The Best Web Programming Language for a Beginner: A Short Review on Python, Ruby and PHP

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Abstract— Nowadays it is very heard to say which web programming language is the best. This is because there is no general web programming language that suits for all web based application projects. Each project/application has its own set of custom requirements. So which is the best web programming language for a beginner and for a pro- PHP, Python or Ruby? This document gives a brief idea on benefits, drawbacks, features and feasibility of top web programming languages. The paper not only suggests choices that the programmers have to begin with, but also the set of requirements from the web programming language to develop an efficient web application.

I. INTRODUCTION

Few years before PHP was considered as the most admitted web tool for web based applications. But these days' python and ruby are becoming more popular web tools as they are growing with matured and robust libraries and web frameworks around them. So today if you Google for the best web programming language you will get several responses voting Java, Python, Ruby , PHP, C++ etc. Even though Java, JavaScript and C++ are used in cool interactive applications, online games, banks, security offices and other high risk services they are less preferred as their complexity with syntax is beyond the understanding limits of a common web application developer. Since this paper is about best programming language for beginners it emphasizes on Python and Ruby.

Wikipedia, Wordpress and Yahoo are written in PHP - Amazon, eBay, LinkedIn are written in java – Stack overflow is written in C# - 140 characters social network Twitter is written in Ruby - And the world's most used search engine Google, most visited social network Facebook, most visited video sharing site YouTube, Blogger and many more are written in Python at the back end.

So today we have lot many options to pick up the best suitable web programming language for application development. Hence a beginner and also sometimes a matured programmer will be in confusion about which language and framework to select.

The contribution of this paper is comparison of performance measuring key terms that a beginner should be aware of.

II. WHAT MAKES DIFFERENCE?

As far as the simplicity is considered Python, Ruby and PHP provides outstanding performance as dynamic and easy to develop web coding languages. Few would say PHP is best suitable for average everyday web system. But Python and Ruby are more suitable than PHP for most web applications in general and for more advanced applications in particular. Like PHP they are free, open source and can be run on open source stack (Apache and Linux, windows and BSD) and can easily be integrated with any database engine. However Python and Ruby enforces good programming habits by their syntax nature. In addition to these, PHP has less attractive object oriented features.

Python and Ruby are the most popular dynamic web programming languages. In fact, Ruby is developed using some of the design ingredients from the Python. Many would prefer Python and Ruby instead of perl and PHP because of the simple scripting nature, rapid development, higher computation efficiency and better syntax for code design nature.

III. PHP, RUBY OR PYTHON?

A brief discussion on benchmarks for web programming languages will give a proper idea on what type of language selection must be maid and what are all the parameters that are to be considered.

A. Background

Ruby is inherited from Smalltalk and Perl. So it follows both 'everything is an object' and 'always there is more than one way to do it' concepts. Python is inherited from Algo family. So it believes that 'Always there should beonly one way to do it'. So two different code developed by two different programmers always looks almost same in Python but not in Ruby.

B. Ease-of-use

The beauty of Python is that once you begin coding in that it seems very much like a easiest and simplest language to learn because of its easier set of variables, functions, inbuilt libraries and object oriented features. It is evident that it is one of the must and should programming language to learn for a beginner. A beginner can start rapidly developing powerful sites. Also it can be grown in any complex way still keeping its ease of use comprehension. An example to illustrate is going back to the code you have written a long ago. Because of Python's beautiful indentation syntax and simplicity it is always easy to debug your old code and make enhancements. There are many pre-built libraries which the developer can use to develop the code more rapidly. The use of natural language to code, indentation and syntax makes Python more readable than Ruby, PHP or any other web programming language. This makes it easier to find out and fix issues in code. Pythonists say their language is ease through consistency and Rubyists say their language is ease through conceptual elegance.

