# Scanning Strings at Supersonic Speed

# @

# murphy

Everything
that can go wrong,
will go wr

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## murfy.de

## sofatutor.com

# Scanning

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# Strings

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# Strings

"<!DOCTYPE html><html lang="en"><head><meta
charset="utf-8"><title>Agenda –EuRuKo 2011</
title><link rel="stylesheet" href="/stylesheets/
screen.css"><link rel="stylesheet" href="fancybox/
jquery.fancybox-1.3.4.css"><linkrel="alternate"
type="application/atom+xml" title="ATOM
feed"href="http://euruko2011.org/feed.atom"><link
rel="alternate"type="application/atom+xml"
title="github feed"…"

# Strings

```
"class Song
  def initialize name, author
    @name = name
    @author = author
  end
  def to_s
    "this is :#{@name}----#{@author}*****"
  end
end"
```

# Strings

```
"class Song
  def initialize name, author
    @name = name
    @author = author
  end
  def to_s
    "this is :#{@name}----#{@author}*****"
  end
end".scan
```

# Supersonic

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3KB | | | | | | | | |

Mach 1.8 = 1900 km/h

2514 pages per second

7.5 MB/s

# Speed

Why?

- Syntax Highlighting
- Parsing (eg. HAML)
- Rite

# Shootout


12.283
Syntax
11.571
Pygments
3.565
source-
highlight
1.811
3.396
CodeRay

# Target

write a supersonic scanner
with pure Ruby code

# Resources

a fast machine

# Resources

big examples

5+ seconds JRuby

here: 160 MB

= 9 times ruby-head

# Resources

rvm ♥ ♥ ♥

# Resources

Time

Endurance

Craziness

# General Ideas

C

- avoid convenient APIs
- write everything yourself
- write for the CPU

# General Ideas

Ruby

- embrace the core libraries
- write less code
- write for the interpreter

# General Ideas

Ruby

- embrace the core libraries
- write less code
- write for the interpreter

# String

```
s = "<head><title>EuRuKo 2011</title>"
```

# RegExp

```
s = "<head><title>EuRuKo 2011</title>"

pattern = /<(\w+)/
```

# String + RegExp

```ruby
s = "<head><title>EuRuKo 2011</title>"

puts s[/<(\w+)/, 1]
```

```
head
```

# String + RegExp

```ruby
s = "<head><title>EuRuKo 2011</title>"

puts s.scan(/<(\w+)/)
```

```
head
title
```

# String + RegExp

```
s = "<head><title>EuRuKo 2011</title>"

s.scan(/<(\w+)/) do |tag|
  puts tag
end
```

```
head
title
```

# StringScanner

```
scanner = StringScanner.new(s)

until scanner.eos?
  if scanner.scan(/<(\w+)/)
    tag = scanner[1]
  else
    scanner.getch
  end
end
```

# StringScanner

Why?

- avoid big RegExp
- control the scan process
- use patterns depending on state
- create patterns on the fly

# Benchmark

```
s = "<head><title>EuRuKo 2011</title>"

s *= 5_000_000

s.scan(/<(\w+)/) do |tag|
  tag
end
```

| | |
|---|---|
| sonic™ | 21.2 |
| 1.8.7 | 13.6 |
| 1.9.2 | 5.4 |
| jruby | 4.7 |
| rbx | 29.1 |
| mac | 34.7 |

