

Spring Framework vs Django Framework: A Comparative Study

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Abstract - A framework is used as a platform for developing software applications such as Ruby, Django, Angular, Laravel etc.,. Framework contains libraries, programs and compiler.

The proposed work is about the comparative analysis between the web technology frameworks Django and Spring. Spring framework is for developing the JVM(Java Virtual Machine) based systems and applications. This framework helps to create performance, simple and fast flexible code. Django framework is for developing python based web application. This framework helps to create fast, secure and scalable website. Comparison is based on pros and cons and the framework usage in particular websites. Based on the website usage and various domain usage Django is better when compare to spring framework.

Key Words: Spring, Django , Angular, Framework & JVM

1. INTRODUCTION

The fundamental issue which becomes apparent for a web developer is to select a language with a particular framework. Making custom web application according to a user's convenience has always been a priority, for which a developer should make a wise choice while selecting the framework which can provide all the necessary components to develop the web application.

So what is a framework? Framework is a platform which provides the ease of developing user friendly application. It can be defined as an open or unimplemented function or object which helps in developing custom application. It includes predefined classes and functions which are considered to be the best features, as it can be used to process inputs as well as interact with both hardware devices and system software. And also it provides the structure of an application.

Since the era of framework came into picture, almost every language has its own framework. These frameworks are widely used in web development, for which, the most trending languages are Java and Python. Both of these

languages contain a number of frameworks, but Spring and Django for Java and Python respectively, are considered to be the best framework to develop web application according to the web developers.

2. METHODS AND MATERIAL

2.1 Review of literature

Presently choosing a framework is a great deal for web development. There are a lot of frameworks in the market and each is designed to address different project needs. For many organisations and independent projects, the spring and django frameworks are an easy choice - they are the most popular web development tools. But why is that? What are they used for? Let's figure out what they are and why so many developers use them?

[1] Explored work based on Struts framework and hibernate framework are integrated with Spring framework. This is used for college student information management. The main purpose is to reduce the coding part.

[2] Explored work is to reduce the usage of EJB(Enterprise Java Beans), instead of EJB work is based on Spring framework for reducing the complexity in area of web applications software development and implementation.

[3] Explored work is about the Django framework usage in greedy strategy algorithm. In this work Django is used to save the usage of memory about 10% with almost time consuming.

[4] Explored work is about creating the real time point of sales system using open source technologies like Django, Rabbit and Node.js. This is for implementing customer purchase to supplier being initiated over mail for business organization.

2.2 SPRING FRAMEWORK

The spring framework is an application framework and inversion of control container for the java platform. Spring is

one of the widely used java platform. It is a Java platform that provides comprehensive infrastructure support for developing Java applications. It is also the most popular application development framework in java, which is used to create high performing, easily testable and reusable code.

Spring framework is developed by pivotal software on 1st October, 2002(i.e., 17 years ago).it is written in Java where it uses the platform of Java EE. Spring framework is an open source java platform. It was initially released written by Rod Johnson and was first and was first released under the Apache 2.0 license in June 2003. Spring is lightweight when it comes to transparency and size, the basic version of spring is around 2MB only.

It also allows us to enable POJO based programming principle. Here, POJO is used as an acronym for "PLAIN OLD JAVA OBJECTS" which means that it is not bounded by any special restriction and not requiring any class path.

DESIGN PATTERN

Inversion of Control (IOC) and Dependency Injection (DI) is a core design pattern of Spring framework. Dependency injection is one of the important part of inversion of control. Inversion of control is the principle of object oriented programming, where the object of the programs does not depend upon the implementation of other objects, but they are familiar with the abstraction of other objects for later interaction. Dependency injection is a design pattern used to implement inversion of control.

1. Inversion of Control:

An IOC container is a common features of frameworks that implement IOC. The container will create the objects, wire them together, configure them, and manage their complete development stage from creation till demolition. This Spring container uses dependency injection (DI) to manage the components that make up an application. It can maintain the creation, configuration and lifecycle of all container managed object separately from the code where they are referenced. The application also depends more flexible and adaptable, especially if the application pulls instances of interfaces from the IOC container. At any point, the maintainer of the IOC container can provide a new implementation of a class when they request an instance. An IOC container can provide better implementation at runtime. The inversion of control is a technique of reversing the traditional approach to create and initialize Java objects. Rather than creating objects, developers ask a third party, such as the Spring

container(IOC) or the Java EE context, to provide instances instead.

