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RubyConf 2024

# Fifty Years of Ruby

**Craig Buchek**

@CraigBuchek

*“The best way to predict the future is to invent it.”*

— Alan Kay



1971

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1993


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1968


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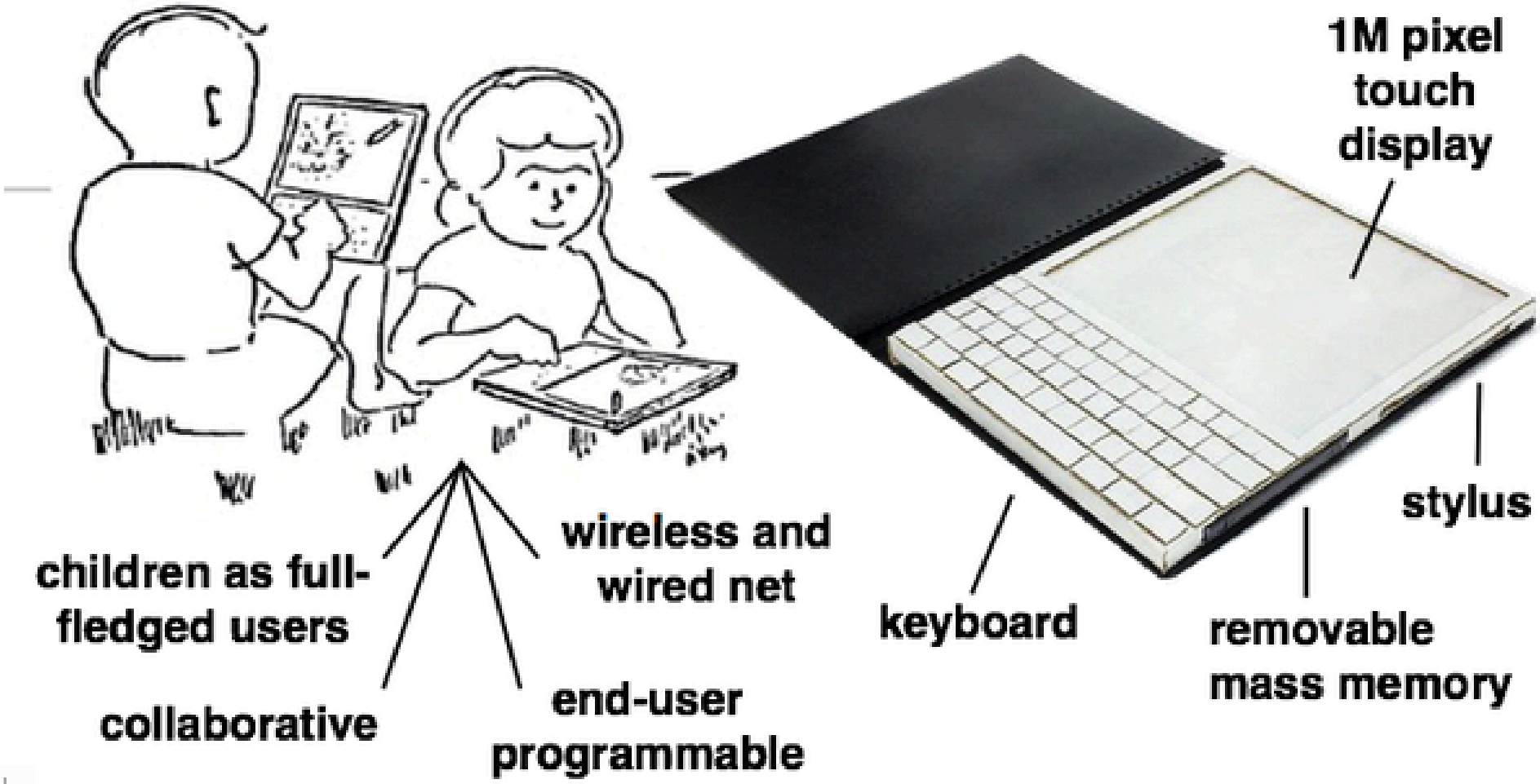
# The First Dynabook Idea – Fall 1968

## Alan Kay

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A Xerox Company
3333 COYOTE HILL ROAD
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1969

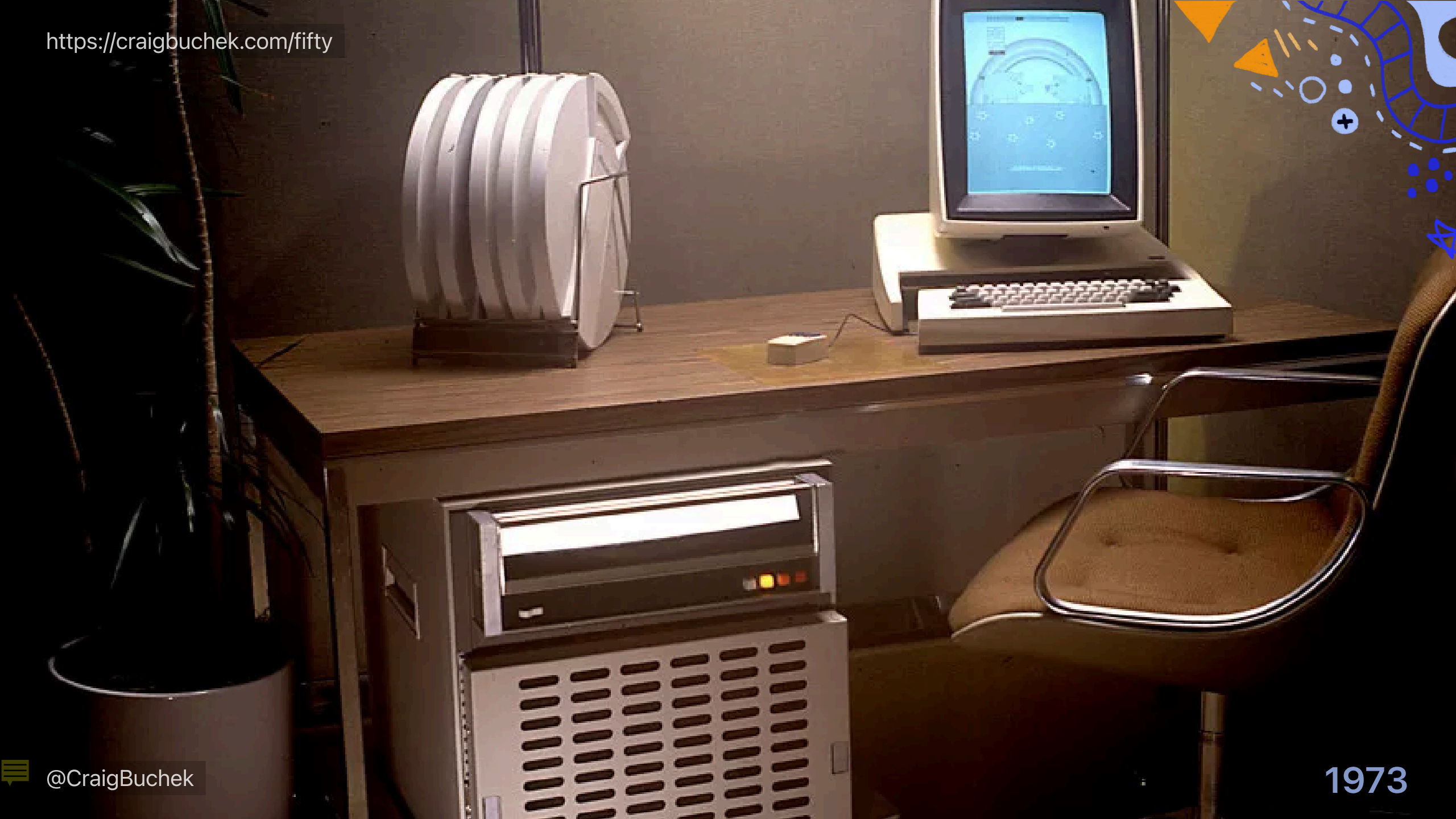
# Smalltalk-72

```
to box b | x y size tilt "x, y, size, tilt are instance variables"
  (ISNEW   »    (SELF undraw. 'size ← size + :. SELF draw. ⇑SELF)
  ☙draw    »    (😀 place x y turn tilt. square size.)
  ☙undraw  »    (😀 white. SELF draw. 😀 black)
  ☙turn    »    (SELF undraw. 'tilt ← tilt + :. SELF draw)
  ☙size    »    (⇑size))

to square size
  (poly 4 size)

to poly sides size
  (👉sides ← :. 👉size ← :.
    do sides (😀 go size turn 360/sides))

👉mybox ← box 0 0 50 0
mybox turn 45  "redraw box turned 45°"
```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1973

