

Spectrum of Contemporary Object Oriented Programming Languages for Web Application Development

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Abstract: As a matter of fact, a plethora of programming languages are available off-the-shelf for software development. Due to lack of knowledge of features specific to the field of application, hardly any software developer leverages the full potential of a programming language to deliver a quality software product. To provide a good insight of unique features of state-of-the-art object oriented programming languages used for web application development , this paper discusses the important features of these languages namely Python, Java, C#, Go, Scala, and Perl. A discussion on establishment of ranking of programming languages used for web development is made at the end, based on usage and performance.

Index Terms: Object Oriented programming, web application, software product, server programming

I. INTRODUCTION:

With the emerging developments in web technology, it is almost inevitable for every enterprise or organization to have a website and one which is highly functional and having good visual effects. The set of processes using which a good website, mobile apps or other similar platforms are developed is called web development. One of the most paramount aspect of web development is web programming that is achieved with the help of programming languages. Web development languages are the platforms through which instructions are provided to a machine and actions are pursued [1]. Web development includes several actions or practices and some of them include web design, content creation, programming, network security tasks as well as client side or server side scripting, etc. All these actions/tasks need to be implemented through programming. So deciding a best suited programming language, through which one can easily develop, maintain and upgrade the web-app is very crucial aspect.

The developer must have a good insight of programming languages, so that based on the strengths and limitations of it, a proper selection of a coding language can be made, depending upon the requirements. This discussion provides a quick summary of unique features of object oriented programming (OOP) languages used most widely for web development along with benefits of using OOP. Hither to, no such quick glance of language features is available in a compiled fashion. This work compiles the most suited OOP languages with mapping of features to the web-app requirements. The paper is organized as follows. The next section discusses features and benefits of OOP, and it compiles and discusses features of languages that are significant to web development. The last section of the paper provides brief conclusive remarks of this study.

OBJECT ORIENTED PROGRAMMING FEATURES THAT ARE SIGNIFICANT FOR WEB APPLICATION DEVELOPMENT.

At the outset, a discussion on the benefits of using OOP is helpful for web developer to know how OOP is providing a platform to develop a dynamic, robust, portable and distributed web-apps. The gamut of benefits in a nut shell, are described below [2].

- Ease of maintenance
- Reuse of code
- Easily adapted, extended, and improved
- Better tools to solve problems
- Easier for others to work with your code

Principles of Object Oriented Programming, There are 4 major principles to object oriented programming.

- Abstraction
- Encapsulation
- Polymorphism
- Inheritance

Abstraction

Basically there are two types abstractions, functional abstraction and data abstraction. When a particular task is achieved/done without going into it's background details , it is functional abstraction. When an object or entity is described without going into

details of it, it is called Data abstraction. The primary objective of using it is to make the interface between user and system simpler.

Encapsulation

Encapsulation is binding of data and methods which use it. This way the data is not visible to other part of the program and thus it is secured. The primary goal of Data Encapsulation is data hiding, so that it can be secured.

Polymorphism

Polymorphism means one name many forms. When an object is provided with changing scenarios, it behaves differently. There are two kinds of polymorphism, static and dynamic. In static the linking is done during compile-time of the program, where as in dynamic it'd done at run-time of the program. The major advantage of polymorphism is the reusability and extensibility of higher level abstractions. The higher the abstraction that can be reused, the more reliable and less expensive the end result of the project.

Inheritance

The primary goal of Inheritance is reusability of code, which in turn provides cost-effective solutions. Normally Inheritance is implemented where-ever ' a kind-of ' or ' is-a ' relationship exists. It is basically designing or developing a new object from already existing object, by inheriting all/or some of the traits of existing object.

OOP LANGUAGES USED FOR WEB-DEVELOPMENT:

Fig 1. Displays the most widely used OOP languages used for Web development.

