

# Research report

## Spring Boot

Maarten Hormes

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## Problem description

For creating back-ends using Java, there are enough possible frameworks to support the development of these back-ends. From the start of this semester we have been using Spring Boot since it was recommended to us. Although I did follow this recommendation I have no clue where the limits of Spring Boot lay and if it would be a suitable framework for creating the back end of the Smoke-it website.

## Main question:

Is Spring Boot a suitable framework for creating the back end of the Smoke-It website?

## Sub-questions:

### 1. What is Spring Boot?

- A. Document analysis: By studying the Spring Boot documentary, I can find general information about what Spring Boot is.
- B. Expert interview: By talking to one of my teachers or someone else with experience in Spring Boot, I can gather information about what the Spring Boot is. Besides that, they can guide me to into the right direction for my literature study
- C. Literature study: Looking through guides and Spring Boot related posts on forums like Stack Overflow can give me an idea of what Spring Boot is.

### 2. What features does Spring Boot offer?

- A. Decomposition: By splitting all the Spring Boot has to offer in smaller pieces, it can be easier to discover all that Spring Boot has to offer.
- B. Expert interview: By talking to teachers that have experience with Spring Boot I can discover the functionalities that Spring has to offer.
- C. Literature study: There are enough online resources documenting the possibilities and functionalities that Spring has to offer. Resources like Stack Overflow or the Spring documentation.

### 3. What software project can benefit from using Spring Boot?

- A. SWOT analysis: By making a SWOT analyses I get an overview of when Spring Boot can be useful and where its pitfalls are.
- B. Community research: There are enough people that worked with Spring Boot before. Their experience can be gathered via a platform like Stack Overflow. Comparing multiple of these experiences can lead to a conclusion for what software project can benefit from Spring Boot
- C. Expert interview: Instead of gather the experiences of people online, I can gather the experiences from the teachers at school.

4. What alternative frameworks are available for projects that could use Spring Boot?

- A. Community research: Just like finding experiences for the use of Boot Spring, there will be experiences with other frameworks. These experiences can once again be gathered to draw a conclusion.
- B. Guideline conformity analysis: Since we know what software project we are doing, we can gather the guidelines for these kinds of projects. These guidelines can include what frameworks to use.
- C. Best good and bad practices: Gathering information on what has and hasn't worked before is helpful to decide what frameworks will and will not be suitable for my software project

## Results:

### Sub-question 1:

#### What is Spring boot?

Spring Boot is an open source Java framework that helps to create stand-alone, production-grade applications. It is build on the existing Spring framework. Spring Boot can be used as any other Java library. It provides Java developers a platform to get started with an auto configurable Spring application. This is exactly the reason it was made, since it was created to; provide a radically faster and widely accessible 'getting started' experience with Spring (since the Spring framework has a lot of configuration that can be hard for a new user), provide a range of non-functional features that are common to large classes of project(e.g. security, software metrics, embedded servers, etc.) (*Spring Boot reference documentation, 2021*). (*What is Spring Boot?, 2019*)

Spring Boot can be used to build applications both in Gradle and Maven using java, Kotlin and Groovy. It has an initialer you can use to generate new project with the correct settings and dependencies. This showcases how Spring Boot helps you with a first experience in Spring.

Since I'm new in Java development, this Spring boot framework seems like a nice way to start since it offers this widely accessible 'getting started' experience. The initializer helps me to get all the Gradle files set-up and ready to start development.

## Sub-question 2:

### What features does Spring boot offer?

Spring Boot has a lot of features. Too much to just list them all. The most notable features are listed and described below:

**Stand alone:** Spring Boot removes the need to deploy your application to a web server. You can simply run the application from the command line to start your application, which would be hosted on your local machine. (*What is Spring Boot?*, 2019)

**Support for in memory databases:** Spring does not support the usage for in memory databases. With the introduction of Spring Boot this issue has been resolved. In memory databases are great for testing an application without having to worry about ruining your persistent database. (*Difference between Spring and Spring Boot*, 2020)

**Auto-configuration:** Spring Boot is capable of changing the configuration based on the dependencies you list. If you list a dependency that is dependent on another one, Spring Boot will automatically include this needed dependency. This helps you write less lines of code, and helps the developer prevent configuration errors. (*What is Spring Boot?*, 2019)