2. Dependency Injection:

Dependency Injection is a technique where an object supplies the dependencies of another object. It allows the creation of dependent object outside of a class and provides those objects to a particular class through different ways. There are three types of class's involved Client class, Service class and Injector class. Also types of dependency injection are Constructor injection, Property injection and Method injection.

Dependency injection/inversion of control design pattern allows us to abolish the hard coded dependencies. We can make implement dependency injection in Java to move the dependency resolution from compile-time to run-time.

BENEFITS OF SPRING

1. **Lightweight:** Spring is modular lightweight framework which allows you to selectively use any of its modules on the top of Spring core.

2. **Solving difficulties of enterprise application development:** Spring is solving the difficulties of development of complex applications. It provides Spring Core, Spring IOC and Spring AOP for combining various components of business applications.

3. **Support enterprise application development through POJOs:**Spring supports development of Enterprise application development using POJO classes which abolish the need of importing heavy enterprise container during development. This makes application testing convinient.

4. **Application Testing:** Spring container can be used to develop and run test cases outside enterprise container which makes testing much easier.

5. **Modularity:** Spring framework is a modular framework and it has many modules such as Spring MVC, Spring ORM, Spring JDBC, Spring transaction, which can be used as modular requirement.

6. **Testing your application:** Testing an application written in Spring is easier because environment dependent code is shifted into framework, further it becomes easy to use dependency injection for injecting test data by using JavaBeanstyle POJOs.

DJANGO FRAMEWORK

Developers particularise django as “the web framework for perfectionists with deadlines”. It is defined as a high level web framework that persuades rapid development and clean, practical design. It is built by well experienced developers and takes care of much of the inconvenience of web development, so one can focus on writing their app without needing to reinvent the wheel. Also, it’s a free and an open source. Django is a framework for backend web applications based on python, which is one of the top web development languages. It’s main goals are simplicity, flexibility, reliability and scalability.

Django has its own naming system for all functions and components, for an instance, the HTTP responses are called “views”. It also has an admin panel which is considered easier to work with when compared to Lavarel or Yii. The other technical features include simple syntax, its own web server, MVC (model view controller) core architecture, it comes with all the essentials needed to solve common cases i.e., the batteries are included, an ORM (object relational mapper), HTTP libraries, middleware support and a python unit test framework.

In addition to this, django provides a dynamic **CRUD** (create, read, update and delete) interface which is configured with admin models and generated through introspection. CRUD is used to detailed the basic database commands, which means the interface facilitates viewing, changing and searching for information.

BENEFITS OF DJANGO

1. **Fast and simple:** one of django’s main goals is to make work simpler for the developers. For which, the django framework uses the following ways

- The principles of rapid development, which means developers can do more than one iteration at a time without starting the whole schedule from scratch.
- DRY philosophy (don’t repeat yourself), which means developers can reuse the code which is already existing and focus on the unique one. As a result it takes lesser time to get the project to market.

2. **Secure:** security is one of the priority for django. It helps developers avoid common securing issues like clickjacking, cross-site scripting and SQL injection. It promptly releases

new security patches and is usually the first one to respond to vulnerabilities and alert other frameworks.

3. **Suits any web application project:** with django, projects of any size and capacity can be tackled, whether it’s a simple website or a high-load web application. Reasons to use django for your project are as follow

- It’s fully loaded with extras and scalable, therefore, applications can be made that handle heavy traffic and large volumes of information.
- Your project can be based on Mac, Linux or PC as it is cross-platform.
- It works with most major databases and allows using a database that is more suitable in a particular project, or even multiple databases at the same time.

4. WELL ESTABLISHED

Django is time and crowd tested. It has a big, supportive community accessed through numerous forums, channels and dedicated websites. When there’s a problematic function in the code, it’s easy to find help and to find developers if your company is looking to base the next project on django.

Django started off with great documentation, the best of any other open-source framework. And it’s still maintained on a high level, amended along with the new functions and fixes, so you can conveniently adapt to changes. Any issues with framework will be solved as soon as they arise. The software is constantly updated to make working with django more convenient than it already is.