# Smalltalk-76

```
Class new title: 'Point';
    fields: 'x y'. "Cartesian coordinates"

"Access to fields"
x [⇑x]
y [⇑y]
x: x y: y

"Testing"
≤pt  "return true if I am below/1eft of pt"
    [⇑x≤pt x and: y≤pt y]

"Point arithmetic"
+ pt [⇑Point new x: x+pt x y: y+pt y]
- pt [⇑Point new x: x-pt x y: y-pt y]
* scale [⇑Point new x; x*scale y: y*scale]
```

# Smalltalk-80

```
x := OrderedCollection with: 1 with: 2 with: 3.
x addFirst: 0.
x select: [:a | a > 1].  "result: #(2 3)"
x collect: [:a | a * a]. "result: #(0 1 4 9)"

Object subclass: #MessagePublisher
    instanceVariableNames: ''
    classVariableNames: ''
    category: 'Smalltalk Examples'
publish
    Transcript show: 'Hello, World!'
multiply: i1 and: i2 by: n
    | mul |
    mul := i1 * i2.
    ^mul * n  "Return i1 * i2 * n"
```

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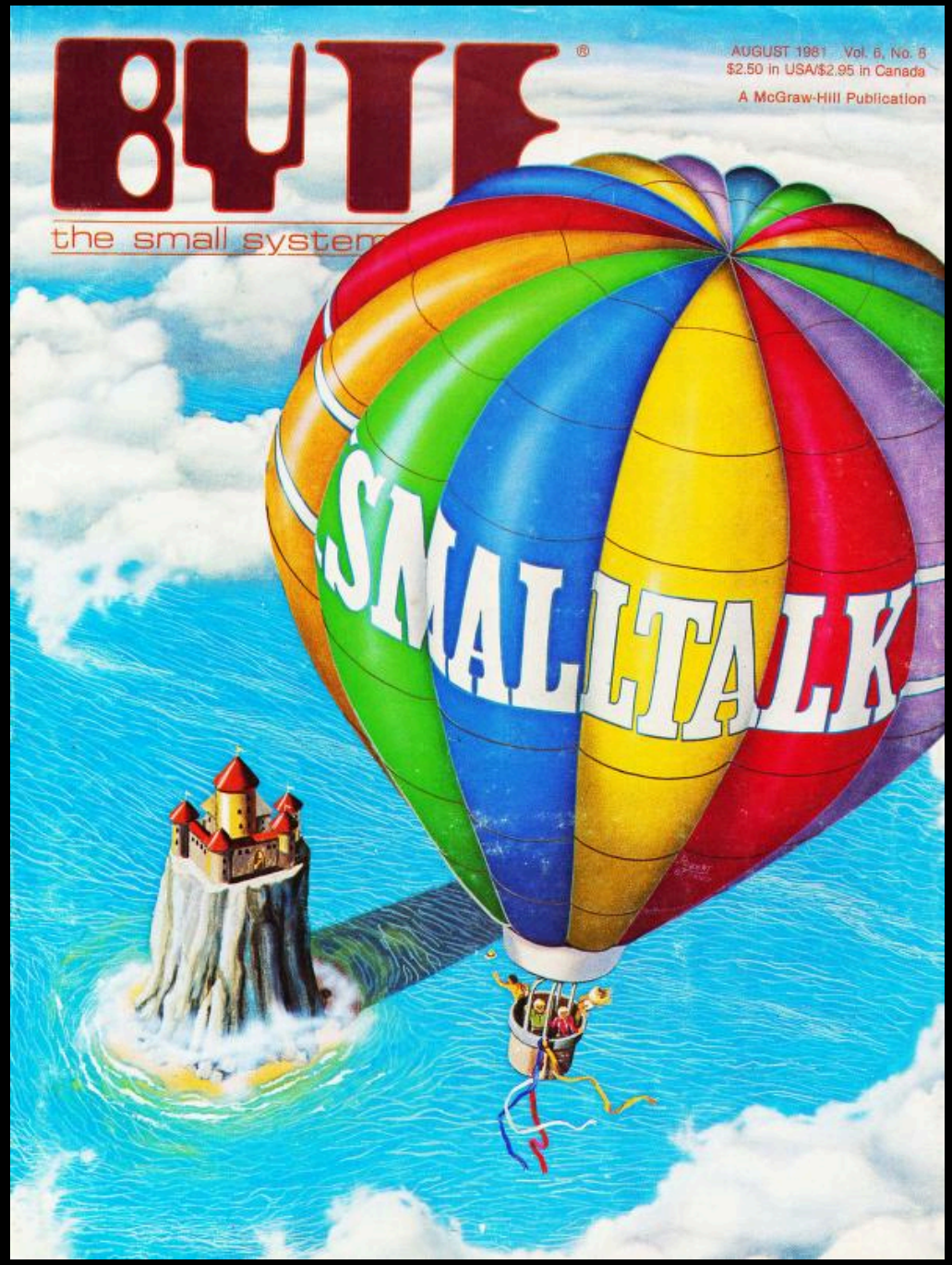


