Ruby for .NET Programmers

Venkat Subramaniam

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spkr.name = 'Dr. Venkat Subramaniam'
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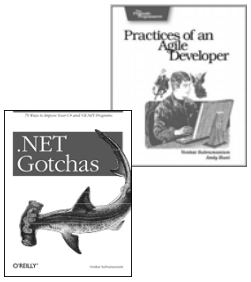
```



Guest on dnrTV!

Abstract

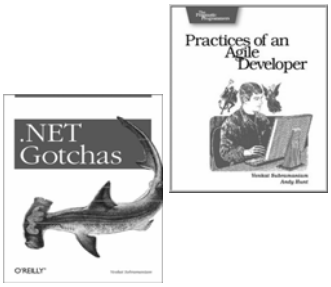
Abstract Object-oriented scripting languages, or agile dynamic languages, as some like to call those, are gaining programmers' attention. Ruby is gaining popularity and acceptance due to it expressive power. The language is light and simple. The dynamic nature allows you to express some constructs that are generally harder in so called strongly typed languages (C++, Java, C#) must easier in Ruby. In fact, Microsoft is actively working some of the Ruby features into future versions of C#, and is keen on making the CLR support dynamic typing. Learning Ruby is critical even if you don't intend to use it directly. It helps you stay ahead.

We will take an example driven approach to look at interesting features and strengths of Ruby, and also discuss some of the weaknesses as well. We will also take a look at Ruby .NET bridge and discuss some of the .NET specific dynamic language initiatives.

About the Speaker *Dr. Venkat Subramaniam*, founder of Agile Developer, Inc., has trained and mentored thousands of software developers in the US, Canada, Europe, and India. He has significant experience in architecture, design, and development of software applications. Venkat helps his clients effectively apply and succeed with agile practices on their software projects, and speaks frequently at conferences.

He is also an adjunct faculty at the University of Houston (where he received the 2004 CS department teaching excellence award) and teaches the professional software developer series at Rice University School of continuing studies.

Venkat has been a frequent speaker at No Fluff Just Stuff Software Symposium since Summer 2002.



Ruby For .NET Programmers

- What's Ruby
- Related C# 2.0 features
- Using Ruby and .NET
- C# 3.0 and beyond
- Conclusion

What's Ruby

- Power of dynamic language
  - Dynamic, agile, OO
  - Derives strengths of Perl, Smalltalk, Python
  - Elegant
- Alternative to Java/C++/C# for small/medium size projects
- Serves to write small additional tasks on a project
- Great to write unit tests with
- Can take care of all those "side" projects/tasks you need to get done

History

- Created by Yukihiro Matsumoto (Matz) in 1993
- Slowly being accepted in the west
- Popularized by some key players in the industry
- Gaining strength in various applications
  - Ruby-On-Rails (ROR)

Tools

- Ruby interpreter

- Comes with FreeRIDE IDE
- Mondrian IDE
- Command line and Notepad(2) works great as well!
  - The following blog entry shows you how
  - **http://tinyurl.com/as8z7**

Documentation

- ri

```
C:\workarea\RubyExamples>ri Date.today
------------------------------------------------------- Date::today
     Date::today(sg=ITALY)
------------------------------------------------------------------------
     Create a new Date object representing today.

     +sg+ specifies the Day of Calendar Reform.
```

```
C:\workarea\RubyExamples>ri Date
---------------------------------------------------------- Class: Date
     Class representing a date.

     See the documentation to the file date.rb for an overview.

     Internally, the date is represented as an Astronomical Julian Day
     Number, +ajd+. The Day of Calendar Reform, +sg+, is also stored,
     for conversions to other date formats. (There is also an +of+ field
     for a time zone offset, but this is only for the use of the
     DateTime subclass.)

     A new Date object is created using one of the object creation class
     methods named after the corresponding date format, and the
     arguments appropriate to that date format; for instance,
     Date::civil() (aliased to Date::new()) with year, month, and
     day-of-month, or Date::ordinal() with year and day-of-year. All of
     these object creation class methods also take the Day of Calendar
     Reform as an optional argument.

     Date objects are immutable once created.