C. Syntax

In Ruby most of the things are implemented with block and mixin syntax. These features make Ruby more dynamic and interactive with the external world (code or library). Even though these types of syntax can be achieved in Python it will be less clear and natural. These features combined with

light weight syntax make Ruby more suitable for meta-programming. But intentionally Python is more restrictive in its syntax to provide a canonical style to make it more comprehensive. PHP's syntax is derived from C. There are no namespaces and supports uninitialized variables. PHP uses implicit type conversion which makes it weak type system. For example: an integer can be compared with a string inside a Boolean expression which creates uncertainty in using correct operator.

D. Object Oriented Programming

Ruby is much more object oriented than Python. Python is similar to C++ is object oriented feature as it allows functions to reside outside the class definition, nearly everything in Python is object or instance. But Ruby is strict in function definition as it allows functions to reside only inside class like Java. Ruby's object orientation is much more pure. Object oriented features are introduced to PHP very recently (in PHP4) and are not adequately advanced.

E. Libraries

Python has greater range of libraries available to it compared to Ruby. Python has mature and better documented set of libraries. Ruby however can take advantages of Python with some compromise in performance. Ruby's standard library is small but better organized. PHP scores less here.

F. Logic and Functional Programming

Even though both Python and Ruby support functional programming evidently Ruby wins here. Ruby relies on functions that make use of 'lambdas' more than Python does. Ruby's lambda support is flexible and allows any arbitrary length of lambda expressions. Python has its own restrictions on statements. So Ruby is more functional. PHP is quite versatile in nature when functional programming is considered.

G. Speed

Python is more optimized and faster than Ruby and PHP. Latest version of Ruby 1.9 is about 2x faster than Ruby 1.8 but still it is slower than Python but better than PHP.

H. Style

Python code is indentation sensitive. More the complex code deeper will be the indentation. It is stated that python code is like an executable pseudo code. Ruby uses blocks and mixin style. Blocks always end with 'end' tag. Ruby allows multiple statements to put on same line but Python won't. PHP is the first language that supported embedding the contents inside the code. A variable should start with $ symbol.

I. Features

Python and Ruby are high level application development languages and promotes test driven development. Both the languages support multithreading, Unicode support. Python distinguishes between Unicode and byte strings but on the other hand Ruby treats all strings as byte strings. Python supports generators and generator expressions. There are number of default functions available in Ruby. In Python it is required to import the module from library. Hence Python and Ruby have high scores against PHP in Rapid Application Development.

J. Community support

Recent observations depict Python has more mature and developed community support than PHP and Ruby. Python Community supports in terms of libraries are best suited for natural language processing, machine learning and data analysis. Python community believes that all the features are conservative and less interested in changes and new technology is not adapted quickly. But Ruby guys always welcome changes adapting the new technology. This also means that python one's are much stable, consistent and one developer can update his installations without any fear.

K. Web Frameworks

A number of frameworks are available for PHP and Python. Logiks, FuelPHP, Joomla are popular frameworks for PHP. Python's web frameworks are Django, CherryPy, Flask, Grok, Pylons etc. Out of which the most popular one is Django (MVC architecture). Ruby has very few web frameworks namely Camping, Ruby on Rails and Sinatra. Out of which popular one is Ruby on Rails. Python with Django is considered to be one of the best combinations for rapid development, reusability, pluggability, complex database driven web applications.

L. Popularity

According to Wikipedia JavaScript stand first considering popularity (21%) and then Ruby (14%) and then Python (8%). However as far as number of projects are considered PHP has excellent record in its favor. For example PHP has 33281 projects in n sourceforge.net, Python has 16061 projects. However Ruby has only 281 projects (as of 30-May-2014). Popularity of PHP is now becoming almost equal to Python and Ruby. But very soon PHP's popularity will become less than Python and Ruby. Python finds its use in data analyzing, natural language processing, machine learning, biostatic, data manipulation, web application development, software development, automation system development and in many other modernistic fields.

M. Security

All three (PHP, Python and Ruby) provide security against cross site scripting attack, SQL injection attack, server side code execution flaw. However PHP has security more security flaws than Python or Ruby because of its poor language design. Almost 33% of the security vulnerabilities listed by NVD (National Vulnerability Database) are related to PHP. So PHP is not suitable for the applications that are more concerned about security.

