BSc. Software Engineering

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Advanced Web Development Report: Laravel

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AIM

The aim of this report is to discuss about Laravel, a Web Development Framework and examine how Laravel could complement or replace Symfony in the development of my web application.

MOTIVATION

To figure out what web development framework would be perfect to discuss about in this report, I first did a bit of research on various web development frameworks such as Django, Laravel, Ruby on Rails, Spring and Express and finally decided to focus on Laravel because it is a great tool used in modern day full-stack web development and for many other reasons that will be discussed later in this report.

OVERVIEW OF LARAVEL

Laravel is a web application framework with expressive and elegant syntax as it provides a structure for creating a web application as well as an amazing developer experience through its various features such as an expressive database, dependency injection, unit, and integration testing, and many more features (Laravel, n.d.). This was confirmed by Stauffer (2019) when he explained that the two most renowned values of the Laravel framework is that it increases developer speed and developer happiness. Furthermore, he expatiated on this by explaining that unlike most other frameworks that also claim to deliver an amazing developer experience, Laravel has a primary goal of providing clear and simple codes, as well as features that aids the developer to learn and start writing codes easily.

COMPARISON BETWEEN LARAVEL AND SYMFONY

The comparison between the similarities and/or differences between the Laravel and symfony frameworks will be done based on the various features they both perform and how these features relate to both. Some of these features are:

Composer

Composer is a PHP tool dependency management used to list the packages a web application will depend on to function (Dockins, 2016). The composer is used by both the Laravel framework and symphony. Using the *composer.json* file found in the root of the project, several configuration options such as dependency management with packages, stability checking and many more are allowed (Dockins, 2016). Furthermore, it is required in both Laravel and symfony to have composer installed first and composer can be used in creating a new project in both frameworks as well.

MVC

A very core feature of the Laravel framework is that it follows the Model-View-Controller (MVC) design pattern. In the MVC pattern, the action of the user is sent to the controller from the view and the controller in turn notifies the model, then the model reads the information from the controller, processes it and then updates the controller and the controller finally updates the user (Sinha, 2019). Just like the Laravel framework, symfony also makes use of the MVC design pattern. The Model is used in storing the data of the application and most times in relation to the table and field of the database and in symfony, the model class is referred to as an entity.

Authentication

Laravel allows for multiple authentication types such as the login, register and logout (Ahmed, 2022). He also explained how to set up and use the authentication in laravel. Furthermore, he explained that for authentication in Laravel, two different user models are created and summarised by saying *Auth::guard('admin')* command is what allows the use of the login, logout, register, and many more authentication methods. Authentication is similar in the symfony framework as well because symfony uses authentication to find the correct user details. However, in symfony, authentications are created using *$php bin/console make:auth* or in the case of the registration, it is *$php bin/console make:registration*.

Database

A very significant difference between the Laravel framework and symfony framework is the way at which they both access the database. While symfony uses doctrine, Laravel makes use of Eloquent (Laaziri et al., 2018). This point was confirmed by Matula (2013) when they explained that the Laravel's Eloquent ORM is very efficient and easy to use. However, they also explained that instead of the Eloquent ORM, the RedBean ORM can also be used.

Migrations

A very important aspect of web development is the use and manipulation of the database (Matula, 2013). Just like symfony, Matula explained that in Laravel, data models can be created easily created using schemas and migrations. When creating the migrations table, Matula (2013) showed that we use artisan and provided the code as *php artisan migrate:install*. However in symfony, migrations are created using the console *php bin/console make:migration*.

Template

The template is the view section in the MVC model. The template used in Laravel is called Blade (Bean, 2015), while the template used in symfony is twig. Bean (2015) explained that Blade is Larvel's lightweight template, and that blade has a very easy to learn syntax. He then showed that in the blade syntax, *{{ $var }}* is used instead of the *<php echo htmlentities($var) ; ?>* used in the standard PHP syntax and this shows how Laravel increases template readability. Blade just like twig allows for the implementation of bootstrap and CSS.

Parameter	Symfony	Laravel
patterns	Factory, Composite, QueryBuilder, Flyweight, Observer, Dependency Injection, Data Mapper	Builder, Factory, Depot, Strategy, Supplier, Facade, ActiveRecord, Dependency Injection
Compatibility of the REST API	Yes (with FOSRestBundle)	Yes
Scaffolding	Yes	Yes
MVC	Yes	Yes
HTML modeling	Brindille	Lame
Installation via the composer	Yes	Yes
PHP standards recommendations	Yes	Yes
ORM	Yes	Yes
Multiply drivers support DB, storage	Yes	Yes
Full text search	Yes (ElasticSearch)	Yes (ElasticSearch)
CI Support, AQ	No	PHPUnit

Fig. 1. A table comparing some features of both Laravel and symphony. Source: Laaziri et al. (2018).

ADVANTAGES OF LARAVEL

There are several factors that gives Laravel the edge over some other frameworks and the reasons behind it being used for development of web applications. Some of these factors are:

- Laravel is a very good option when working on a large-scale time bound project because of its very easy data migrations and global management, as well as a very simplified authentication (Laaziri et al., 2018).
- Laravel has an advanced query builder mechanism (Soegoto, 2018).
- Laravel is used in creating highly interactive websites due to its effective and easy navigation (Solanki et al, 2017).
- Laravel is arguably the best and most efficient framework in e-commerce and one major reason for this argument is that Laravel provides a different and very efficient way of seeding the database through seed classes (Yadav, Rajpoot and Dhakad, 2019).
- It is a lot easier to make websites using Laravel as codes are not typed from the beginning rather, changes are made to the inbuilt libraries (Arai et al, 2018).