     Once a Date has been created, date
```

- RDoc at http://www.ruby-doc.org

Less Clutter

- Code less, do more
- C#:

```
public class Hello
{
    public static void Main(String[] args)
    {
        Console.WriteLine("Hello");
    }
}
```

- Ruby

```
puts 'Hello'
```

Variables

- Dynamic typing

```
x = 1
puts x

x = Date.today()

puts x

x = 'test'
puts x
```

- Output:

```
1
2006-02-02
test
```


Types

- Everything is an object

```
puts -1.abs
puts 'test'.capitalize
puts 'HELLO'.downcase
puts 'HELLO'.downcase() # () is optional
puts ('No need for ()')
```

```
1
Test
hello
hello
No need for ()
```

```
puts 1.class

puts 'We start with Bignum and end with Fixnum'
val = 123456789000
6.times do
    puts val.class
    val /= 10
end
```

```
Fixnum
We start with Bignum and end with Fixnum
Bignum
Bignum
Bignum
Fixnum
Fixnum
Fixnum
```

Global and Predefined Variables

- This is hideous
- You may be setting some global variable and not know it (familiarize yourself)
- Some predefs: $_, $0, $$, $&, $!, ...

```
str = gets.chomp
puts str

# or you can do
gets.chomp
puts $_

puts $0
```

```
input1
input1
input2
input2
C:/workarea/RubyExamples/GlobalPredefinedVariables/Predefined.rb
```

```
require 'English'
# Provides descriptive names for
# cryptic predefined variables

puts $0
puts $PROGRAM_NAME
```


Conventions

- Lower case start or underscore
  - Method, parameters, local variables
- Upper case start
  - Class name, module name
- Multiword
  - Instance variables use underscore
  - Class name uses mixed case
- Method names ending with
  - ! Imply sideeffect (modify object)
  - ? Return boolean
  - = set value (can appear as l-value)
- nil is an object that represents nothing
  - nil is false when used in comparison
- $ - global
- @ - instance variable
- @@ - class variable

"" vs '' (Double vs. Single Quotes)

- '' is a simple string
- Expressions within "" are evaluated

```
today = Date.today

puts '#{today}'
puts "#{today}"
```

```
#{today}
2006-02-02
```

- Better to use ' if you don't have expressions

More on Strings

```
str1 = ['This', 'is', 'an', 'array', 'of', 'strings']
str2 = %w{and this one is array too}

puts str1.length
puts str2.length

str3 = %Q/You can write a string "like" this/
str4 = %q~or like this one. The char next to %q is the delimiter~

puts str3
puts str4
puts %q[This too]
puts %q(and this)
puts %q!It is #{Time.now}!
puts %Q!It is #{Time.now}!

str5 = <<REALLY_DONE
whatever string you
want to write, keep writing until you
are REALLY_DONE.
REALLY_DONE
#Must be on first column. Use <<-REALLY_DONE to indent this

puts str5
```

```
6
6
You can write a string "like" this
or like this one. The char next to %q is the delimiter
This too
and this
It is #{Time.now}
It is Thu Feb 02 08:40:46 Central Standard Time 2006
whatever string you
want to write, keep writing until you
are REALLY_DONE.
```

Writing Class

```
class Car
# default is public
attr_reader :year, :miles, :color
attr_writer :color

    def initialize(year)
        @year = year
        @color = "Red"
        @miles = 0
        @fuel_level = 0
    end

    def fuel=(level)
        @fuel_level = level
    end

    def fuelLevel
        @fuel_level
    end

private
    #...
protected
    #...
public
    def drive()
        @miles += 1
    end

    #...
end
```

```
c1 = Car.new(2006)
puts "Car made in #{c1.year}"
puts "Miles: #{c1.miles}"
c1.drive()
puts "Miles: #{c1.miles}"
puts "Car color: #{c1.color}"
c1.color = "Black"
puts "Car color: #{c1.color}"
puts "Fuel level: #{c1.fuelLevel}"
c1.fuel = 0.5
puts "Fuel level: #{c1.fuelLevel}"
```

```
Car made in 2006
Miles: 0
Miles: 1
Car color: Red
Car color: Black
Fuel level: 0
Fuel level: 0.5
```


Array

