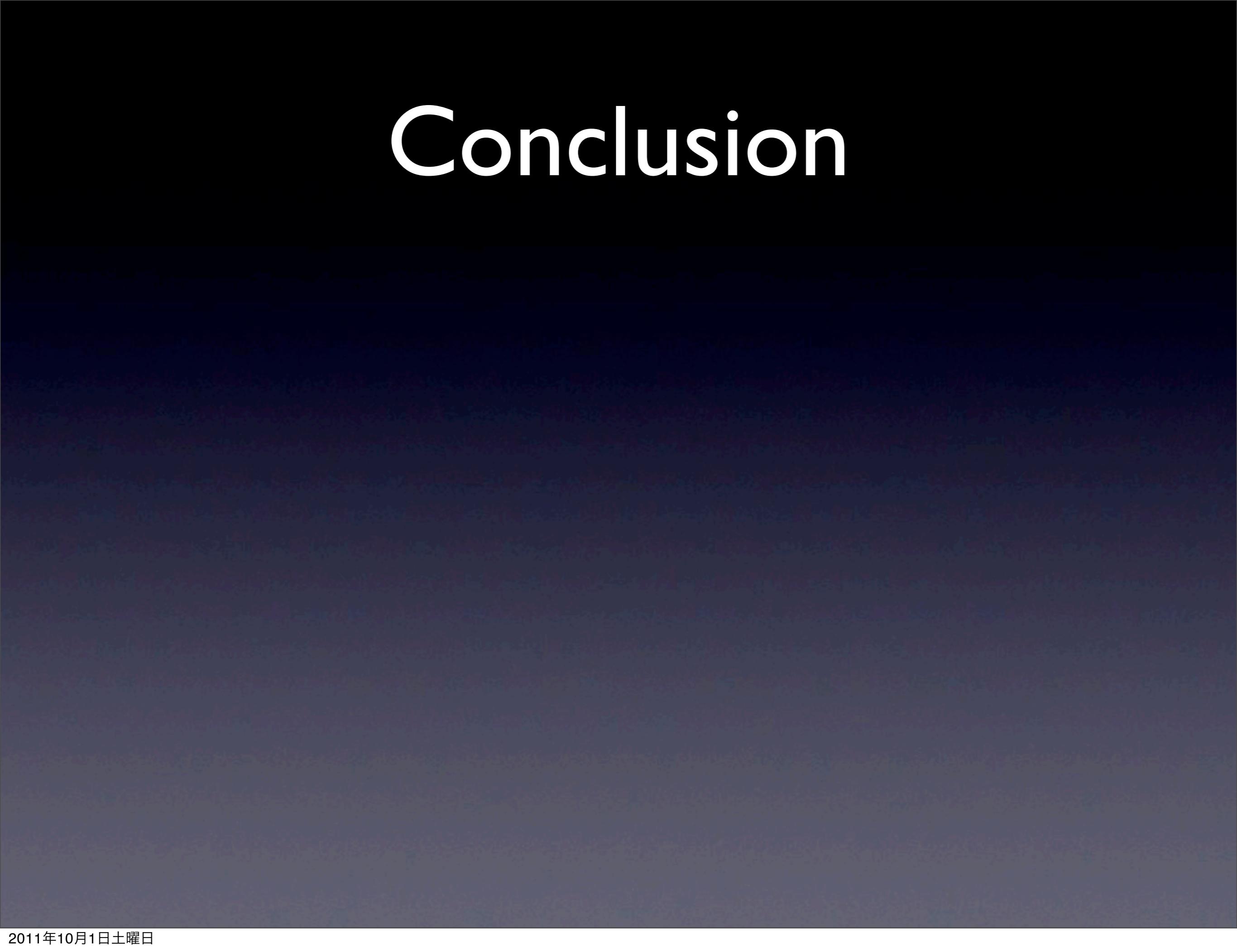
<http://www.macruby.org/>

@macruby

GitHub:MacRuby/MacRuby

macruby-devel@lists.macosforge.org

Conclusion



Conclusion

- **MacRuby**

- ➡ MacRuby is a unique blend of Ruby 1.9 and Objective-C.
- ➡ The goal is to be 100% compatible with Ruby 1.9.