DISADVANTAGES OF LARAVEL

Irrespective of having a lot of uses, functionalities and advantages, the Laravel framework has its short comings as well. Some of the disadvantages are:

- Blocking I/O calls (Arai et al., 2018). They explained that in Laravel, complexities in the implementation of non-blocking I/O and custom interfaces makes Laravel not an ideal framework for this because of the project scalability.
- Laravel lacks inbuilt support, and this is because Laravel is lightweight (Szecsei, 2020). He further explained that this problem is not just specific to Laravel, but instead it's a PHP problem when dealing with long term supports and this in extension affects Laravel.

DISCUSSION ON HOW LARAVEL COULD BE USED IN MY WEB APPLICATION

Just like the Symfony framework, Laravel is also a PHP framework that can be used in developing a user interactive website (He, 2015). For this report, a website that allows users to store and retrieve their data from the database through registration and login/logout will be developed. Furthermore, the website would allow users to create albums, in addition, users can create, edit and view reviews of the albums created.

LARAVEL PROJECT

To build this website using Laravel, a Laravel project is first created. To create this project, Laravel must first be installed along with the needed dependencies such as the Composer. With this done, the command "*laravel new projectName*" creates the project (Nurullah, 2021).

DATABASE AND IDE

A database is created to store the user, album and review details. The database is created using Poseidon and the database server type is set to MySQL. The database created is linked and connected to the Laravel project using the PHP Storm IDE and the *.env* file will be modified to fit the database created.

LOCAL LARAVEL SERVER

The command "*php artisan serve*" is used to host a local Laravel server (stillat, 2016).

MODEL-VIEW-CONTROLLER (MVC) DESIGN PATTERN

This project will be following the MVC design pattern. The Model will be used to store the User, Album and Review classes and interacts with the database table (Chen et al., 2017). The view will be used in display the front end of the website to the users using Laravel's blade template and the controller used in making the different functions of this website (Nguyen, 2015).

FORMS AND SEEDING

In the development of this website, forms will be created to store the details of the user, album and reviews in the database (Stauffer, 2019).

The form views are created with the blade templates and styled using Bootstrap and CSS (McCool, 2012).

REGISTRATION AND LOGIN/LOGOUT SYSTEMS

To create the registration and login forms, the User Model is first created to define the user table in the database and to store the data inputted in the forms. The command for creating the User Model is "*php artisan make:model User -m*" (Ramalingaiah and Sulthana, 2018). After the User Model has been created, the form validation controllers are made. To make the controllers, the command "*php artisan make:controller FormValidationController*" is used (Digamber, 2022). In the registration controller, the method "*createUserForm()*" is used in making the form and this method also renders the view. The command "*php artisan migrate*" is used to migrate the user data into the database (Saunier, 2014).

The password entered in the database needs to be hashed and Laravel can hash a password by using the *make* method on the *Hash* façade (Sendiang et al., 2018).

The Laravel authentication library Fortify, is installed to handle the registration, login and routing of the system. Fortify defines the routes that returns the views of login and register (Laravel, n.d.). Fortify is also used in redirecting the user to the homepage after the inputted details has been validated by the system.

CREATING AND LISTING ALBUMS AND REVIEWS (SEEDING)

After the forms and model of the album and review has been created (using the "*make:model* and *make:controller*" as used for registration and login), the Laravel command "*make:seeder*" is used to create the class that will add albums and reviews to the database (Sinha, 2016). Using *Eloquent* relationship, One To Many (inverse), the *userId* will be made a foreign key in both the Album Table and Review Table and the *albumId* a foreign key in the Review table (Lopez, 2016).

To create and list the albums and reviews that has been created, SQL Queries are used. The *insert* statement is used in adding into the database and the *select* statement used to retrieve information from the database (Jound & Halimi, 2016).

SECURITY

Laravel provides security using tokens. For the forms, a hidden "*@csrf*" token field is added in the form to validate requests (Bruce, 2019).

CONCLUSION

Laravel is a PHP open-source framework that is used for full stack development. Laravel has been argued by a couple web developers to be one of the best, if not the best PHP framework for many reasons, but one very significant feature of the Laravel that makes it stand out among other frameworks is that Laravel is developer friendly. Furthermore, Laravel contains libraries which can be accessed using different Laravel commands and used by the developer, without them having to type in new codes.

Laravel has several features which in some cases are very similar to that of the symfony framework and some features very different. For an example, both Laravel and symfony both makes use of the Model-View-Controller, however, in Laravel, the template makes use of blade to implement the view, while symfony makes use of twig to implement the views.

Laravel is not a perfect framework, even though considered by most to be great, Laravel has its defects as well as its strengths. When using Laravel to review the development of the project in part 1, it is clear that Laravel is a perfect replacement for symfony in this project as it allows for user interactions and authentication as well as database migrations.

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