```
val = [1, 'test', 2.3]

for aVal in val
    puts aVal
end

puts val[2]

puts val[5]

puts val[5] = 'ha'

print 'Now the list: '
puts val.join(', ')
```

```
1
test
2.3
2.3
nil
ha
Now the list: 1, test, 2.3, , , ha
```

Range

```
str = 'hello'

puts str[1..4]
puts str[0..-4]
puts str[0..-1]
puts str[2..-2]
puts str[2..-4]

puts str
```

```
ello
he
hello
ll

hello
```


Hashes

```
langs = {'C++' => 'Stroustrup', 'Java' => 'Goslin',
    'C#' => 'Hejlsberg', 'Ruby' => 'Matz'}

puts langs['Ruby']

for key, value in langs
    puts key + ":" + value
end

print 'langs[blah] = '
puts langs['blah']

hash = Hash.new(0)
hash['test'] = 'always'

puts "hash[test] = #{hash['test']}"
print 'hash[blah] = '
puts hash['blah']
```

```
Matz
C#:Hejlsberg
C++:Stroustrup
Ruby:Matz
Java:Goslin
langs[blah] = nil
hash[test] = always
hash[blah] = 0
```

if...

```
val = 5

if val > 4
    puts 'hello val is > 4'
end

puts 'haha' if val > 4
```

```
hello val is > 4
haha
```


Writing a function

- def a function just like you would in Java
- No need to return, the value of last statement is returned

```
def countTill(number)
    for i in 1..number
        puts i
    end
end

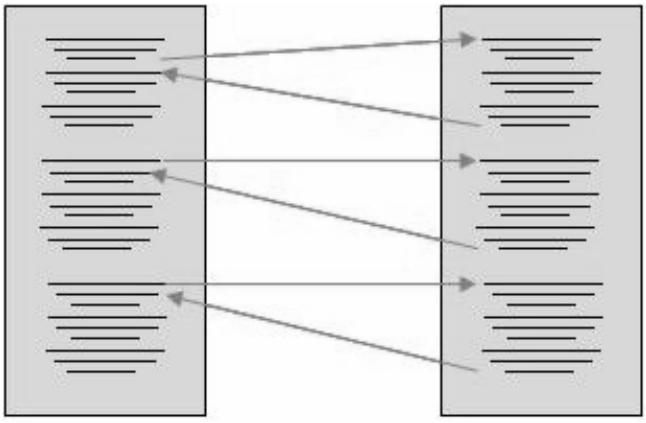
countTill(10)
```

```
1
2
3
4
5
6
7
8
9
10
```

Closures

- An anonymous chunk of code you can invoke
  - take arguments
  - return a value
  - reference and use variables declared in its surrounding scope
- Some what like anonymous inner classes in Java, but more powerful and convenient
- How is this different from a method?
- You directly call a method
- Closure is really cool, it is used for the method you call to call back
- Now we are talking about coroutines

Coroutines



Coroutines with closures

- I have a method that creates even numbers until a given limit
- What do you want to do with these even numbers?
- That is up to you, it depends on what you want to do at the place of call
- So, my method is going to create even numbers, but will yield to your code so you can do something with it

Closures

```
def createEven(number)
    for i in 2..number
        if i % 2 == 0
            yield i
        end
    end
end

#You can simplify above code
#using step method. But, that
#will use what we're trying to
#learn here!

createEven(10) { |val| puts val }

print 'Total of even numbers from 1 to 10 is: '
total = 0
createEven(10) { |i| total += i }
puts total
```

(lots of syntax sugar)

```
2
4
6
8
10
Total of even numbers from 1 to 10 is: 30
```

Closures As Parameter

```
class Pump
    def initialize(&calc)
        @myCalc = calc
    end

    def compute(val)
        @myCalc.call(val)
    end
end

p1 = Pump.new() { |v| puts "Using calc1 to work on #{v}" }

p1.compute(3)
p1.compute(4)

p2 = Pump.new() { |i| puts "I got #{i}"}
p2.compute(3)
p2.compute(4)
```

```
Using calc1 to work on 3
Using calc1 to work on 4
I got 3
I got 4
```


Closures and Collections

```
lst = [1, 2, 3, 1, 8]

print 'Elements in the list are: '
lst.each {|val| print "#{val} " }
puts

puts 'Each element incremented by one:'
puts lst.collect {|it| it + 1 }

print 'Look for val > 3: '
puts lst.find {|it| it > 2 }

puts 'Look for all val > 3: '
puts lst.find_all {|it| it > 2 }

print 'Total of all elements is: '
puts lst.inject(0) {|carryOver, it| carryOver + it }

print 'Total of all elements plus 5 is: '
puts lst.inject(5) {|carryOver, it| carryOver + it }

print 'All elements joined by ~: '
puts lst.join('~')
```

```
Elements in the list are: 1 2 3 1 8
Each element incremented by one:
2
3
4
2
9
Look for val > 3: 3
Look for all val > 3:
3
8
Total of all elements is: 15
Total of all elements plus 5 is: 20
All elements joined by ~: 1~2~3~1~8
```

Accessing File