# StringScanner

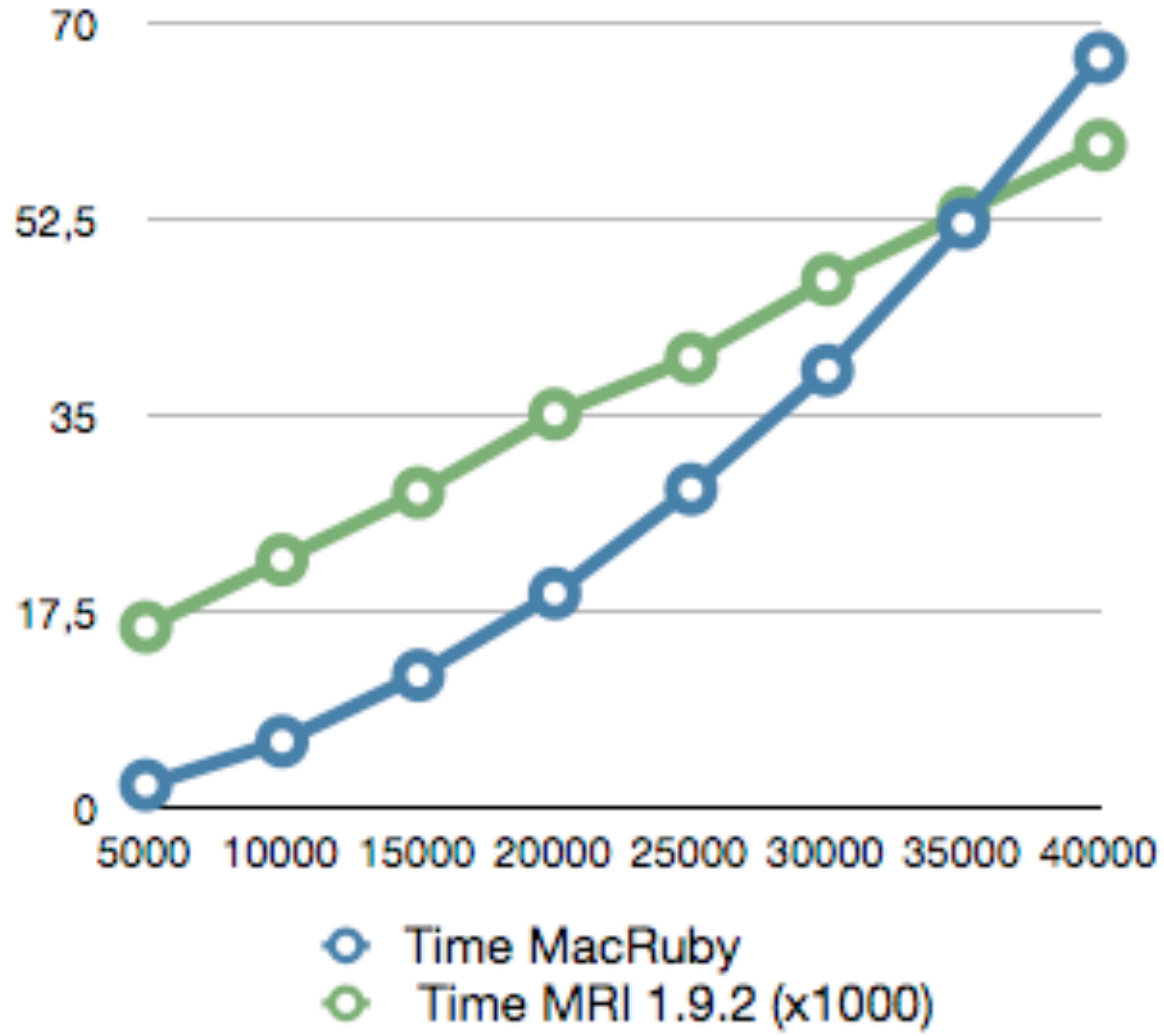
```
scanner = StringScanner.new(s)

until scanner.eos?
  if scanner.scan(/<(\w+)/)
    tag = scanner[1]
  else
    scanner.getch
  end
end
```

| | |
|---|---|
| sonic™ | 21.2 |
| 1.8.7 | 61.0 |
| 1.9.2 | 40.0 |
| jruby | 21.1 |
| rbx | 180.1 |
| mac | ? |

# StringScanner on MacRuby

http://www.macruby.org/trac/ticket/938

| String length | Time MacRuby | Time MRI 1.9.2 (times 1000) |
|---|---|---|
| 5000 | 1,9 | 16 |
| 10000 | 5,8 | 22 |
| 15000 | 11,7 | 28 |
| 20000 | 19,0 | 35 |
| 25000 | 28,3 | 40 |
| 30000 | 38,9 | 47 |
| 35000 | 52,0 | 53 |
| 40000 | 66,8 | 59 |



# StringScanner

```
scanner = StringScanner.new(s)

until scanner.eos?
  if scanner.scan(/<(\w+)/)
    tag = scanner[1]
  else
    scanner.getch
  end
end
```

| sonic™ | 21.2 |
|---|---|
| 1.8.7 | 13.6 |
| 1.9.2 | 5.4 |
| jruby | 4.7 |
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| sonic™ | 21.2 |
|---|---|
| 1.8.7 | 61.0 |
| 1.9.2 | 40.0 |
| jruby | 21.1 |
| rbx | 180.1 |
| mac | ? |

