Web System Development with Ruby on Rails

Day 8(15/Nov/2011)

Ruby Language

Today's Theme

- Learn the basics of Ruby
- Learn what is Object-oriented language
- Also actually run ruby language, and get in touch with ruby.

What is Ruby

Ruby!? →

http://ja.wikipedia.org/wiki/%E3%83%AB%E3%83%93%E3%83%BC

Ruby / Rails / Gem

- There are three main pillars in “Ruby on Rails”
  - Ruby – language
  - Gem / bundle – Tools and utilities library for Ruby and rails
    - rake – make tool in Ruby version
    - for Java, ant is used
  - Rails – platform/and “rail” which enable users to run the development smooth

What is Ruby language

- What is Script language
  - Compiler language? Or interpritter?
  - Mid-code language? (such as Java)
    - Ruby IS script language (interpritter language)
- Perfectly “Object-Oriented”
  - Class and instances are main structure
  - Message-Passing;
    - Is the way to connect components
  - Event Driven; is the concept of programming

Program Languages

  - C, C++, C#, Java, Javascript
  - Perl, PHP, Ruby, Python,
  - LISP, Prolog, Fortran, COBOL, etc
- There are so many(more than hundreds) computer languages proposed.

  => you can design your own language even more.
- Why there are so many languages?
  - Specialized for its main purpose;
    - ex. Artificial Intelligence language
  - Evolved to apply for some specific environment: C => C++/C#/Objective-C

How program runs?

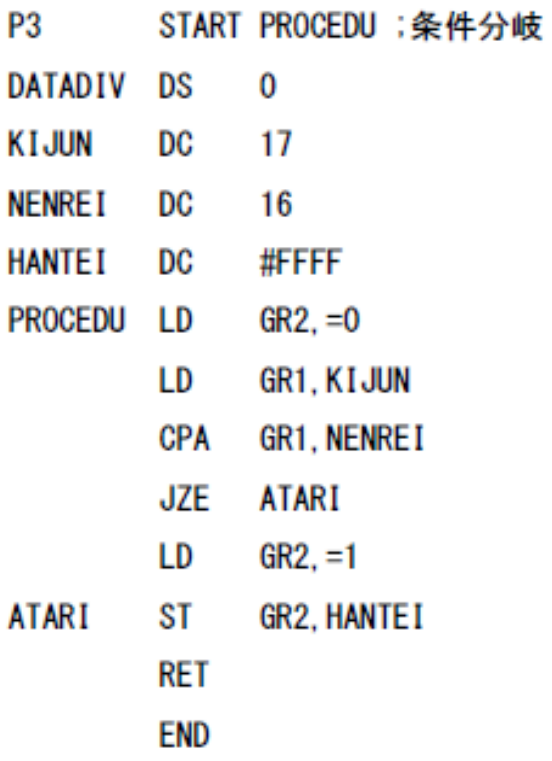
- Programs are finally executed by CPU
  - Machine languages differ from CPU to CPU
  - Lastly, programs must be translated into the machine language to "execute"
- If a set of program code is translated "BEFORE" its run;
  - Programs are translated by "compilers"
  - If there is any error, programs cannot be translated, but it is fast to run.
- If a set of program code is translated "WHILE" it is running;
  - Programs are translated by "interpritter"
  - We can run even if there is any error, but it is slow.

Compilers and Assemblers

- Computer languages which are readable by human are called “High Level Language”

  Languages are translated into “Assembler language” before they are translated into machine languages

  - Assembler's script and machine languages are identical.



```
P3        START  PROCEDU ;条件分岐
DATADIV   DS     0
KIJUN     DC     17
NENREI    DC     16
HANTEI    DC     #FFFF
PROCEDU   LD     GR2,=0
          LD     GR1,KIJUN
          CPA    GR1,NENREI
          JZE    ATARI
          LD     GR2,=1
ATARI     ST     GR2,HANTEI
          RET
          END
```

Sample picture is copied from：http://www.vector.co.jp/soft/win95/edu/se453553.html?ds

Java vs Ruby

- Source code of Java is transformed into “mid-code”(byte-code)
  - Byte-codes are executed by Java VM
    - VM:Virtual Machine
  - Java compilers translate Java source code into “byte-codes”, not into machine languages.
  - Why?
- Java Script is Script language
  - Ruby is executed as script just like Java Script

What is script?

- “Script” is a book of act, and because the command inputs in ‘shells’ are piled and executed as if we read scripts’ “stage act”.
  - Batch job files for Windows (extention: bat)too have the same purpose.
- The scripts has become embedded in HTML (Web screen), and the simple script programs written in script languages have become capable of running, such as Java Script.
- Then some new languages specially designed for Web Environment, have become more famous than batch and/or shell scripts. They have become the main stream of Script languages.