```
File.open('FileAccess.rb', 'r') do |file|
    file.each_line { |line| puts line}
end
```

```
File.open('FileAccess.rb', 'r') do |file|
        file.each_line { |line| puts line}
end
```


Adding Methods

```
class String
    def greet
        'Hello ' + to_s() + ', pleased to meet you!'
    end
end

bob = "Bob"

puts bob.greet
```

```
Hello Bob, pleased to meet you!
```

Regex

- Very strong support for Regular Expressions
- =~ compares regular expressions

```
str = "It a rainy day in Houston"
puts str

puts 'Take umbrella' if str =~ /rainy/
```

```
It a rainy day in Houston
Take umbrella
```


Unit Testing

```
require 'test/unit'

class TestCode < Test::Unit::TestCase
    def test1
        assert(true)
    end

    def test2
        assert_equal(5, 2+3)
    end
end
```

```
Loaded suite C:/workarea/RubyExamples/UnitTesting/Testing
Started
..
Finished in 0.0 seconds.

2 tests, 2 assertions, 0 failures, 0 errors
```

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Iterator Implementation

```
public IEnumerator<Wheel> GetEnumerator()
{
    foreach(Wheel aWheel in wheels)
    {
        Console.WriteLine("Here within Car");
        yield return aWheel;
    }
}

public IEnumerable<Door> Doors
{
    get
    {
        foreach(Door aDoor in doors)
        {
            yield return aDoor;
        }
    }
}
```

```
Here within Car
Here in main
Wheel 58225482
Here within Car
Here in main
Wheel 54267293
Here within Car
Here in main
Wheel 18643596
Here within Car
Here in main
Wheel 33574638
Door33736294
Door35191196
Door48285313
Door31914638
```

```
Car myCar = new Car();

foreach(Wheel wheel in myCar)
{
    Console.WriteLine("Here in main");
    Console.WriteLine(wheel);
}

foreach(Door door in myCar.Doors)
{
    Console.WriteLine(door);
}
```

Anonymous Delegates

```
public delegate void MyDelegate(double val);

class Service
{
    public event MyDelegate someEvent;

    static void Main(string[] args)
    {
        Service p = new Service();

        p.someEvent += new MyDelegate(MyMethod1);

        p.work();
    }

    public static void MyMethod1(double val)
    {
        Console.WriteLine("MyMethod1 " + val);
    }
```

```
    static void Main(string[] args)
    {
        Service p = new Service();

        p.someEvent += delegate(double val)
        {
            Console.WriteLine("My Anonymous delegate " + val);
        };

        p.work();
    }
```

Agile Developer

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A few implementations

In various stages of development

- Ruby/.NET Bridge - Ben Schroeder, John Pierce
  http://www.saltypickle.com/rubydotnet
- IronRuby – Wilco Bauwer
  http://www.wilcob.com/Wilco/IronRuby.aspx
- Ruby .NET Interop – Thomas Sondergaard
  http://rubydotnet.sourceforge.net/
- Ruby CLR – John Lam
  http://rubyforge.org/projects/rubyclr
- Rubynet
  http://www.plas.fit.qut.edu.au/rubynet/

Unit Testing .NET using Ruby

```
#Test code for Calculator

require 'dotnet'
require 'test/unit'

loadLibraryFromFile '.\bin\Debug\Utility.dll'
#Utility.dll has a Calculator (C#) class with Add method in it

class CalculatorTest < Test::Unit::TestCase
  def test1()
    calc = Calculator.new()

    assert_equal(5, calc.Add(2, 3))
  end
end
```

Using .NET in Ruby

```
require 'dotnet'

lst = ArrayList.new

puts "Count = #{lst.count}"

lst.Add(1)

lst.Add(2)

total = 0
for val in lst
    total += val
end

puts "Total = #{total}"

puts "Count = #{lst.count}"
```


WinForm in Ruby

```
require 'dotnet'

loadLibrary 'System.Windows.Forms'
loadLibrary 'System.Drawing'

form = Form.new

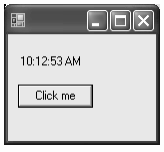
lbl = System.Windows.Forms.Label.new
lbl.Text = "Test..."
lbl.Location = Point.new(10, 20)

button = Button.new
button.Text = "Click me"
button.Location = Point.new(10, 50)
button.add_click(
    proc { lbl.Text = System.DateTime.Now.ToLongTimeString() } )

form.show

form.Controls.Add(button)
form.Controls.Add(lbl)

