Quality Evaluation of PHP Frameworks

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Abstract— Now a day's frameworks are playing vital role in development of web-based applications. In this article, world wide web-based development has been carried to compare the two most widely used PHP frameworks in the development community; Yii and CodeIgniter. The study is based on comparison of both frameworks by considering various quality frameworks, moreover we have implemented web-based Inventory system to validate results. In results Yii found to be an automated tool and has various functionalities, without knowing any further complex architecture to develop the required web in quick time. On other hand CodeIgniter is complex in nature, so it is highly recommended for the expert level users. Both have advantages and disadvantages; these frameworks can be used based on the project nature and time constraints.

Index Terms— Evaluation, Frameworks, Comparison, Web Development.

1 INTRODUCTION

Since few years development of web applications is very common, and many server-side scripting languages are being used for developing dynamic and interactive web-based applications.

Initially, the World Wide Web was imagined for sharing information where documents were linked together in an inter-network. These documents were basically static as growing; forms were introduced, helping users to interact with servers.

After the first Web application was created with server-side scripting language making dynamic generation of HTML documents possible. Until now, the web technology has reached to a new standard where creation of web-based applications is much faster using frameworks [1].

Online market is emerging developers to produce better featured application within less amount of time and web application frameworks are created with this purpose in mind. Frameworks have proven its ability to switch with the market demands, due to this several companies have succeeded in saving time and boosting applications' features.

Sometimes it seems like yesterday that a markup language with a strange name HTML was used by some developer to link documents with the group of concern servers. Now data server-side scripting languages are being used for business designing software for business prospectus.

Creating a web application is a dynamic task for every company. Everyone may know web applications have something common. Most of them have users who can register, gain access and may interact with the application. Interactions are often carried out through fixed and secure forms, connected to databases. Data is fetched from stored database and compared with user given information to process and present data back to the user. Grouping these patterns into some kinds of abstraction and transport them further into other applications could push up the process much faster.

There are so many brilliant choices for developers to choose and start working on creation of new web application to make it better and faster. Web Frameworks are proving to be most emerging platforms to support web application development.

Frameworks are importance for developing large-scale object-oriented software system by providing higher productivity in shorter time to market through design and code reuse. Software framework focused on programs, compilers, code libraries, tool sets, and Application Programming Interfaces (API) that bring together all the different components to enable development of project or solution.

Previously when frameworks were not in use, it was common to see web sites written in a proprietary fashion. Different coders would employ their own arsenal techniques and methodologies in arranging their code and designing their architecture. This created number of issues such as lack of documentation and complex ties.

Without a PHP Framework it's difficult to produce applications rapidly [2]. Developer will have to write lot of code for it and he/she will also have to execute the connection between database and whatever application he/she developed from scratch. Meanwhile, using a PHP Framework makes it easier to ensure this connection because built-in classes are given for it.

Now day's automation is strongly recommended, in which computer program play vital role. Different automation techniques/tools are being used to store data in the database files, most of the organizations prefer to make an automated inventory system for their daily use items. This research study is to focus on using PHP frameworks for an organization to store and retrieve their inventory system and to study PHP Yii framework.

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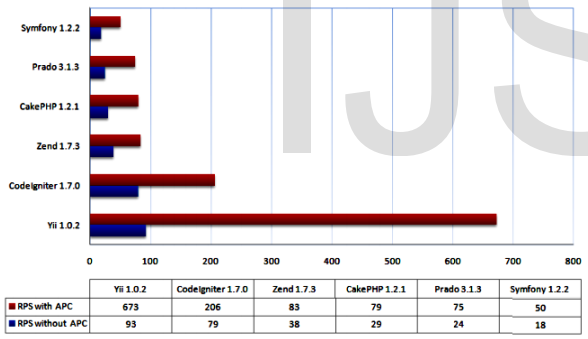
2 RELATED WORKS

Lerdorf et al, 2003 [3], PHP Group introduced a powerful object-oriented programming (OOP) structure in PHP 5.0 at the end of 2003, which created possibility to work on frameworks.