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1981

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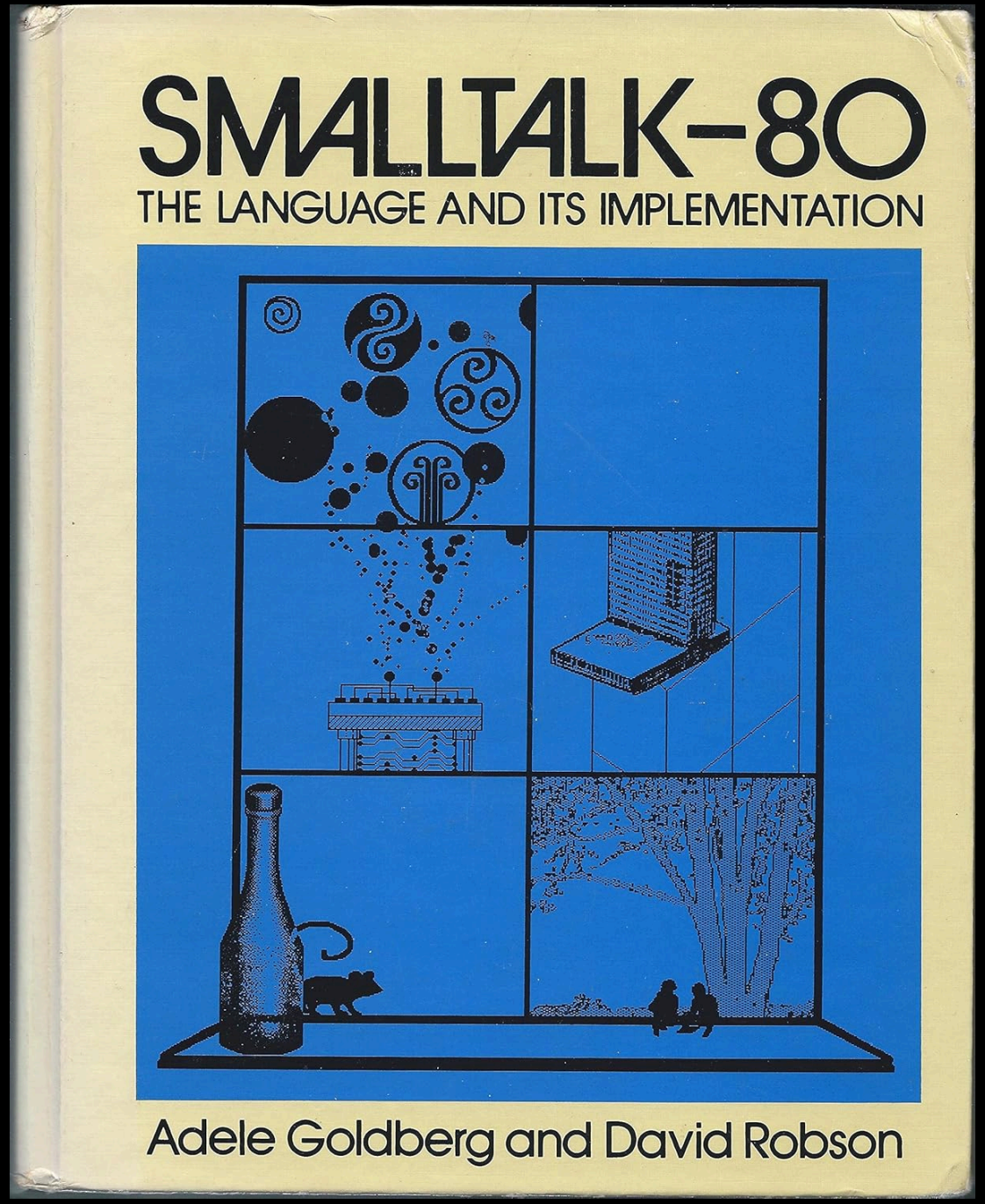


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1983

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1984

# Perl 4

```
@numbers = (1, 2, 3, 4, 5);
$total = 0;
foreach $num (@numbers) {
    $total += $num;
}
print "Sum: $total\n";

$filename = "sample.txt";
open(FILE, $filename) || die "Cannot open $filename\n";
while ($line = <FILE>) {
    print $line;
}
close(FILE);

%ages = ("Alice" => 30, "Bob" => 25);
print "Alice is $ages{'Alice'} years old.\n";
```

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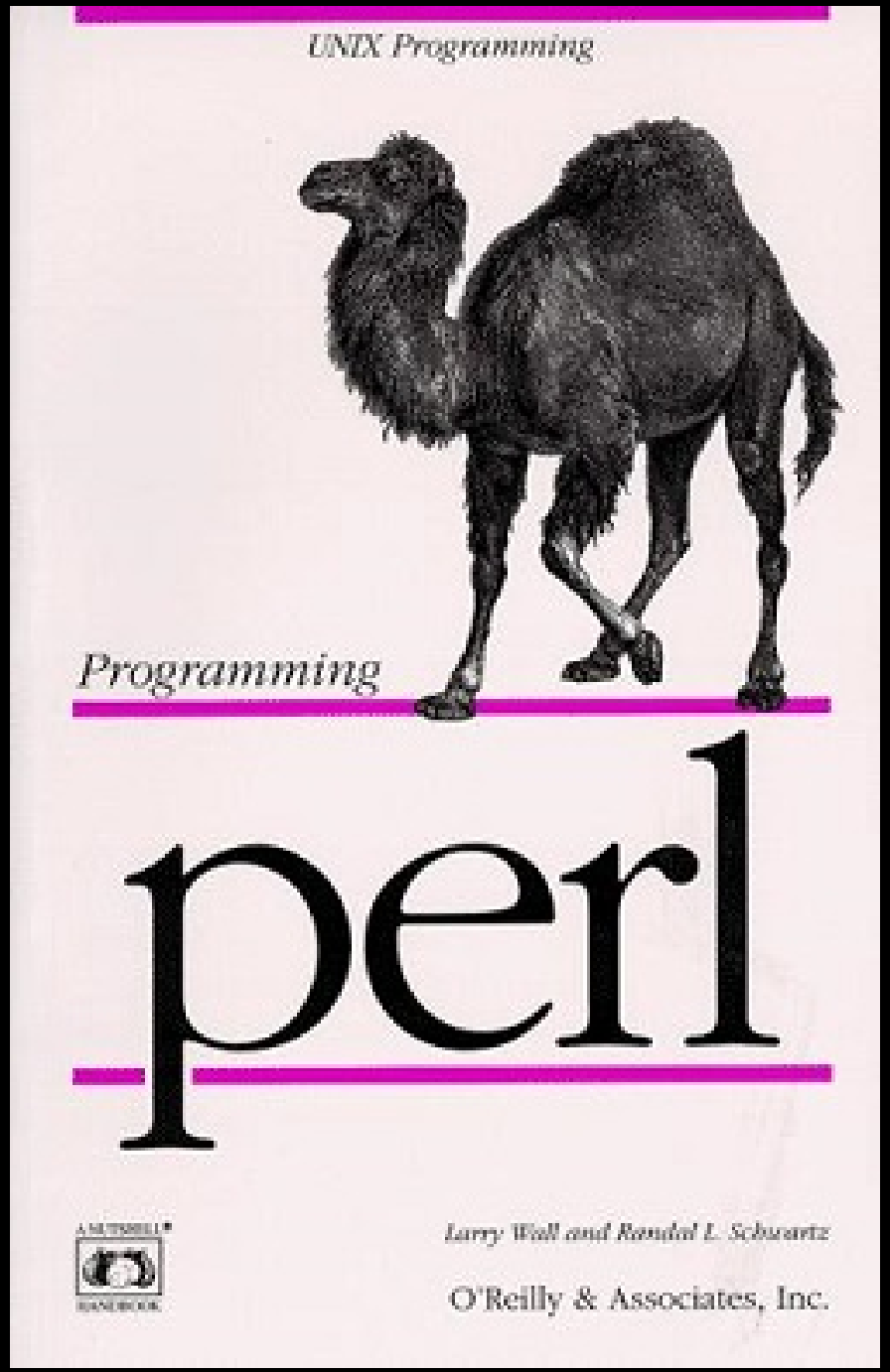