System.Windows.Forms.Application.Run form
```



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Dynamic Influence

- C# 3.0 (.NET in general) is gaining a number of features from dynamic languages
- Ruby influence can be seen in several places
  - C# 3.0 extension as part of LINQ project
  - Language Integrated Query

Type Inference

- In traditional C# (and other static typed languages) we write
- Program p = new Program();
- List<int> lst = new List<int>();
- You had to say the type several times
- I call these **retarded languages**

Type Inference…

```
class Program
{
    public void foo() { Console.WriteLine("foo called"); }

    static void Main(string[] args)
    {
        // Not quite dynamic typing... This is type inference

        var salary = 100000.00;

        var p = new Program();
        p.
        Console.WriteLine(salary.GetType().FullName);
```

Equals
foo — void Program.foo()
GetHashCode
GetType
MemberwiseClone
ToString

```
foo called
System.Double
Press any key to continue . . .
```

```
var lst = new List<int>();
lst.Add(1.0); // Compile time error
```

How about adding useful methods

```
static void Main(string[] args)
{
    string str = "secret";

    Console.WriteLine(str.Encrypt());
```

Extension Methods

```
public static class Enhancer
{
    public static string Encrypt(this string input)
    {
        // Silly, poor mans Encryption!
        var bldr = new StringBuilder();
        foreach(var ch in input)
        {
            bldr.Append(Convert.ToChar(Convert.ToInt32(ch) + 1));
        }

        return bldr.ToString();
    }
}
```

```
static void Main(string[] args)
{
    string str = "secret";

    Console.WriteLine(str.Encrypt());
```

```
tfdsfu
Press any key to continue . . .
```

Anonymous Methods… Lamdba Expressions

```
// Provides anonymous methods though Lambda Expressions.
var lst = new int[] {1, 2, 3, 8, 7, 8, 9};

Console.WriteLine("Find 8");
ObjectDumper.Write(lst.Find(element => element == 8));

Console.WriteLine("Find All numbers 8 or higher");
ObjectDumper.Write(lst.FindAll(element => element >= 8));

Console.WriteLine("Find All even numbers");
ObjectDumper.Write(lst.FindAll(element => (element % 2) == 0));
```

Part of LINQ sample

Parameter to delegate

Result of delegate evaluation

Our Own method
Find and FindAll work with a delegate

Lambda Expression

```
public delegate bool Evaluator(int val);

public static class Enhancer
{
    public static int[] Find(this int[] arr, Evaluator eval)
    {
        var lst = new List<int>();

        foreach(var val in arr)
        {
            if(eval(val))
            {
                lst.Add(val);
                break;
            }
        }

        return lst.ToArray();
    }
```

```
public static int[] FindAll(this int[] arr,
    Evaluator eval)
{
    var lst = new List<int>();

    foreach(var val in arr)
    {
        if(eval(val)) lst.Add(val);
    }

    return lst.ToArray();
}
```

LINQ uses this to "create" where and select methods for collections…

Just the Beginning

- .NET is evolving
- Learning a great deal from dynamic and functional languages
- Very nice to see a powerful language not being stagnant
- Heading in an exciting direction

Quiz Time

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Conclusion

- Ruby is an exciting language
  - It's a lot of fun
- Lightweight, productive, intuitive, higher signal to noise ratio
- C# is embracing quite some nice features
- Learning Ruby prepares you for what's ahead
  - New features look like a smooth transition

```
"Try to learn something about everything and
    everything about something." - Thomas Henry Huxley
```

References

1. http://www.rubycentral.com
2. http://www.ruby-doc.org
3. Programming Ruby, Dave Thomas, with Chad Fowler and Andy Hunt (http://www.pragmaticprogrammer.com/titles/ruby/index.html)
4. http://msdn.microsoft.com/vcsharp/future/
5. Download examples/slides from

http://www.agiledeveloper.com/download.aspx

Thanks for being a dynamic audience!