Analysis on Web Frameworks

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Abstract—while creating a website choosing the best framework for the required application is the most important step. Since there are different types of frameworks it is not an easy task. Besides, if the wrong framework is chosen it could negatively impact the website. With the evolution of the web many frameworks like PHP, Java servlets, struts, Stencil, Rebel, Ruby on rails, Flask and Falcon have been developed. Large amounts of personal information and data are being sent and recovered on a daily basis from web applications. Every application contains confidential information and therefore has its own integrity policies. There can be a huge negative impact on the financial status of the company involved, if these policies are violated. Although, implementing them is very difficult even for the programmer’s with good security framework. The environment of the web consists of a huge number of different technologies and components; therefore, web applications have an extraordinary surface of attack. Security defects stored in web browser may expose authentication details and sensitive information stored in the website. This may breach the integrity and confidentiality of the session and errors in the code may lead to the addition of destructive contents in the web pages. Complex elements such as databases, operating systems, firewalls, servers and other software’s functioning of a web application. But for it to run properly, persistent maintenance and configuration is required. Injection attacks normally takes control over the websites database by data injection into the application. In this paper we discuss about different Frameworks, its types, benefits, the security provided and its challenges. We have also compared five of the leading frameworks in aspects of complexity and security.

Keywords—Framework, web design, cakePhp, struts, Ruby on rails, lift, django, security.

1. INTRODUCTION

In the early stages of web development era all applications were coded manually which produces a lot of errors and human work. To overcome these advances web frameworks were introduced in the early 2000’s. Web framework is basically a tool that helps build a website thus avoiding the bugs and conserving time. Both static and dynamic web pages can use frameworks. We can choose a framework depending on the task. Frameworks can be classified in two categories namely client side and server side. Client-side frameworks are responsible for implementing and improving user interfaces which come in the form of animated features, fancy layouts, vue.JS, angular.JS and ember.JS are some of the examples of client-side frameworks. Server-side frameworks however have rules and architecture and allows you to create many different kinds of pages. These frameworks can provide safety factors to the web pages. The examples of server side include Django, Zend, Ruby on rails, etc. The common features of framework cover security, URL mapping, web templates system, web caching, etc. Some of the major challenges in frameworks is scalability and performance. The behaviour of the core cannot be modified or changed. Some frameworks lack to provide sufficient support. Some may even cause difficulties for the developers to make any changes to the core behaviour of the framework. Some features of the frameworks may also affect the performance and speed of the websites. When a user chooses a framework, he/she is supposed to be cautious of the limitations. Some frameworks allow the web server to identify the users who are using the application and also restrict access to some functions based on some specific criteria. One example of framework that provides an interface for creating users and assigning them roles is Drupal.
2. ARCHITECTURE

Basic structure of a web framework consists of model, view and the controller. The Model basically supports the backend and contains all the data logic layers. The View takes care of how the page visually looks like (front end). The Controller converts the input to commands.

Another kind of architecture is the three-tier organisation. It has three physical layers i.e client, application and database. The database is usually RDBMS. The application communicates with the client using HTTP and also consists of the business logic running on a server. The HTML generated by the application layer is run by a web browser on which the client is working.

3. LITERATURE SURVEY

Hightower discussed some guidelines for struts and some related technologies like validator framework, java Server faces (JSF), etc. This research provided guidelines for using these technologies to develop web applications based on struts. The guidelines comprised of background information step by step instructions in best practices.

Golding discussed about the benefits of using frameworks as well as the main features of cakePHP framework. The author discussed topics like how to efficiently build and organize cake-based
applications to build more substantial web applications. The paper also talks about cakes built in helper’s which includes asynchronous JavaScript and XML.

Hazrati showed that the lift-based source code which was running inside Tomcat ran four times faster than the Rails based source code running inside Nmongrel. However, in the lift-based version the central processing unit (CPU) utilisation was less than 5% while it was 100% for the rails-based version on a dual core machine.

Chen et al. Discussed that lift solved problems more efficiently than other frameworks. The work presented the following lifts; strengths templating system, separation of presentation boot and schemifier, content and logic and snippets.

Maria Del and Giner analysed the best practices on web development frameworks. They also compared the various frameworks and identified issues in different contexts.

Mathias Schwarz gave descriptions about how to create, maintain and secure the frameworks.

4. RELATED WORK

To design a framework, we must start by setting up solid framework hierarchy. Components like colour and typography must be designed first followed by smaller components like grid, buttons and icons. And we have to constantly test the design framework.

A. Cloud Computing

Cloud computing is the delivery of services such as storage, servers, analytics, etc. over the internet which provides benefits such as security, performance, productivity, flexibility and cost. There are different types of cloud deployments such as public, private and hybrid clouds which allows the user to opt for the better option that covers their necessity. Examples include cloud tweets, Gmail drop box.

B. HTML 5

It defines the properties and behaviours of web page. HTML stands for Hyper Text Markup Language. It is developed by W3C. It is possible to embed images, animation, audio, etc without using any third-party programmes.

C. Template Framework

Templates can be used to improve the uniformity, layout and the navigation of any website. Templates are basically pre-designed web pages that is set of pieces of HTML code which cuts down the process of the developing the web application. Website templates can be fast and easy way to shorten the workload.
D. Object Related Mapping

ORM is a kind of virtual database for objects which can be used from the program itself. The prime function of ORM is to reduce the complexity of the code.

E. Security

Open web application security project helps industries, groups, companies, institutions, etc to develop, maintain, and secure applications. OWASP can be used to restrain different kinds of attacks such as XSS and SQL injections which change to obtain data.

F. Platform Support

One of the major challenges could be picking a suitable platform for the frameworks. Usually frameworks are designed to function on most of the existing platforms such as Linux, Windows, etc.

G. Debugging

Debugging can be defined as the process of pinpointing and eliminating errors or mistakes from code. And this particular action could be troublesome for the developers. Debugging can help or switch the false alarm of the developer. It uses the debugger to locate bugs in the code.

Other notable frameworks are Meteor, Flask, Laravel, Phoenix, Spring, Express, etc.
5. CONCLUSION

Different websites have different characteristics, which reflects on the website design. These characteristics are determined as challenges which need to be considered and analysed at the design stages. The websites require to fulfil user satisfaction which can be measured by testing. This paper proposes to consider using particular Django and Lift which will act as a framework for designing these websites with high usability rate. The proposed frameworks can be used for building or designing websites for different governmental, non-governmental or private institutions.

| TABLE 1: COMPARISON TABLE |
|----------------------------|
| Platform Support | DJANGO cakePH RUBY ON RAILS LIFT STRUTS |
| Cloud Computing | YES | YES | YES | YES | YES |
| HTML5 Support | YES | NO | NO | YES | NO |
| Debugging | YES | YES | YES | YES | YES |
| ORM | YES | YES | YES | YES | YES |
| Platform Support | Window s, Linux, OSX | Window s, Linux, OSX | Window s, Linux, OSX | Window s, Linux, OSX | Window s, Linux, OSX |
| Template Framework | YES | YES | YES | YES | YES |
| Security | YES | YES | YES | YES | YES |
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