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1991

# Pre-release Ruby

```
keiju> By the way, do you have considered the name of the language?
matz> Well, Tish, if it's like shell enough.
matz> But I want a smarter name.
keiju> Toilet paper?
...
keiju> ruby
keiju> a jewelry name after all
matz> why jewel's name?
keiju> perl
matz> I see
keiju> But, perl is related to a shell.
...
matz> What is your best up to now?
keiju> I'm content with coral.
matz> I thought ruby is cool as a codename, isn't it
keiju> Well. Ruby is also good.
```

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# Ruby 0.95


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1995

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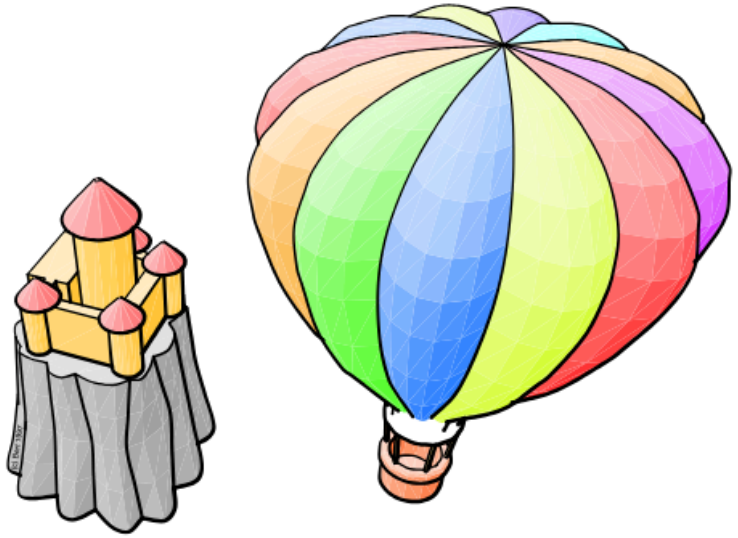


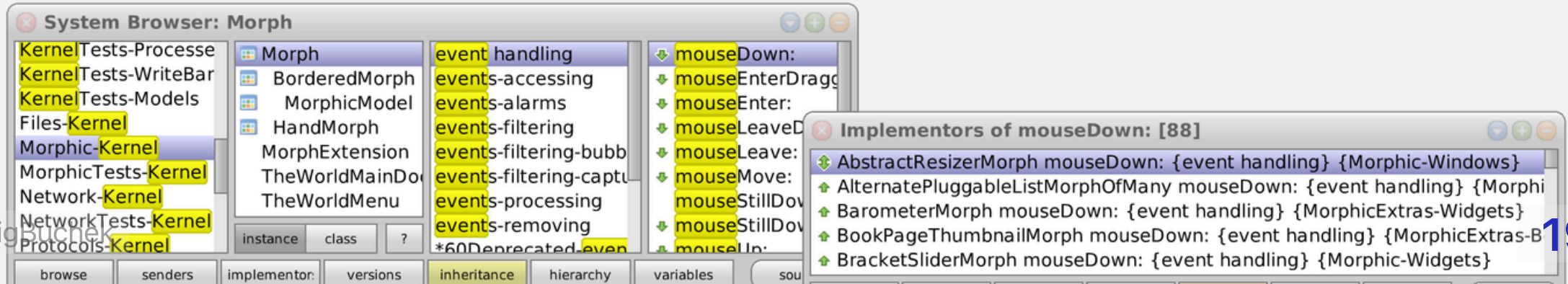
## Welcome to Squeak/Smalltalk

Squeak is a modern, open-source Smalltalk programming system with fast execution environments for all major platforms. It features the Morphic framework, which promotes low effort graphical, interactive application development and maintenance. Many projects have been successfully created with Squeak. They cover a wide range of domains such as education, multimedia, gaming, research, and commerce.

macOS Windows (x64 Linux (x64)

All-in-One · Linux (ARMv8) · Release Notes · More...

Engage Bugs Gifts Donate

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1996

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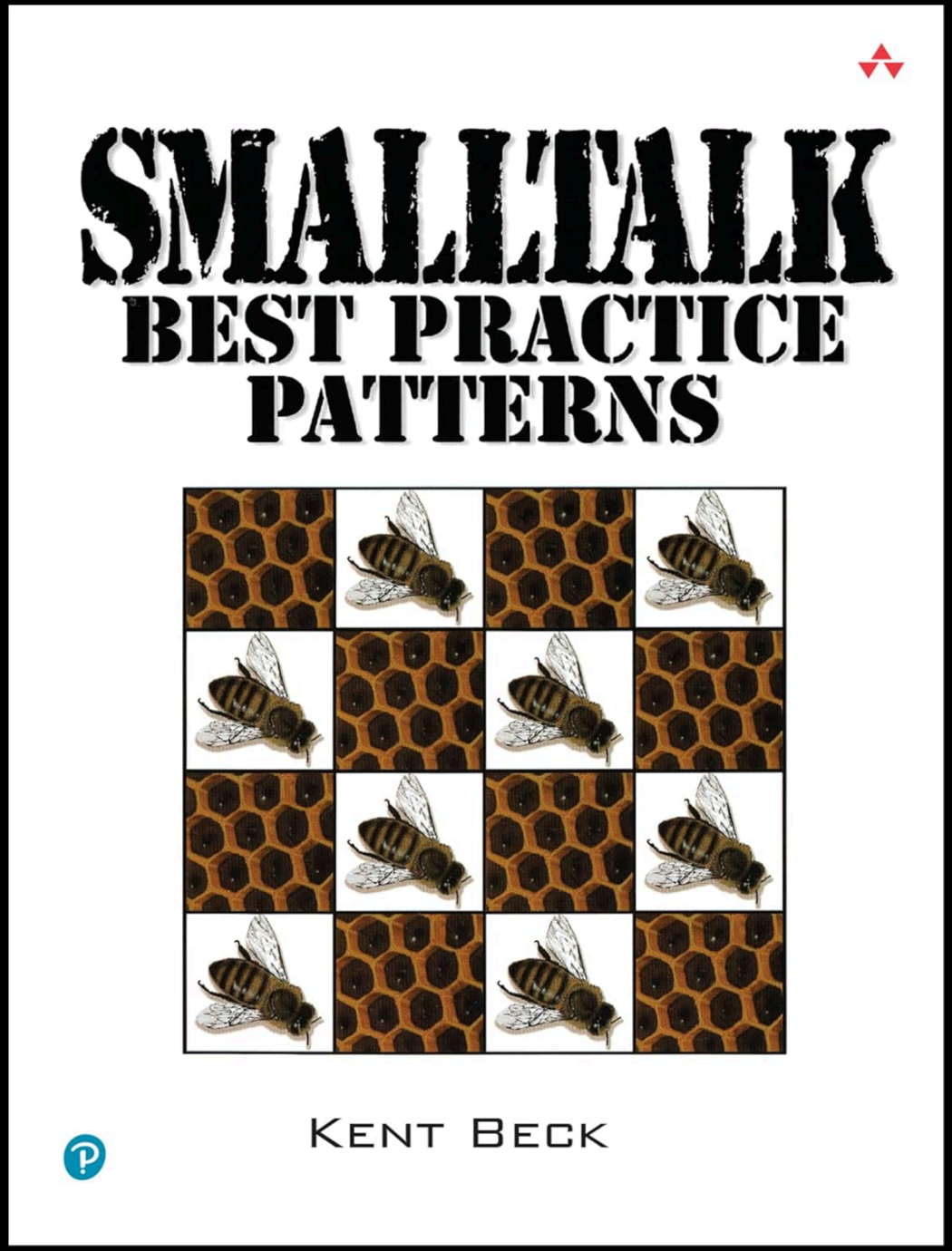