Lancor and Katha, 2003 [4], Comparative study was conducted to determine which framework is best for development. PHP has many advantages in field of performance and flexibility, the development in core PHP is much time consuming, manually management of coding, validations, authentication and session managements may have security issues. Reusability of codes is essential in robust application development which is critical in core PHP, development without a framework does not enforce an MVC architecture that is critical in web design.

According to Burney, 2008 [5], there are two broad methods of reasoning as referred to the deductive and inductive approaches sometimes the two methods are combined to have the third kind. Deductive approach moves from the more general to the more specific which usually begin with the theory then narrow down to the specific problem that we can test and conclude the research with confirmation. Inductive approach, on the other hand, works in other way. It begins with some specific observation to detect the patterns and ends up broader theory.



	Yii 1.0.2	CodeIgniter 1.7.0	Zend 1.7.3	CakePHP 1.2.1	Prado 3.1.3	Symfony 1.2.2
RPS with APC	673	206	83	79	75	50
RPS without APC	93	79	38	29	24	18

Fig. 1. Framework Performance and Comparison [11]

Each framework has its own quality, advantages and disadvantages which are important in performance, documentation and user community. In the development of web-based applications frameworks are being used to improve development processes and choosing a framework may prove critical that's why choosing a good framework is positive point for developing web-based application. The complex framework consumes more time than simple framework when apply for small and medium projects.

Burney, 2008 [5], decided to choose Zend Framework for development purpose. He declared Zend as promising framework and good choice for many projects, because of its ability to scale. Moreover, the current version is very stable, though the beta releases may add more features and bug fixes in near future. Finally, it's backed by the leading PHP company which makes it more reliable.

Thanh, 2008 [6], defined factors to choose a right tool for starting up and for that one should analyze the needs and goals. This depends on the work's requirements, and sometimes development skills. First, developer should decide which language to use in a project. If it isn't set to a specific language, the best way is to turn to the language which developer is most confident to use. After that, to choose whether using any tool or coding by hand is also a critical choice. Although many companies have chosen web frameworks as a tool to aid its development process and improve coding standard because most of frameworks are very strict on this, it isn't necessary true in all cases. Developer may practically find it easier to code by hand while using framework may make it more difficult. The list of advantages and disadvantages of framework over coding by hand may prove helpful when making the decision.

Figure-2 it is a representation of the result of PHP frameworks that shows which framework is more promising. In this figure each framework is indicated by color, and area of circle is divided into the parts which describe that which framework is good for development.

Tian & Wang, 2013 [7], gave an abstraction after analysis and comparison on the existing PHP frameworks, a PHP Agile development framework based on the MVC pattern has been proposed which is simple, efficient, and easy to learn, develop and operate. It has a unique entrance designed to facilitate the reunification process and the system overall management, to prevent the site exposure and reduce the security risks. They presented some highly efficient improvement for every layer of the MVC model, gave the detailed introduction about the improvement approaches about frameworks.

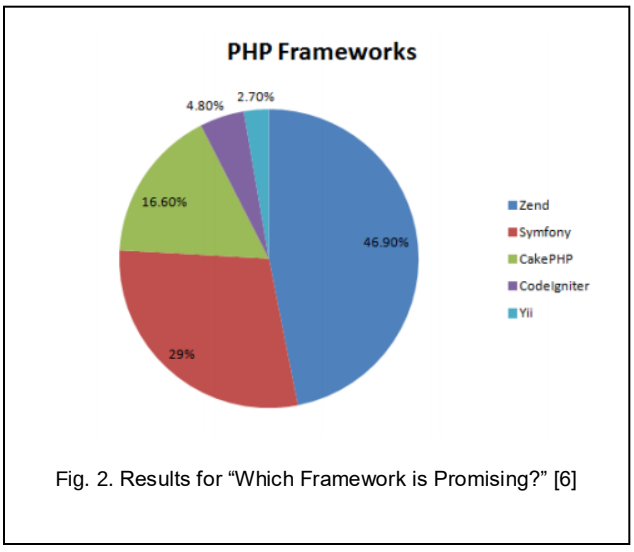


Fig. 2. Results for "Which Framework is Promising?" [6]

Paikens, A & Arnicans, G, 2008 [8], defines that the use of design patterns in the design of Web applications is simple, but as soon as the work begins, it becomes clear that the situation is far more complicated than it has been expected. Some frameworks have good homepages, which most framework developers have not really ensured. Hence,

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finding information about projects can be very complicated or even impossible. Most developers have taken the time to prepare sensible comments in relation to their software codes, but sometimes it is quite hard to understand whether the method has a name because a specific design pattern has been used, or the developer has simply decided on what he or she considers to be the most appropriate name without even thinking about the design pattern. After collecting all the information, we found that MVC and Singleton are still the leading design patterns.