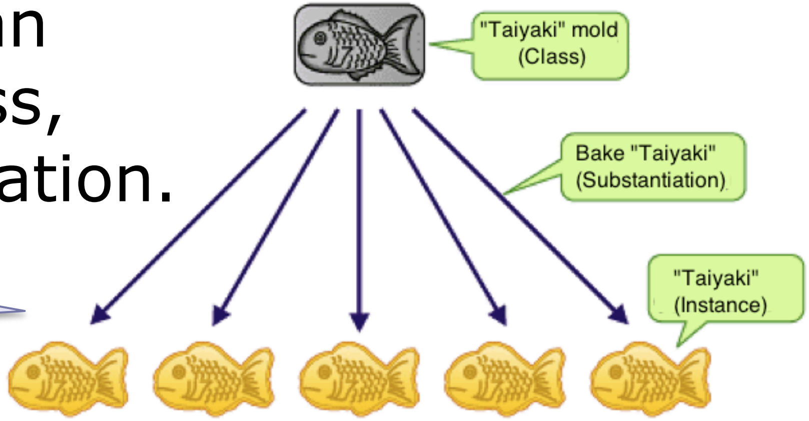
What is Object?

- Please do not think that Object is a ”Substance” but a “Target”.
- Which implies the meaning, that “Object” is in the center of the target of processing.
- Traditional programming was to handle data in the designed procedures (program), but design objects first to describe the behavior and attributes of the objects instead, and let the objects communicate each other.

Class and Instance

- What is Class – type, molds
  - Define a certain set that describes the characteristics of the object abstractly.
  - Ex. "Human" Class
- Instance is substantiated object
  - Substantiation of Class
  - Ex. "Mr. John Brown" is an instance of "Human" Class, as the result of substantiation.

"Taiyaki" is a Japanese traditional sweets. Try it!!!



http://sweets.nifty.com/cs/kuchikomi/sweets_spot/listtop/aid_080926982009/img_1/1.htm