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1996

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# Ruby 1.0

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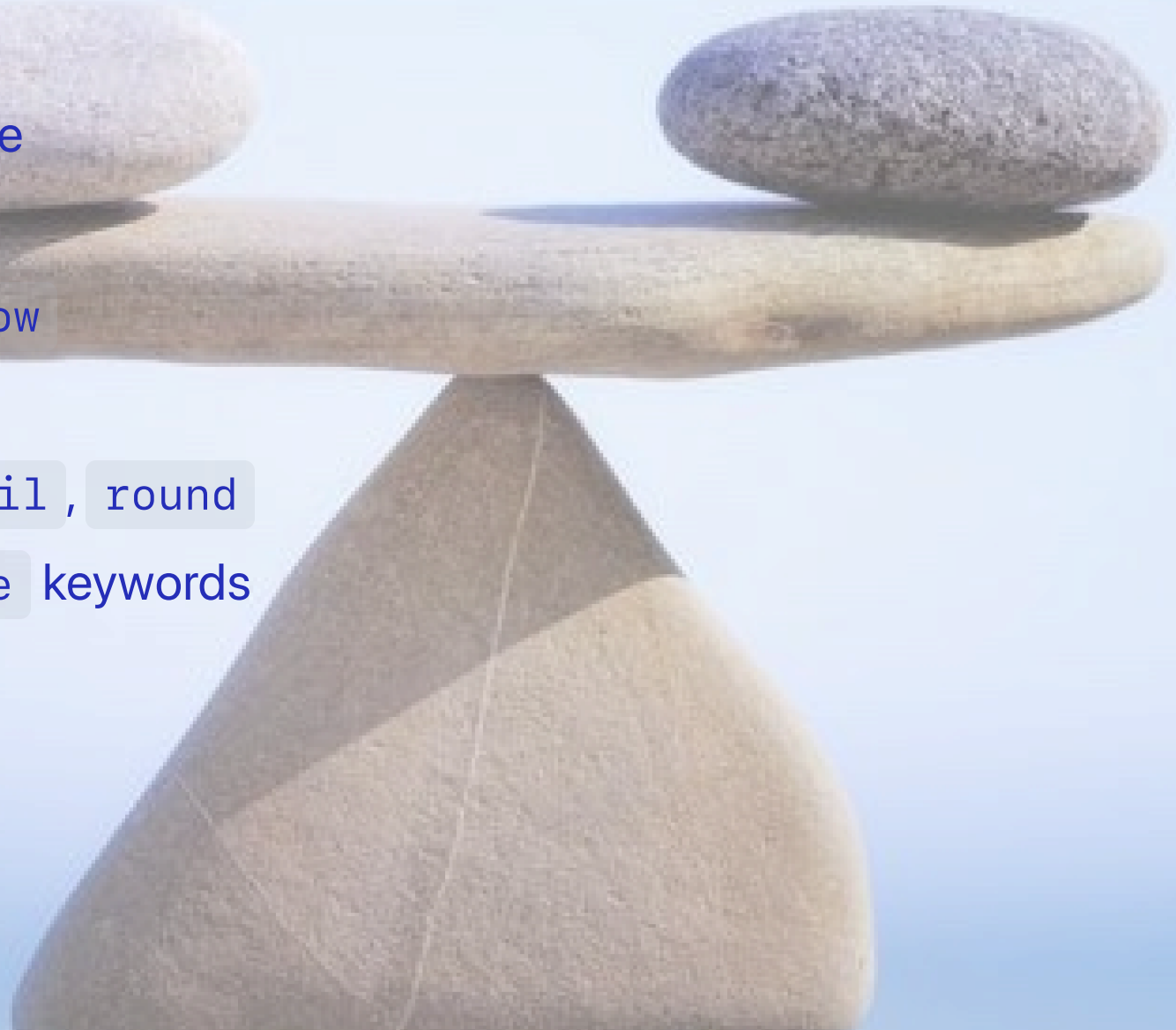
1996

# Ruby 1.2



- First stable release
- `defined?`
- `catch` and `throw`
- `&&=` and `||=`
- Float `floor`, `ceil`, `round`
- `true` and `false` keywords



1998

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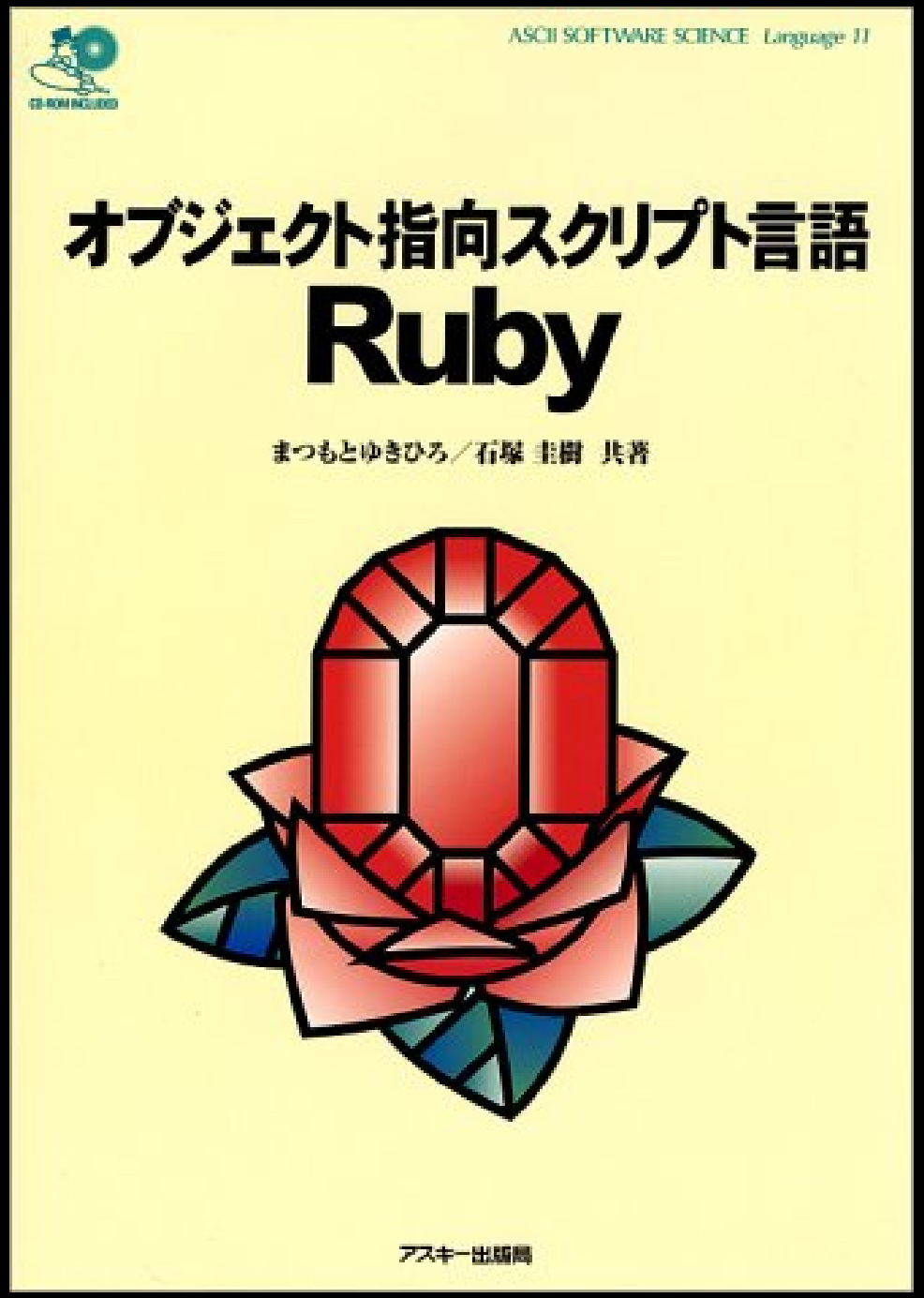