A. COMPARISON BETWEEN SPRING AND DJANGO

i) Why developers choose

- **Django** – for its features like rapid development, open source, great community, easy to learn, MVC, elegant and beautiful code.
- **Spring** – for its features like java, open source, very powerful, enterprise, lot of subprojects and easy setup.

ii) Cons of using

- **Django** – it has underpowered templating and ORM. Also it ignores HTTP method in URL dispatcher. It uses internal subcomponents coupling and consists of autoreload that can restart the whole server.

- **Spring** – it has a verbose configuration and draws us into its own ecosystem and bloat.

iii) Companies using

- **Django** – Instagram, Pinterest, Udemy, Spotify, Trivago, Hinge, MIT, Courser, etc...
- **Spring** – Zaland, Zillow, Fitbit, Edify, BillGuard, Ticketmaster, Meltwater, Opower, etc...

iv) Tools integrated with

- **Django** – Python, Laravel, PyCharm, Sentry, Django REST framework, Stream, etc...
- **Spring** – Java, Spring Boot, Bugsnag, Auth0, Hazelcast, Java EE, QueryDSL, etc...

v) How developer use

- **Django**- it takes out the inconvenience out of building an enterprise web application using Python. For instance, admin app for administrations, ORM, for deploying against different database vendors, social auth package for authentication with enterprise IdP and guardian package for authorization.
- **Spring** - from Spring Boot, to SpringMVC, the configuration architecture & profile paradigm, Spring Cloud expandability, to the ease with which one can deploy Spring applets as microservices is very convenient.

B. RESULTS AND DISCUSSION

As a result, it was found that Django have 97,716 websites whereas Spring have 2,968 websites all over the world. Let's discuss about the market share by top websites through a bar graph.

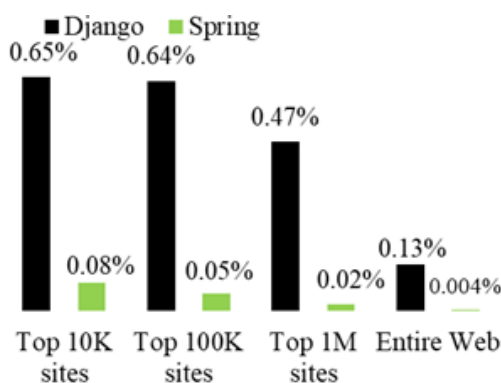


Fig -1: Market share for Django and Spring

The following bar graph shows the market shares of top websites. As you can see in top 10K sites Django shoots up to 0.65 percent market share whereas Spring hits a low point at 0.08 percent market shares. As we go to top 100K sites Django only drops by 0.01 percent in its share whereas Spring drops to 0.05 percent in market share. When we go to top 1 million sites still, we see a good market share of 0.47 percent by Django but only 0.02 percent of market share by Spring. In the entire web there is a huge decline for both the frameworks but still Django manages to keep 0.13 percent of market share. But Spring reaches its lowest point of 0.0004 percent in its market share.

Let us not stick to one graph analysis instead analyse another graph which shows different website categories which uses either Django or Spring framework.

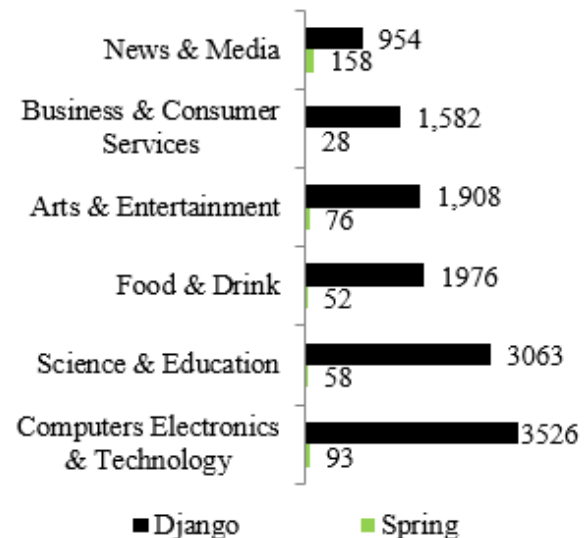


Fig -2: Comparison of frameworks in various domains

3. CONCLUSION

Framework is a form of libraries to develop web based or software applications. There are different types of frameworks are available. Here the proposed work to, compare spring and django framework. Comparison is based on user usage, pros and cons, and based on the various domain usage. From the result analysis came to the conclusion that Django framework usage is higher when compare to spring framework.

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BIOGRAPHIES

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