Conclusion

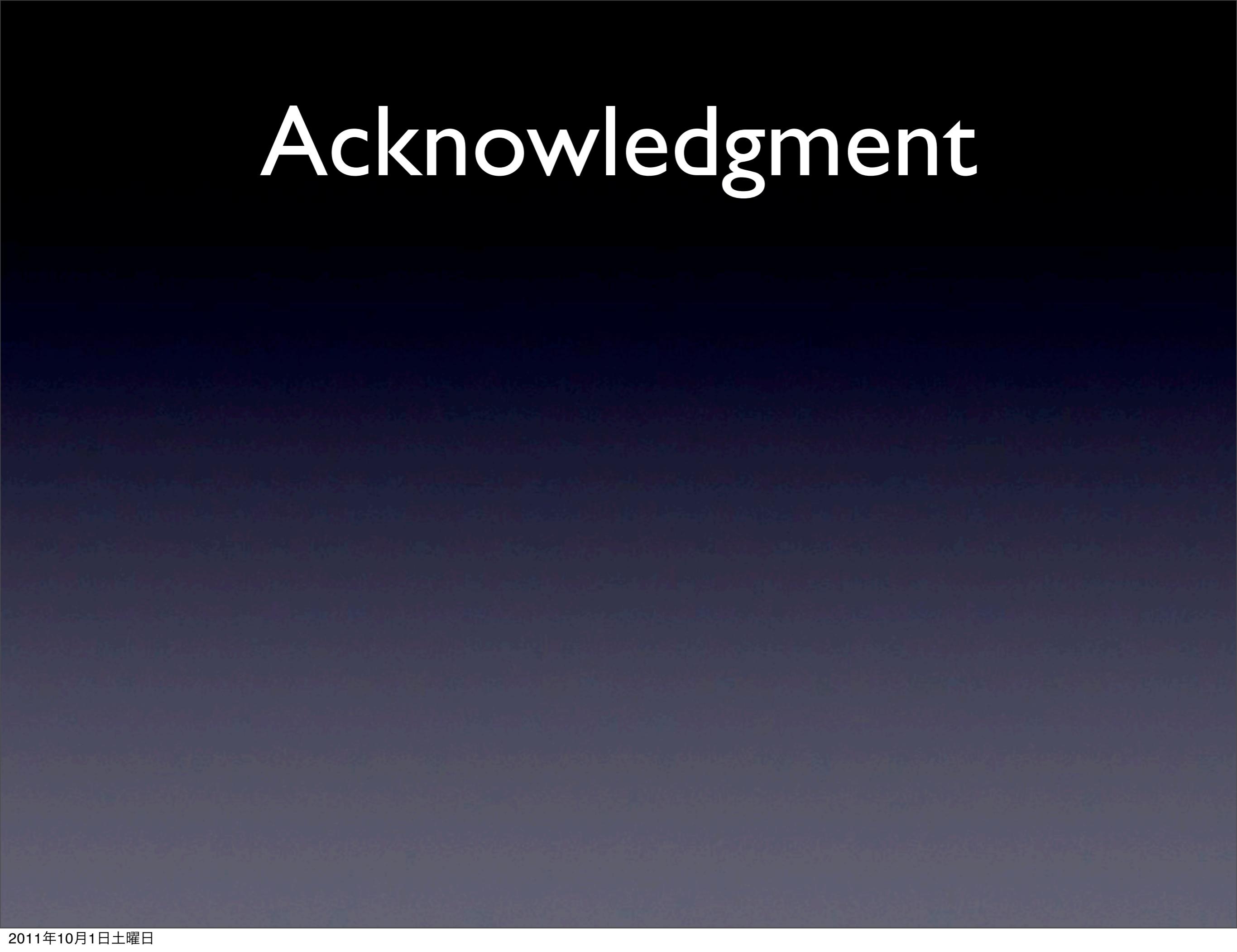
- **MacRuby**

- MacRuby is a unique blend of Ruby 1.9 and Objective-C.
- The goal is to be 100% compatible with Ruby 1.9.

- **MacRuby on Rails**

- We're now able to show the default Rails welcome page.
- But there is still a lot to do.

Acknowledgment



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- The RubyConf hosts and organizers

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- Tor Yamamoto-Sorensen (@shakaijin)

Acknowledgment

- The RubyConf hosts and organizers
- Tor Yamamoto-Sorensen (@shakaijin)
- Everyone present today

Thank you

Q & A

- If you have a question, please ask me, but if possible please speak slowly.
- or contact [@takaokouji_en](https://twitter.com/takaokouji_en) by Twitter
- or send e-mail to MacRuby ML