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1999

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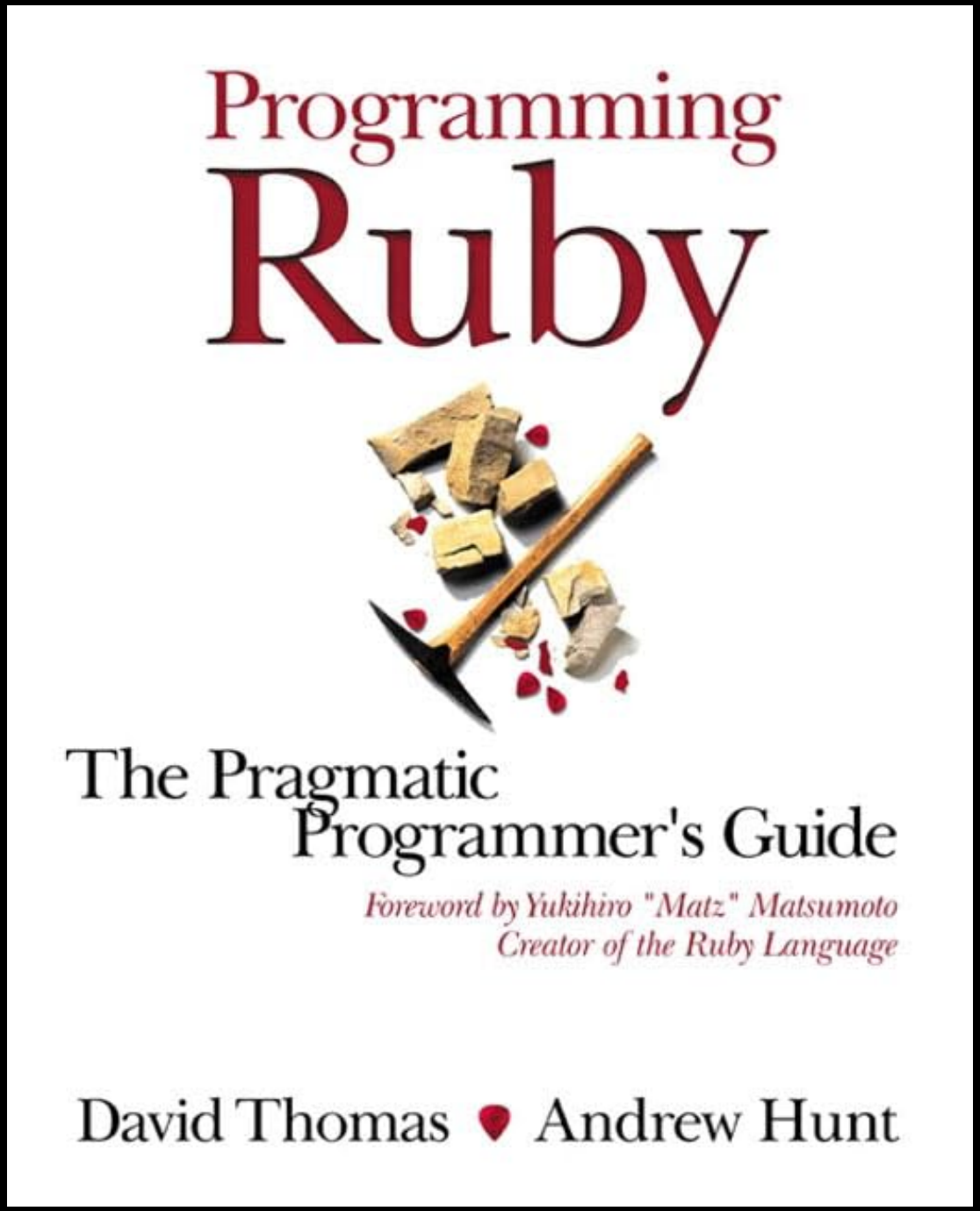




2000

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2001

# JRuby

- Runs on JVM
  - Faster
  - Java interoperability
  - Java libraries
- Jan Arne Petersen
- Charles Nutter
- Thomas Enebo

# Ruby 1.8

- Expression interpolation in strings
- Enumerable `all?`, `any?`
- Enumerable `inject`
  - Later renamed `reduce`
- Net::HTTP breaking changes
- Libraries (lots!)
- Hooks

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RAILS

2004

# Groovy

- JVM
- Concise syntax
- Dynamic typing
- Meta-programming
- DSLs
- Grails (2006)

```
languages = ["Ruby", "Java"]
languages << "Groovy"
languages.each { println "Language: $it"}

def say(msg = 'Hello', name = 'world') {
    "$msg $name!"
}
say
say()
say 'Hello'

class Test implements GroovyInterceptable {
    def sum(Integer x, Integer y) { x + y }
    def invokeMethod(String name, args) {
        System.out.println "Invoke method $name with args: $args"
    }
}
def test = new Test()
test?.sum(2,3)
test?.multiply(2,3)

class Foo {
   def propertyMissing(String name) { name }
}
def f = new Foo()
assert f.boo == "boo"
```