Class and Instance

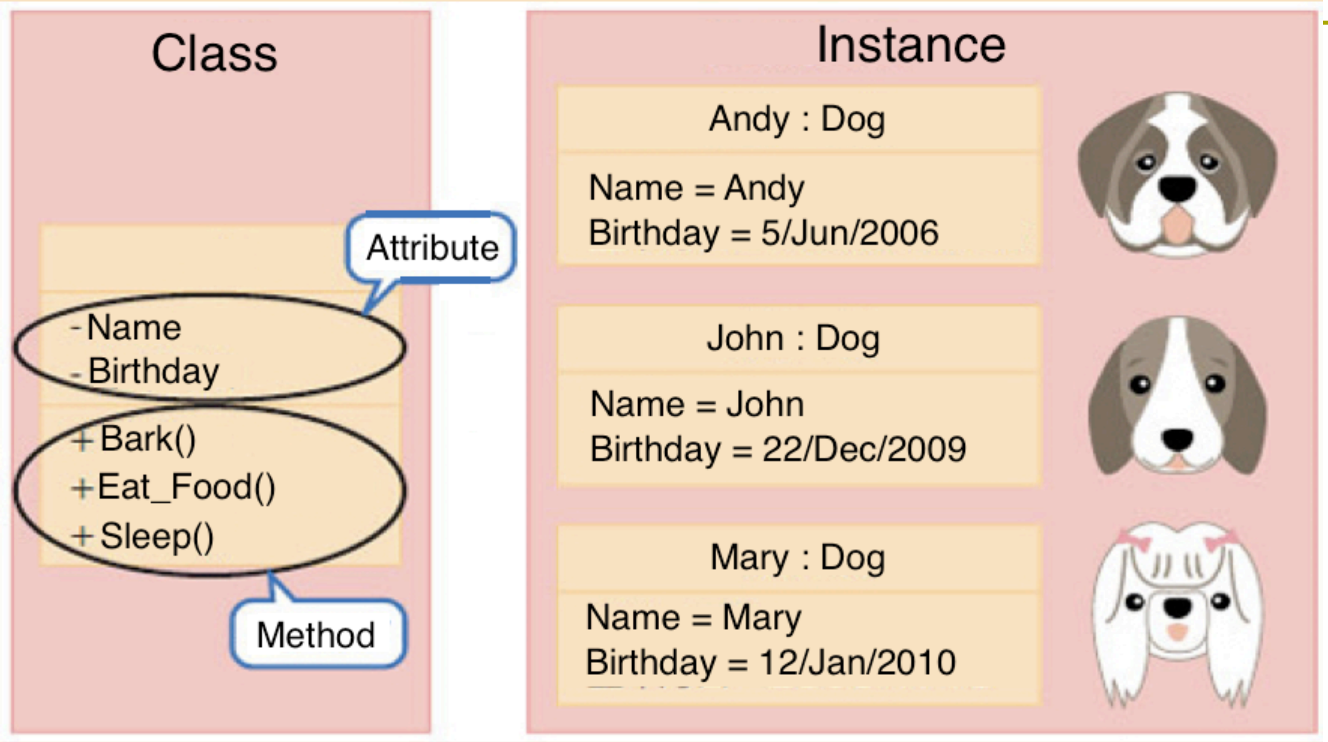


Fig. Class and Instance: Abstract Class is "Dog," and substantiated "Andy", "John", "Mary" are Instances.

Original figure: http://itpro.nikkeibp.co.jp/article/COLUMN/20060921/248617/

“Perfect” Object-Oriented

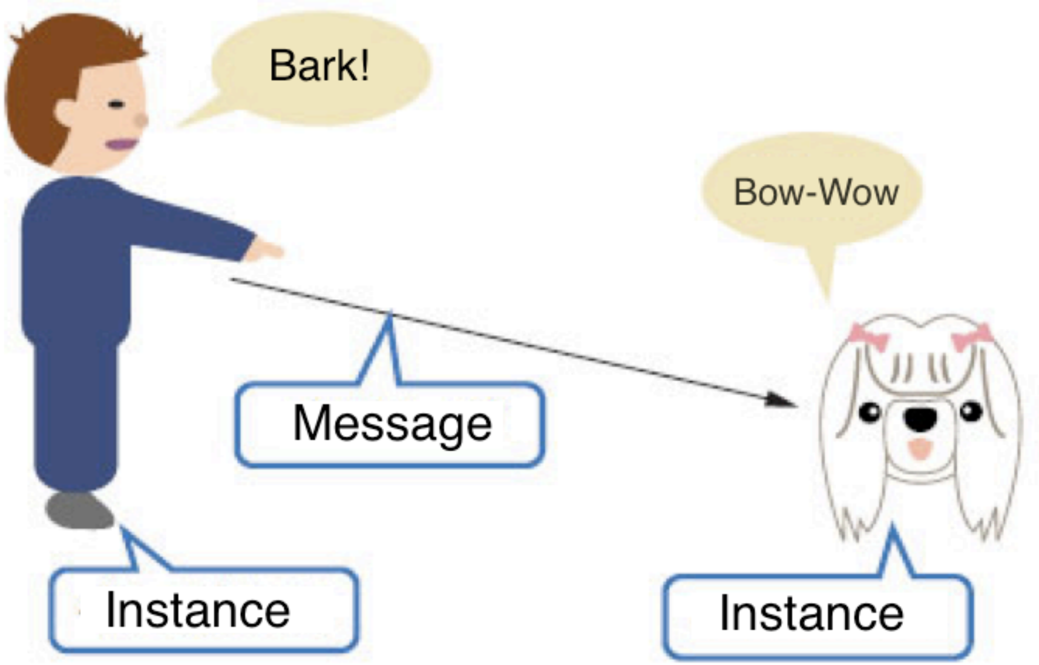
- Java is Object Oriented Language
  - Class and Instance are defined.
    - We conceptually design classes,
    - And substantiate classes as instances.
  - On the other hand, Java has “int”, “boolean” and such “variable types”.
    - It inherits classical languages characteristics.
- Ruby does not have “type” for variable.
  - All variables are instances of Class
  - We can easily re-design the “variable types”.

Rails’s Concept

- CoC （Convention over Configuration）
  - Many language/development environment uses XML and such languages, and causes troubles.
  - Require programmers to obey “Convention” and make “Configuration” disused.
- DRY
  - Don't Repeat Yourself
  - We often copy and paste some program parts, but we should write methods for such repeatedly used program.