N. Performance

Computer language benchmarks say that there are three times more Python programs than Ruby programs. Python has a JIT compiler called Psyco Python and also it can be compiled to .Net and java byte codes. Threads are pretty simple in Ruby but don't perform well compared to Python's inbuilt threads. PHP doesn't support threads and performance is comparatively less.

O. Multiple Inheritances

Python supports Multiple Inheritances. Hence Python codes are more reusable. Ruby and PHP doesn't support this feature, hence less reusability.

IV. RESULT OF SURVEY

The results of surveying all related stuffs are put under Table 1. A kind of grading is given for each benchmark (superior, good and poor) with description. Always a Poor doesn't mean like worst. So poor in the sense not bad, a Good is better and a Superior is always the best.

Benchmarks	Grading for different languages and description			
	Superior	**Good**	**Poor**	**Description**
Ease-of-use	Python	Ruby	PHP	Python is known for ease-of-use and rapid application development
Object Oriented Programming	Ruby	Python	PHP	Object oriented concepts are pure in Ruby
Libraries	Python	Ruby	PHP	Python has greater range of libraries
Functional Programming	Ruby	Python	PHP	Ruby uses lambdas and poses less restrictions on statements
Speed	Python	Ruby PHP	-	Python is almost 2x faster than Ruby and PHP
Style	Python	Ruby PHP	-	Indentation makes code tidy and code can be easily debugged
Features	Python Ruby	PHP	-	Considering Multithreading and default functions
Web Frameworks	PHP Python	Ruby	-	Considering Number of frameworks available and their features
Popularity	Python Ruby	PHP	-	Python and Ruby's popularity is becoming more. But PHP's popularity is decreasing considerably
Security	Python Ruby	-	PHP	PHP Python and Ruby are suitable for security critical applications. PHP is most vulnerable
Performance	Python	Ruby	PHP	Considering compiler and threads
Multiple Inheritances	Python	-	Ruby PHP	Only Python supports multiple inheritances
Job Opportunity	Ruby Python	PHP	-	Number of developers per job openings Ruby:5, Python:17, PHP:62
Lines of code	Python	PHP Ruby	-	Considering both Object oriented programming and functional programming
Average runtime	Python	Ruby	PHP	For the execution of similar code
Number of developers	PHP	Python	Ruby	PHP:31,955 Python: 18,706 Ruby:1300
Most discussed language	Python	PHP	Ruby	Python:18%, PHP:11%, Ruby:4%

Table. I :A Brief Comparison On Benchmarks

V. CONCLUSIONS

"What you should use depend on what you want to achieve!"

Ultimate decision of selecting the suitable language for application development depends on what the programmer actually wants to build. If the application is very simple and small PHP is good. If the application requires rapid development, ease to understand code, speed, performance and multiple inheritances Python will be good. If security is of major concern Python and Ruby can be preferred. If you want to develop an application which needs greater community support, you can prefer PHP. Asfar as features and popularity of web frameworks considered Django-Python and Ruby on Rails-Rubyare best. Ruby supports pure object oriented features. In PHP you can find very huge number of projects.

PHP was the best and popular web programming language for long time. But advancements in Python and Ruby have decreased PHP's popularity now. All three are having equal levels of pros and cons now. But for a beginner Python would be the best language to start with.

This paper has described various aspects of advantages, disadvantages and features in most popular web programming languages PHP, Python and Ruby. All benchmarks are clearly discussed considering current requirements of a web programming language. Paper also suggests what are all the aspects to be considered by a beginner? Why not PHP for complex and security critical applications?

Obviously choosing a language depends on user's personal experience. Hence each one's view on languages might be different.

What I would suggest generally for application development is Python. Ruby is next to it, because a lot of modulations still need to be done. If application is very simple, less customized and small then PHP.

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