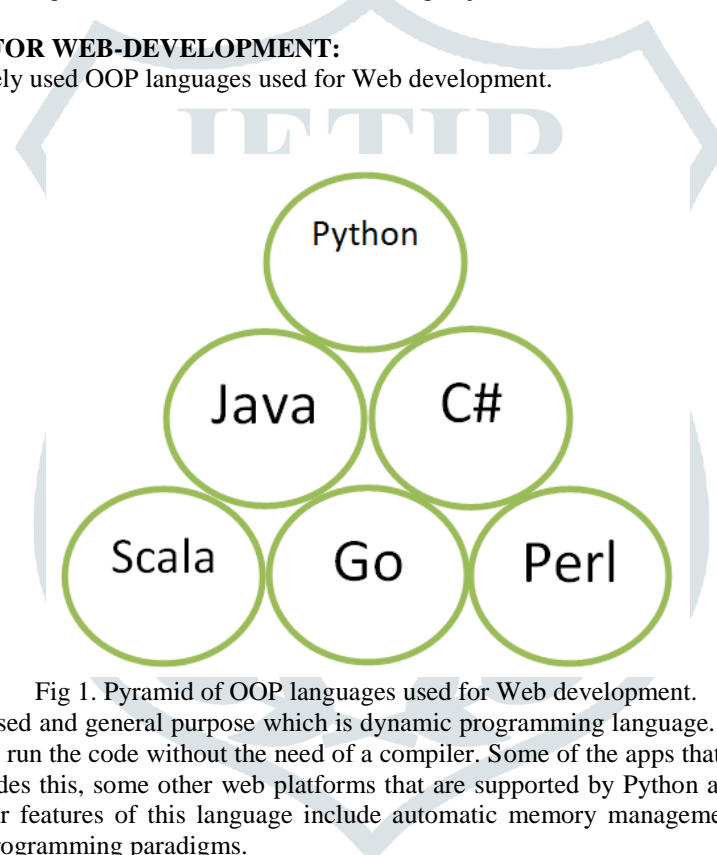


Fig 1. Pyramid of OOP languages used for Web development.

Python : Python is a widely used and general purpose which is dynamic programming language. Being dynamic in nature means that, a developer can write and run the code without the need of a compiler. Some of the apps that are implemented by Python are Instagram, and Pinterest. Besides this, some other web platforms that are supported by Python are Django, Google, NASA, and Yahoo, etc. Some of the other features of this language include automatic memory management, large library, dynamic type system and support of many programming paradigms.

Java: Java is yet another most popular and most widely used OOP language that is specifically developed for web development (Internet). This language is an object-oriented, class-based and concurrent language that was developed by Sun Microsystems in the 1990s.

The important features expected from web development community are,

- It must be a secure and robust programming language
- It must be an object-oriented, simple language
- It must be capable of being implemented and executed with high performance.
- It must be threaded, dynamic and interpreted.
- It must be portable and architecture-neutral.

C#: C# is a powerful, object-oriented programming language developed by Microsoft in 2000.

Microsoft developed C# as a rival to Java. Actually, Sun did not want the interference of Microsoft to make changes in Java. The code is consistent, and logical as compared to C++. Spotting errors in C# is easy as it is statically typed language, where the code is checked before turning it to an application.

In short, it is perfect to develop web applications, desktop application and also proved itself in VR, 2D, and 3D gaming. Cross-platform tools like Xamarin have written in C# makes it all devices compatible [3].

Go(Golang): Go is an open source programming language from Google. Developed its first stable release, in 2011. Robert Griesemer, Rob Pike and Ken Thompson.

The important features are it is, Compiled: There is no VM. It compiles directly to the machine and it Compiles cross-platform to OS X, Linux, Windows. Safe: Strong and static typed. Concurrent: Supports parallel execution of tasks, thus enabling multitasking.

Scala: Scala is a general purpose programming language, It is a type-safe JVM language that incorporates both object-oriented and functional programming into an extremely concise, logical, and powerful language. Its adoption is growing and the big companies like LinkedIn, Twitter, and The Guardian use it in their code-bases [4].