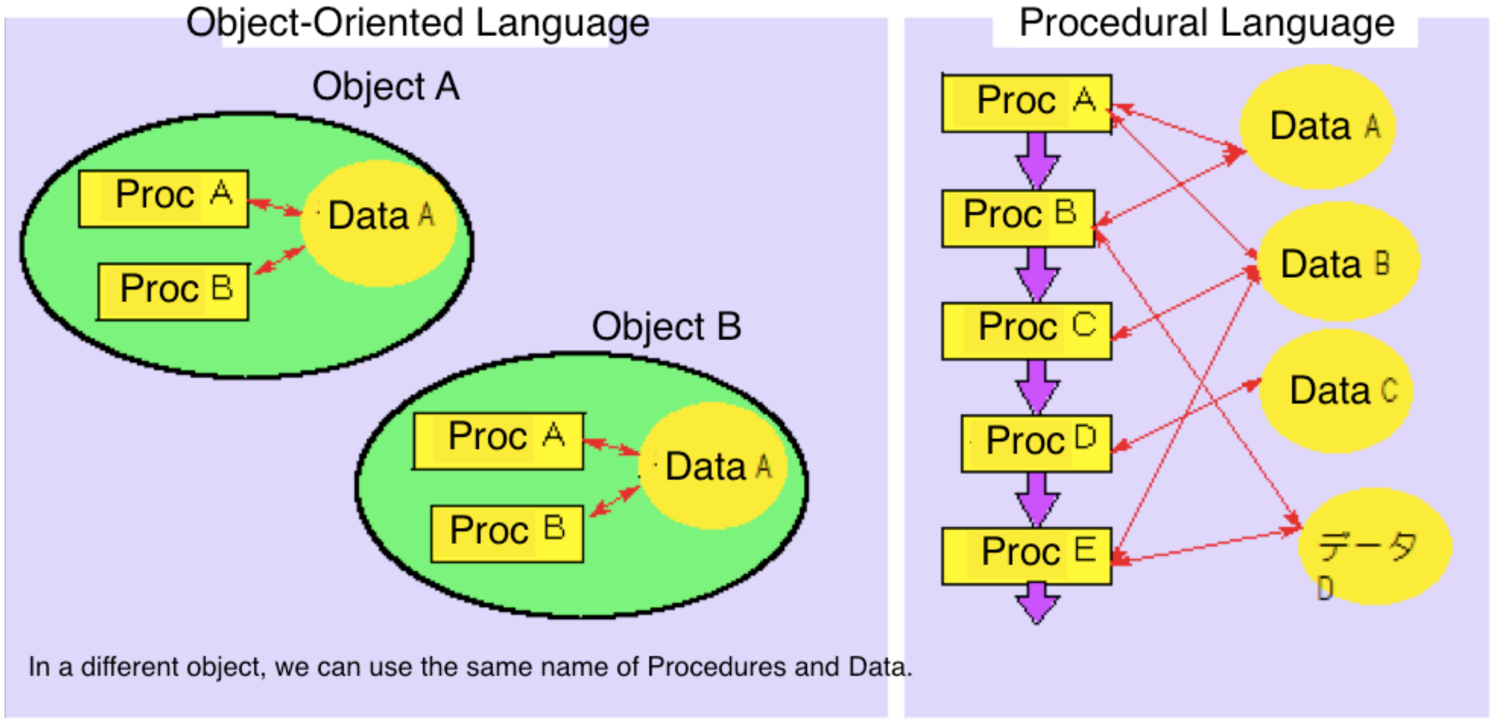
Message Passing

- In Object Oriented Language, program proceeds its process by communicating with messages between instances.
  - Master of a dog send message “Bark,” and a dog respond as “Bow-wow.”



Encapsulation

- Encapsulate data in a class combined with procedures(method):
  - Object = Data(property) + Procedure(method)



In a different object, we can use the same name of Procedures and Data.

Encapsulation (object-oriented programming) ; Academic Definition

From Wikipedia, the free encyclopedia

In a programming language, encapsulation is used to refer to one of two related but distinct notions, and sometimes to the combination thereof:

1. A language mechanism for restricting access to some of the object's components.
2. A language construct that facilitates the bundling of data with the methods (or other functions) operating on that data.

Encapsulation; (continued)

From Wikipedia, the free encyclopedia

Some programming language researchers and academics use the first meaning alone or in combination with the second as a distinguishing feature of object oriented programming, while other programming languages which provide lexical closures view encapsulation as a feature of the language orthogonal to object orientation.

Information Hiding

in “not-a-bad” meaning…

Information that belongs to certain objects should be referred only through the objects.

Such information should not be seen from outside of the objects, as the result of “encapsulation.”

Result: Secured programming is capable.

Event Driven

- Event Driven
  - Here, events mean the occurrence of incidents such as “key pressed,” or “message arrived.”

- We write programs corresponding to “do something,” when “this incident occurs.”
  - We are given the information directly from objects those are related to the incidents.