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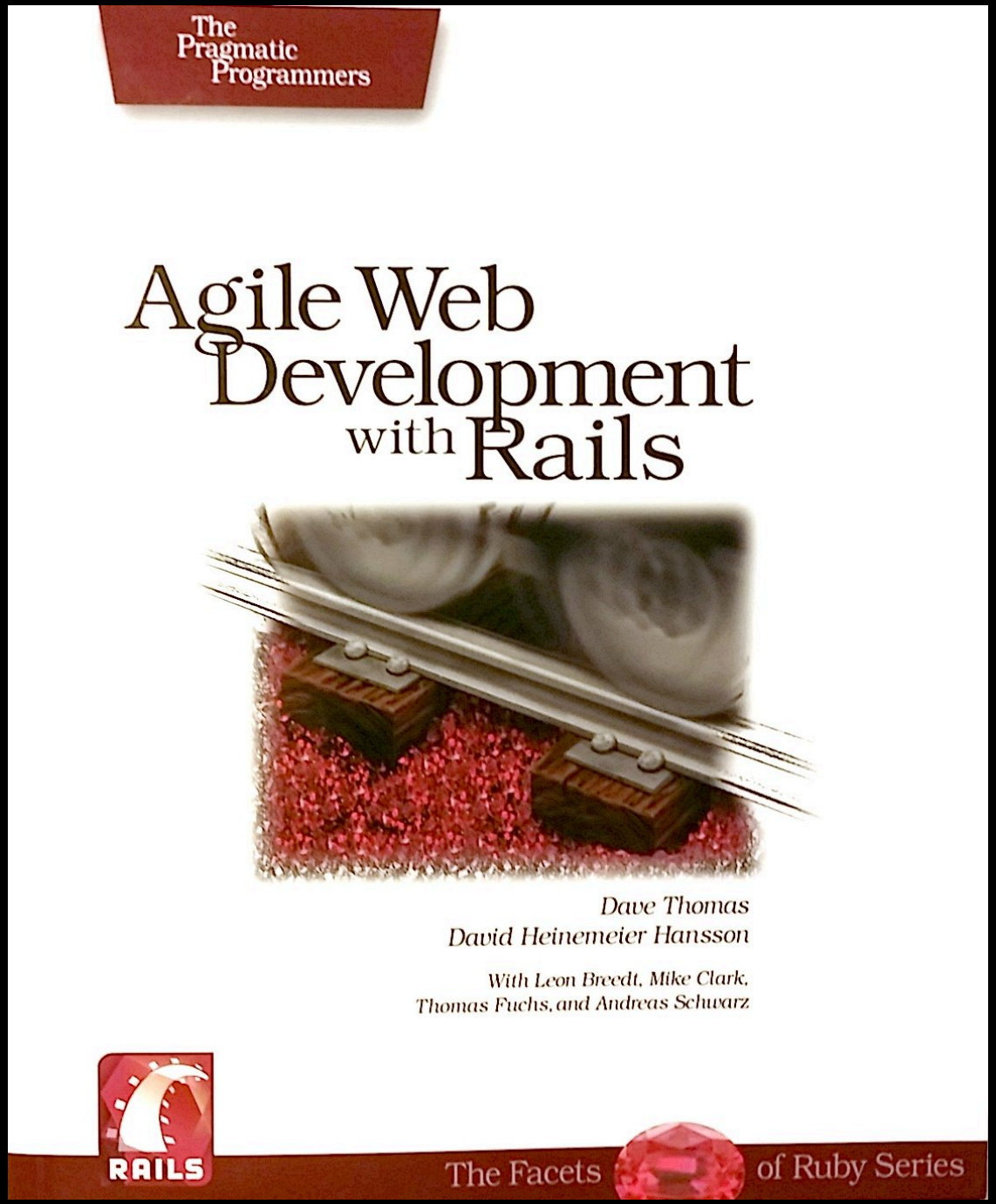


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2005


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2007

# Ruby was a rediscovery of Smalltalk

# Ruby 1.9

- YARV interpreter
- "Stabby" lambda
- Hash colons
- RubyGems
- Variables scoped to blocks
- Compatibility issues!

```
f = ->(a,b) { puts a + b }

has_rockets = { :a => 1, :b => 2 }
has_colons = { a: 1, b: 2 }
has_colons == has_rockets

def foo
  1.times { x = 2 }
  puts x # Worked in 1.8; NameError in 1.9
end
```

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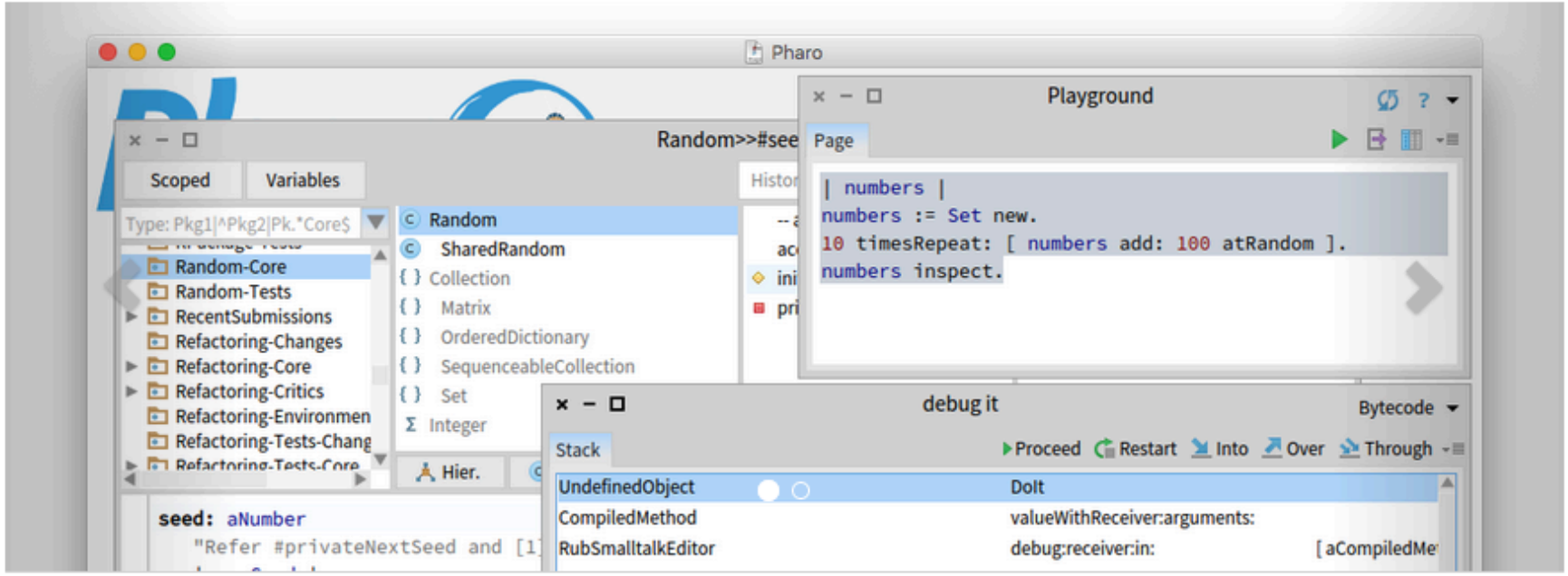
# Pharo

## The immersive programming experience

Pharo is a pure object-oriented programming language *and* a powerful environment, focused on simplicity and immediate feedback (think IDE and OS rolled into one).

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2008

# Rubinius

- Written in Ruby
- Evan Phoenix
- Based loosely on Smalltalk-80 blue book



2008

# Elixir

- FP
- Ruby-like syntax
  - DSLs
- Erlang VM
- Concurrency
  - Lightweight threads
- Fault tolerance
- Scalability
- Meta-programming

```elixir
def hello(nil), do: IO.puts "Hello, Stranger!"
def hello(name) do
  IO.puts "Hello, " ++ name ++ "!"
end

defmodule User do
  defstruct name: nil, email: nil
end
craig = %User{ name: "Craig", email: "craig@example.com" }
craig = %{ craig | email: "craig@new-address.com" }

defmodule Math do
  def sum([]), do: 0
  def sum([head | tail]), do: head + sum(tail)
end

[1, 2, 3, 4]
    |> Enum.map(&(&1 * 2))
    |> Enum.filter(&(&1 > 4))
    |> Enum.sum()
```