Cui, W., 2009 [9], PHP is one of the leading Web development languages, however, the development model of existing PHP organizes without a structure, which mixes the code of data access, the processing of business logic, and Web presentation layer together, as a result, it brought about many problems in the Web applications, it could not meet the rapid development of Web apply any more. IEEE done an implementation of PHP based on MVC design patterns - FDF framework was provided for PHP developers, which offer a framework for Web applications, separate the data, view and control of Web applications, afford to achieve loose coupling, thereby enhanced the efficiency, reliability, maintainability and scalability of application development.

Fayyaz, A & Munir, M., 2013 [10], describes after analyzing the results collected from local and live server, that Overall CodeIgniter framework performed better on local with perspective of response time and throughput. But on live server they got mix results related to response time. After analyzing the results, CodeIgniter performed better in normal load conditions on live server but in stress conditions CAKEPHP performed better. Moreover, CodeIgniter is very light, it does not have huge libraries of functions, Authentication system and access control list like in CAKEPHP.

3 METHODOLOGY

In methodology we have discussed about proposed research work, comparative study of PHP frameworks. The study was carried out to investigate the comparative analysis of widely used MVC based PHP frameworks CodeIgniter and Yii. The goal of this study was to enhance knowledge and understand complete benefits of implementing framework in web application development, and to understand process of all factors relate to Yii framework and CodeIgniter. It is important to know results to manage growing step of Internet technology and user's requirements in the light of framework quality. The portable system of an organization was created to manage an inventory record in flexible manners for both Yii and CodeIgniter to evaluate quality of frameworks.

3.1 Research Design

The study was based on the evaluation of PHP frameworks Yii and CodeIgniter with case study of inventory record. The proposed case study consists of two panels, Admin and other is Member/user panel. The Admin panel is authorized to maintain, insert, delete, update inventory records and can create a user / member who can only see the record. In the last, some quality attributes were considered to evaluate quality of both frameworks CodeIgniter and Yii.

3.2 Methodological Framework

Development of web-based application with core PHP takes lot of time, to keep application clean and safe frameworks are used. Yii framework and CodeIgniter are used to manage PHP code, Apache server to run PHP Code, SQLyog to create and manage database, to create web-based inventory system.

Before starting work on PHP frameworks developer must know all steps and factor which could be driven at the time of creating web-based applications.

Firstly, we have installed both frameworks Yii and CodeIginiter on the system and consist same configuration. We have observed, evaluated that how much time each has taken, and which is easier one.

Configuring frameworks is important before creating web applications so that we configured both frameworks and evaluated taken time by both. Quality of both frameworks was evaluated too.

Each web-based application has database, where data is stored permanently. Before starting work on framework, we have created a database for the web application and made database connectivity in both frameworks. Moreover, we evaluated that, in which framework connectivity of database is easier and time efficient.

Form validation is a most important thing in web-based applications, so end user can enter a valid data which is proceed on the server to be validated. Some frameworks have predefined validation patterns and some frameworks have not, so user must create pattern and regular expressions to validate user inputs. we have evaluated that which framework has good accessibilities, performance in form validation.

Selected frameworks Yii and Codeigniter are based on Model-View-Controller (MVC) architecture. Process for creating Model, View and Controller were also compared for both frameworks. Comparison of several factors used in web development process for both was done. To find result we implemented an inventory system in both frameworks, which is illustrated in figure 3.