Today’s practice

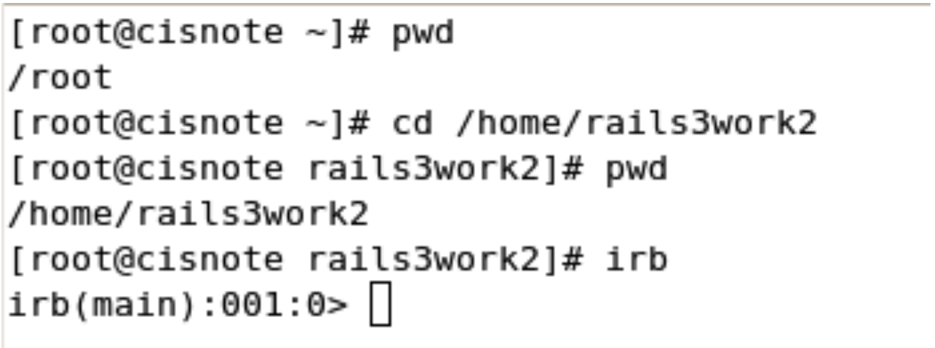
Try two types of ruby programs.

- irb（ interactive Ruby）
- Execute ruby program file.

irb

- Run irb in GNOME terminal; input

  irb



```
[root@cisnote ~]# pwd
/root
[root@cisnote ~]# cd /home/rails3work2
[root@cisnote rails3work2]# pwd
/home/rails3work2
[root@cisnote rails3work2]# irb
irb(main):001:0> 
```

- This environment is interactive. Ruby script is executed in each line.

Practice 1

- Type the following lines in irb:
  - puts “Hello World!”
  - print “Hello World!”
  - print “Hello World!\n”
  - p(“Hello World!”)
  - puts String.new(“Hello World!”)
  - “Hello World!”

Result of Practice 1

- All displays “Hello World!” string
- “puts” start a new line, while “print” not.
- By adding ‘\n’ at the end of line, “print” too starts a new line.
- String.new(“Hello World!”) generate a new instance of String Class.
- To display object, write p(object).

Practice 2

Try the following commands;

```
irb(main):001:0> require "active_support/inflector"
=> true
irb(main):002:0> puts "ox".pluralize
oxen
=> nil
irb(main):003:0> puts "data".singularize
datum
=> nil
irb(main):004:0> puts "category".pluralize
categories
=> nil
irb(main):005:0>
```

We may need require “rubygems” in some environments at the beginning.

The result of Practice 2

- In rails, there are strict constraint for the use of singular form and plural form.
- So, ruby language analyze the variables and symbols names and convert singular and plural forms in the rule of English language.
- The necessary method is in “active_support” as a kind of library.

Practice 3

- Download and test run the sample program in the “lecture support system.”
- You can use USB memory to hand a file from Windows(Platform of VMware) to Cent-OS(Virtual machine.)
  - Type ;

```
ruby filename
```

- Then modify the file, and read the scripts and screen results.

Ruby’s comment

- How to write comment in Ruby

```
# the line start with ‘#’,
Sentences      # the right side of “#”
=begin
        lines between =begin line and =end line.
=end
__END__
 lines after __END__ (two underscores_)
```

Variables

- Ruby does not have defined “variable types,” but has defined Class instances instead.
- Naming rules of variables

Local variable	name
Global Variable	$name
Instance variable	@name
Class variable	@@name
Constant	NAME

Symbol

:name

- Everywhere in the program, a certain object can be handed by its symbol name.
- Used for hash keys.
- Hash is a kind of associative array.
  - --> to be continued to the next time.

Multilingualization

Noun

multilingualization (uncountable)

(software engineering) The act of adapting or localizing something to, into, or for multiple languages

See also

m17n

http://en.wiktionary.org/wiki/multilingualization

The Concept is related I18n, L10n.

Magic Comment of Ruby

After Ruby 1.9, we use Magic Comment to specify the script encoding.

The first line is shebang line.

```
#!/usr/local/bin/ruby
```

and the second line is

```
# -*- coding: utf-8 -*-
```

usually. /usr/local/bin/ruby is the ruby path. Check your installation. Ruby should be there.

More about Ruby

Visit the following site:

http://www.ruby-lang.org/en/documentation/

Report Theme

- Report theme for Day 8:

- Read two sample files of ruby, then run it in your shell.
- Report the result of ruby program, analyze the structure of this ruby program, and report all that you noticed reading this program.

Absent Report for today

There are two themes

1. Report “What is Object-Oriented Language.”
2. Screen shots of practice 1 and 2.

Regular report theme is different from this absent report. (Even if you submit regular report of today for the course evaluation, it is not automatically counted to change the attendance of today’s course.)