Scala was created specifically with the goal of being a better language, shedding those aspects of Java which it considered restrictive, overly tedious for the developer. As a result, Scala programming is a bit more difficult, but the result is a much cleaner and well-organized language that is ultimately easier to use and increases productivity.

Another important benefit is immutability. Scala helps to write code easily using immutable data. This includes constructs such as: first-class vals, case classes, higher order functions. All the default data-structures are immutable. Immutability makes myriad of things simpler.

Examples of the functional features that Scala introduces are:

- String comparison advancements
- Pattern matching
- Mixins, which incorporate functions in class definitions

Scala also includes a full-featured API library that is not bloated. Scalable software is easier to code, test, debug and deploy when written in Scala. Scala can be utilized to program, well, anything if performance is not an issue. The language is versatile, allowing it to be used to develop desktop software, games, web apps, mobile solutions, and software as a service. Highly scalable solutions like Klout, LinkedIn, Amazon, Blizzard, Coursera, Twitter are using Scala. Scala offers clean code, advanced features, functional and object-oriented programming in an open-source package that leverages Java's environment [5].

Perl: Perl stands in for Practical Extraction and Reporting Language. The power of Perl can be implemented in many fields. The most popular use of Perl is in Web development, Perl is also used to automate many tasks in the Web servers, and other administration jobs, it can automatically generate emails and clean up systems. Perl is still used for its original purpose i.e. extracting data and generating reports. It can produce reports on resource use and check for security issues in a network. Due to this reason, Perl has become a popular language used in web development, networking and CGI programming.

Perl is an ideal web programming language due to its text manipulation capabilities and rapid development cycle. There are many web frameworks written in Perl, a leading one is Catalyst. Perl's DBI package makes web-database integration easy. A Comprehensive Perl Archive Network (CPAN) offers thousands of modules, so almost any task needed could be accomplished easily, from URL or image manipulation, to Amazon EC2 APIs and much more. Perl has long been known as the duct-tape of the Internet. Encryption capable : Perl can handle encrypted Web data, including e-commerce transactions [6]. From the features discussed here it is clear that, Perl is the best suited OOP language for web-development.

Discussion:

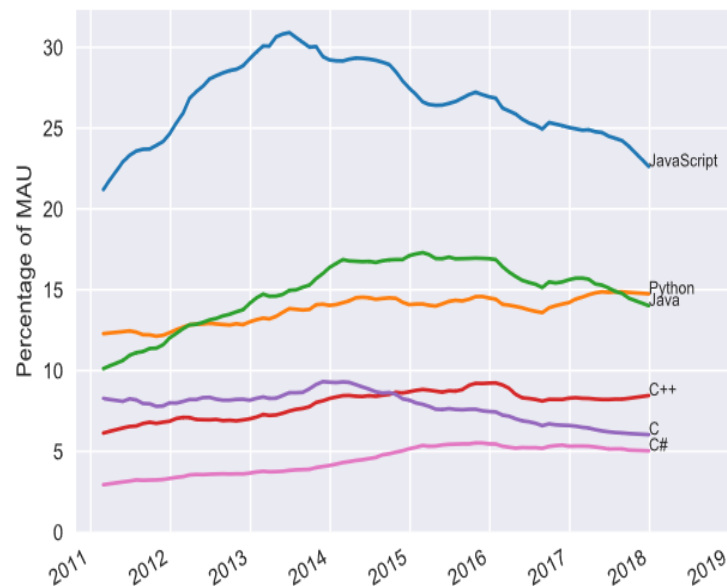


Fig 2. Overall ranking of programming languages based on percentage of Monthly Active Users(MAU) [7]

From the above discussion it is evident that Python has overtaken other object oriented programming languages and is one of the fastest growing language [8]

CONCLUSION: This paper basically highlighted the important OOP features and advantages that are directly relevant to web-development. Besides this it introduced the OOP languages used widely for the development of web-apps. This study guides the developer in selecting a OOP language for web development, there by mapping the characteristics and requirements. Further the study projects Python as leading programming language, invariably used for web development

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