# General Ideas

Ruby

- embrace the core libraries
- write less code
- write for the interpreter

# Less Code

```
class HTML
  def initialize html
    @scanner = StringScanner.new(html)
  end

  def scan
    until @scanner.eos?
      if @scanner.scan(/<(\w+)/)
        yield @scanner[1]
      ...
  end
end
```

# Less Code

```
class HTML
  def initialize html
    @scanner = StringScanner.new(html)
  end

  def scan
    until eos?
      if scan(/<(\w+)/)
        yield self[1]
      ...
  end
end
```

# Less Code

```
class HTML
  def initialize html
    @scanner = StringScanner.new(html)
  end
  delegate :eos?, :scan, :[]
  def scan
    until eos?
      if scan(/<(\w+)/)
        yield self[1]
      ...
  end
end
```

# Less Code

```
class HTML
  def initialize html
    @scanner = StringScanner.new(html)
  end
  delegate :eos?, :scan, :[]
  def tokenize
    until eos?
      if scan(/<(\w+)/)
        yield self[1]
      ...
  end
end
```

# Less Code

```
class HTML < StringScanner
  def initialize html
    super
  end

  def tokenize
    until eos?
      if scan(/<(\w+)/)
        yield self[1]
      ...
  end
end
```

# Less Code

```
class HTML < StringScanner
  def tokenize
    until eos?
      if scan(/<(\w+)/)
        yield self[1]
      ...
  end
end
```

# General Ideas

Ruby

- embrace the core libraries
- write less code
- write for the interpreter

```
out = Encoder.new.encode Scanner.new(in)
```

- Scanner: simple, 9 rules
- Encoder: does nothing

# Single Core

```
out = Encoder.new.encode Scanner.new(in)
```

- Scanner: simple, 9 rules
- Encoder: does nothing

| | |
|---|---|
| sonic™ | 21.2 |
| jruby | 42.3 |
| 1.9 | 72.4 |

# Multicore

```
threads = []

in.lines.each_slice 300_000 do |lines|
  threads << Thread.new do
    chunk = lines.join
    Thread.current[:out] = Encoder.new.encode Scanner.new chunk
  end
end

threads.each(&:join)

out = threads.map { |thread| thread[:out] }.join
```

| | |
|---|---|
| sonic™ | 21.2 |
| jruby | 26.5 |
| 1.9 | 74.4 |

# Multicore

```ruby
threads = []
chunk_offsets = [0]
in.lines.each_slice slice_size do |lines|
  chunk_offsets << chunk_offsets.last + lines.join.bytesize
end

chunk_offsets.each_cons(2) do |this_chunk, next_chunk|
  threads << Thread.new do
    chunk = code[this_chunk...next_chunk]
    Thread.current[:out] = Encoder.new.encode Scanner.new chunk
  end
end

threads.each(&:join)

out = threads.map { |thread| thread[:out] }.join
```

| | |
|---|---|
| sonic™ | 21.2 |
| jruby | 24.2 |
| 1.9 | 73.6 |

# Multicore

```
threads = []
chunk_offsets = [0]
in.lines.each_slice slice_size do |lines|
  chunk_offsets << chunk_offsets.last + lines.join.bytesize
end

chunk_offsets.each_cons(2) do |this_chunk, next_chunk|
  threads << Thread.new do
    chunk = code[this_chunk...next_chunk]
    Thread.current[:out] = Encoder.new.encode Scanner.new chunk
  end
end

threads.each(&:join)

out = threads.map { |thread| thread[:out] }.join
```

| | |
|---|---|
| input | 160 MB |
| join | 793 MB |
| offset | 440 MB |

# MORE MULTICORE

```
threads = []
chunk_offsets = [0]
in.lines.each_slice slice_size do |lines|
  chunk_offsets << chunk_offsets.last + lines.join.bytesize
end

chunk_offsets.each_cons(2) do |this_chunk, next_chunk|
  threads << Thread.new do
    chunk = code[this_chunk...next_chunk]
    Thread.current[:out] = Encoder.new.encode Scanner.new chunk
  end
end

threads.each(&:join)

out = threads.map { |thread| thread[:out] }.join
```

| | |
|---|---|
| sonic™ | 21.2 |
| 2 cores | 24.2 |
| 4 cores | 17.6 |

# Questions?

not allowed:

- When will CodeRay 1.0 be released?

# Thank you!

- @euruko
- @yukihiro_matz
- @bovensiepen
- @heinz_gies
- my girlfriend