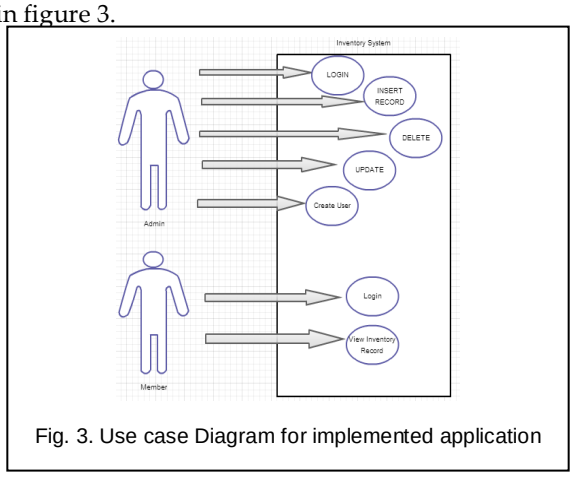

Fig. 3. Use case Diagram for implemented application

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Figure 3. illustrates use case diagram of an inventory system, system is categorized in two distinct panels, one for client and other for administrator. Here administrator is authorized to insert delete update records and create client users for system. While Client is enabled to login and view inventory records.
Figure 4. illustrates activity diagram, in which all steps for development of the case study for an inventory system.

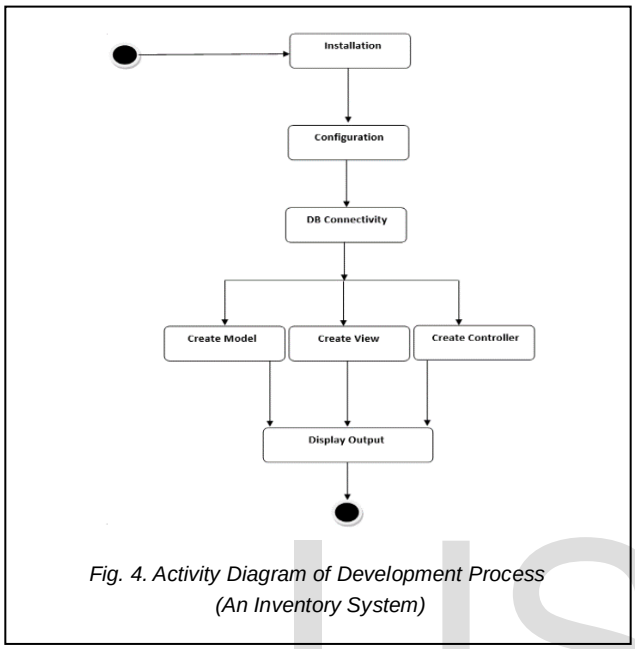

Fig. 4. Activity Diagram of Development Process (An Inventory System)

4 Results

Each framework has its own advantages and disadvantages most important in performance, documentation and user community. To start working with a web application project, choosing a wrong framework may prove critical. Many Developers are confused to choose a right framework for implementation, so point is which PHP framework holds promising features, which framework is easier to understand and implement, which framework is faster and consists quality.

To validate that we have implemented a web-based application of an Inventory system to manage record. After implementing, we have observed that Yii framework is much faster than other PHP frameworks it can be used for rapid application development. The Gii extension /Module is useful, it enables user to perform CRUD operations and make Yii much faster than other frameworks.

Yii is a good framework for developing and designing large projects in low cost of time, installation of CodeIgniter is much easier than installation of Yii. Before installation of Yii framework we require Apache server, newer version is named Xampp for executing server-side scripting language PHP and MYSQL for creating and managing databases.

The study focused on comparison of two frameworks Yii and CodeIgniter, both frameworks have various features, some of important factors are listed and evaluated in following table.

TABLE 1
FRAMEWORK COMPARISON FOR INVENTORY SYSTEM

Factors	Time Taken by Yii Framework	Time Taken by CodeIgniter Framework
Installation	10 Minutes	5 Minutes
Configuration	7 Minutes	3 Minutes
Db Connectivity	5 Minutes	5 Minutes
Model Creation	5 Minutes	12 Minutes
Controller Creation	3 Minutes	12 Minutes
View Creation	<1 min (auto)	20-30 Minutes

Table 1 illustrates comparison of both frameworks considering the factors defined in it. These frameworks are good for developing web-based application. The only major advantage provided in Yii framework is an extension (Gii) that helps developer to develop application rapidly just by filling out the given fields.