# TruffleRuby

- Chris Seaton
- Fork of JRuby
- Graal JIT and VM

# Ruby 2.0 (and 2.1)

- Keyword arguments
- UTF-8
- Refinements (experimental)
- `def` now returns a symbol
- Rational literals

```ruby
def foo(bar: 1)
  bar
end
def foo_old(*options) # Ruby < 2.0, we had to do:
  options[:bar] || 1
end

module M
  refine String do
    def reverse
      "reversed: #{super}"
    end
  end
end
using M
"hello".reverse # prints "reversed: olleh"

def bar(); end == :bar
private def baz(); end

1 // 2 == Rational(1, 2)
```

# Crystal

- Effectively compiled Ruby
- Lose some meta-programming
- Typed, but minimal type hints
- Nil checking
  - No nil errors at runtime!
    - Eliminates class of bugs
- Fast
- Decent community/libraries

```
i = [] of Int32;

def maybe_upcase(name : String?)
  # Compile-time error: 'name' is a 'String?', not a 'String'
  name.upcase
end

module Property
  macro property(name, type)
    def {{name.id}}
      @{{name.id}} : {{type}}
    end
    def {{name.id}}=(value : {{type}})
      @{{name.id}} = value
    end
  end
end

struct User
  extend Property
  property name, String
  property age, Int32?
  def initialize(@name : String, @age : Int32? = nil); end
end
craig = User.new(name: "Craig")
```

# MRuby

- Lightweight Ruby implementation
- Embeddable
  - Easily called from C
- No standard library
  - Only core library
- Can't override some core classes

# Ruby 2.2

- Incremental garbage collector
- Performance improvements

# Rust

- Fast and memory-efficient
- Low-level
- Embedded
- Borrow checker
  - Ownership of mutable values
  - Eliminates a class of bugs

```rust
let numbers = vec![1, 2, 3, 4];
let sum: i32 = numbers
    .iter()
    .map(|x| x * 2)
    .filter(|x| x > &4)
    .sum();

fn divide(a: f64, b: f64) -> Result<f64, String> {
    if b == 0.0 { Err("Cannot divide by zero".to_string()) }
    else { Ok(a / b) }
}
match divide(10.0, 0.0) {
    Ok(result) => println!("Result: {}", result),
    Err(err) => println!("Error: {}", err),
}

let mut s = String::from("hello");
let len = calculate_length(&message); // Immutable borrow
let r1 = &mut message; // Mutable borrow
let r2 = &mut message; // Compile error! Can't mutable borrow twice
```

# Ruby 2.3

- Safe navigation operator: `&.`
- `dig`
- Performance improvements

# Ruby 2.4

- Unify Fixnum and Bignum into Integer
- Performance improvements

# Ruby 2.5

- `rescue`, `ensure` don't require `begin`, `end`
  - can use surrounding block

```ruby
# Ruby 2.5
def foo
  f = File.open("file")
  raise "error"
rescue
  "rescued"
ensure
  f.close
end

# Ruby < 2.5
def foo
  begin
    f = File.open("file")
    raise "error"
  rescue
    "rescued"
  ensure
    f.close
  end
end
```



2017

# Ruby 2.6

- MJIT (experimental)
- Bundler included
- Endless ranges
- Function composition operators
  - `<<` and `>>`
- `then`

```ruby
"My long string"[8..]  # => "string"

f = proc{|x| x + 2}
g = proc{|x| x * 3}
(f >> g).call(3)  # Same as g(f(3))
(f << g).call(3)  # Same as f(g(3))

def filter_by_status(posts)
  return posts unless @status
  posts.where(status: Post.statuses[@status])
end

def order(posts)
  posts.order('published_at DESC')
end

Post.all
  .then(&method(:filter_by_status))
  .then(&method(:order))
```

# Ruby 2.7

- Pattern matching (experimental)
  - `case` `in`
- Numbered block parameters
  - `_1`, `_2`, `_3`, etc

```ruby
people = [
    { name: "Craig", age: 53, children: []},
    { name: "Alice", age: 30, children: [
        { name: "Bob", age: 2 }
    ]}
]
people.each do |person|
  case person
    in {name: name, children: [{name: child, age: age}]}
      p "#{name} has a #{age}-year-old named #{child}"
    in {name: name, children: []}
      p "#{name} has no children"
  end
end

[1, 2, 3].each { puts _1 }
```

# Ruby 3.0

- 3x3 performance improvements
  - 3 times faster than Ruby 2.0
  - JIT
- `end`-less method definition
- Ractors
  - Experimental
- RBS static analysis
- One-line pattern matching
  - Experimental

```ruby
def raise_to_power(number, power) = number ** power

receiver = Ractor.new do
  message = Ractor.receive
  puts "received message is #{message}"
end
receiver.send("Hi!")  # prints received message is Hi!"
received message is Hi!

sender = Ractor.new do
  message = 'Hi!'
  Ractor.yield(message)
end
sender.take  # => "Hi!"
```

# Ruby 3.1

- Hash and keyword argument shorthand
- YJIT (experimental)
- `debug` gem (`rdbg`)
- `error_highlight` gem
- IRB autocomplete
- Pattern matching improvements
  - Pin operator (^)
- TypeProf

```ruby
{x:, y:} == {x: x, y: y}
foo(x:, y:) == foo(x: x, y: y)

prime_pairs = Prime.each_cons(2).lazy
prime_pairs.find_all{_1 in [n, ^(n + 2)]}.take(3).to_a
#=> [[3, 5], [5, 7], [11, 13]]
```

# Ruby 3.2

- Data class
  - immutable value objects
- WebAssembly
- YJIT rewrite
  - C -> Rust
  - no longer experimental

```ruby
class Person < Data.define(:name, :age) do
  def initialize(name:, age:)
    super(name: name.to_s.capitalize, age: age.to_i)
  end
end
craig = Person.new(name: "craig", age: "53")
```

# Ruby 3.3

- Prism parser
  - Not default yet
- RJIT: pure Ruby JIT compiler
- IRB improvements

# Ruby 3.4

- Prism parser by default
- Mutating string literals deprecated
- `it` as block parameter

```
[1, 2, 3].each { puts it }
```

# Newer Ruby Features

- Refinements
- Data classes
- Pattern matching
- Concurrency
- Immutable objects

# Ruby's Future

- Ruby will still get new features
  - Innovations
  - Borrowing/stealing
- Ruby will last a long time
- Something will replace Ruby

# Ideas for Ruby's Future

- Ruby 4.0: To Infinity and Beyond
  - Bozhidar Batsov
- What If...?: Ruby 3
  - Eric Weinstein
- Steal This Talk: The Best Features Ruby Doesn't Have (Yet)
  - John Feminella
- Compiling Ruby
  - Kevin Deisz
- Keynote: Beyond Ruby 3.0 (RubyConf 2021)
  - Yukihiro Matsumoto

# Take-aways

- Good solutions are rediscovered
- Ruby will last a long time
- Ruby will still get new features
- Something will replace Ruby
- TBD

*“A change in perspective is worth 80 IQ points.”*

— Alan Kay

*“The best way to predict the future is to invent it.”*

— Alan Kay



1971

# Thank You

- Attendees
- Viewers
- RubyConf organizers
- People that gave me feedback
  - **Noel Rappin**
  - **Kerri Miller**

# Come talk to me!

Ask me about:

- This talk (or others)
- Yoga
- Agile
- Job interviews

Tell me about:

- This talk (or others)
- Principal Engineer jobs
  - https://resume.CraigBuchek.com
- Hexagonal Architecture
- Cool language features

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