TABLE 2
COMPARISON OF QUALITY CHARACTERISTICS BETWEEN YII & CODEIGNITER

Quality Characteristics	Yii Framework	CodeIgniter Framework
Usability	Easy to Use with Gii Extension	Easy to use but developer must create Model View Controller Manually
Functionality	Framework Does half of Things, many functionalities are provided	Less functionalities provided as compare to Yii
Learnability	Easy to Learn if You know OOP Concepts and Core PHP	Easy to Learn if You know OOP Concepts and Core PHP
Resources	Open Source	Open Source

Table 2 shows the research criteria are carried out to evaluate Yii and CodeIgniter frameworks. The quality attributes Usability focused on how easy to use the Yii and CodeIg-

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niter framework. Form results it has been observed that Yii uses extension with MVC, while CodeIgniter uses just MVC architecture. MVC has much advantage but it is not easy for the new user to understand if creation of Model, View and Controller is manual. Hence in case of usability, this study shows that Yii has an automated approach.

In addition to these Functionality quality characteristics is evaluated for this research on both frameworks. From the results due to the nature of Yii framework i.e automation in the approach has more functionalities than the CodeIgniter. Therefore, one can prefer to use Yii instead of CodeIgnitor in case of having more functionality.

The third major quality attribute Learnability have been focused in this research. By the definition of learnability, it is easy to identify that Yii has more advantages in quick learning of the product instead of CodeIgniter.

The fourth quality attribute is resources, as it is an open source, the resources are available for the customization of the product, and one can easily customized the solution based on the knowledge of the frameworks. In this case both are open source resources are available and have a strong community on the net.

From above results of the quality attribute and all the application of these attributes on the inventory system. It has been observed that the case study was very easily developed with the Yii framework without knowing third party material but in case of CodeIgniter, one must know each step taken to complete the single process because of the complex nature of CodeIgniter.

Graphical summary for evaluation of quality characteristics according to Table 2 is illustrated as following:

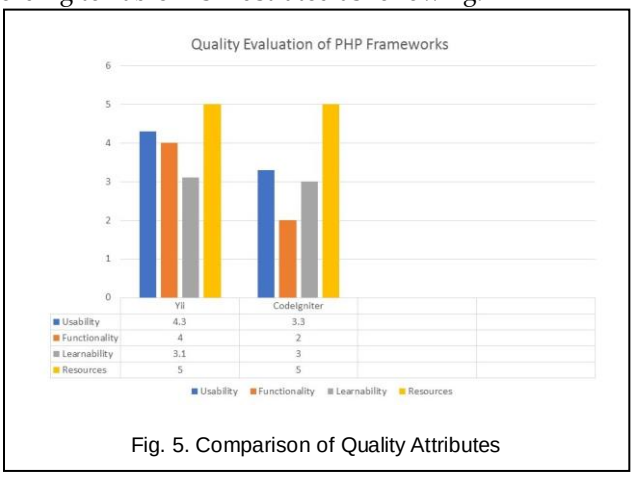

Fig. 5. Comparison of Quality Attributes

5 Conclusions

Many factors are considered for choosing a right tool such as requirements and goals. This depends on requirements and on professional development skills. First, the language selection is important for developer. The second step is to choose appropriate tool for that language. In World Wide Web development framework play vital role especially in the PHP based web sites. These frameworks are makes lots of work automatically for the developer. The developer must know the tool or framework for the required purpose.

In this research, world wide web-based development has been carried to compare the two most widely used PHP frameworks in the development community such as Yii and CodeIgniter. The study was used to develop the inventory system and comparative study was conducted for both frameworks by considering many quality frameworks. The quality attribute of the frameworks was chosen after studying relevant material in the literature.

This study shows that the Yii is an automated tool and has various functionalities and without knowing any further complex architecture to develop the required web in quick time. On other hand CodeIgniter is complex in nature, so it is highly recommended for the expert level users. Both have advantages and disadvantages; these frameworks can be used based on the project nature and time constraints.

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