**Actuator:** The actuator allows you to see what is going on inside a running Spring Boot application. With the auto-configuration there is the possibility of not knowing what is going on in your application. This issue is addressed by the actuator. You could, for example, see what beans are configured in the application context, what auto configuration decisions are made, what environment variables are being used and a lot more. (*Top 5 Spring Boot features java developers should know*. 2018)

**Spring Boot initializer:** The initializer helps solve problems regarding the project structure. It is a web application that created a Maven or Gradle project with Java, Kotlin or Groovy. All you need to provide are some variables such as the name of your project, the language, build tool, etc. This tool helps you start up an Spring Boot application in an instance, instead of having to worry about all the different files and configuration settings. (*Top 5 Spring Boot features java developers should know*. 2018)

Like mentioned in sub-question 1, the initializer would be a very useful feature for me, since I'm still new to Java and Spring. The auto-configuration is helpful as well since I won't have to worry about all configurations. This also leads to a trap, since the auto-configuration can configure stuff that you don't understand, that possibly cause issues later on. The support of in memory databases is a life saver, since I won't have to setup a database and a connection to it. Overall the features seem very helpful in my situation, and the dangers that all the automatic configuration brings are negligible during the first few weeks of development.

### Sub-question 3:

#### What software project could benefit from using Spring boot?

The simple answer would be every. The more important question to ask is why would they benefit from using Spring Boot. (*Marcel. 2021*)

Like listed in the results of sub-question 2, Spring Boot has extra features to offer that are not part of the Spring framework. To answer the question why should we use Spring Boot, we first need to know why we would use Spring in general.

Simply put, Spring provides infrastructure support for developing Java applications. This means that it is packed with out of the box modules like; Spring JDBC, Spring ORM, Spring Security. These modules can drastically reduce the development time of an application. For example, before in Java web development there was the need to write a lot of boilerplate code to insert a record in into a data source. By using the JdbcTemplate of the Spring JDBC module, we can reduce it to a few lines of code with only a few configurations. (*Spring VS Spring Boot. 2021*).

This showcases that using the Spring framework will make your life easier as a developer, saving you a lot of time. Since we already know that Spring Boot is built on top of the Spring framework, it becomes clear the using Spring Boot comes with these same benefits. Plus the added features listed above. The combination of reducing the amount of time spend on the boilerplate code and the easy step in for every new Java developer are a very solid reason to use Spring Boot.

The question why? Bring us the question why not? Of course there is a down side to using Spring Boot. The biggest challenge you will face is the lack of Control. Since Spring Boot was made to do a lot of configuration for you, there may be additional dependencies which increase the deployment file size, and the performance of your software. Another disadvantage may be; If you never worked with Spring and want to learn some harder concepts as proxies or dependency injection, Spring Boot doesn't cover most details. So learning these concepts would work better outside of Spring Boot. (*Pros and Cons of using Spring Boot ,2020*)

To finish this sub-question, I could ask myself is the smoke-it project a project that could benefit from using Spring boot. Once again the simple question is yes. As mentioned in sub-question 2, there are some challenges when using Spring boot with very little knowledge. But since I need some assistance with getting into Spring and Java development, Spring boot would be a proper tool.

#### Sub-question 4:

##### What alternative frameworks are available for projects that could use Spring Boot?

Just like in sub-question 2, there are way to many options to list them all. After some research I decided to list 2 frameworks I found often. Both will be accompanied by a description of the framework, some advantages and disadvantages compared to Spring Boot.

**Grails:** Grails is a Java and Groovy framework used when developing web applications. Grails allows developers to concentrate more on the actual application requirements and spend less time configuring the framework. It provides tools for development based on tools like; Quarts, Hibernate and Spring. (*Getting started with Grails Java Framework, 2021*)

The grails setup process is very simple. You should be able to start building an app in an hour. If you come across something that causes issue, the documentation is really impressive. It has a dynamic configuration feature, meaning you don't have to restart the server to change the configuration. There are also some disadvantages to Grails. Some are; You have to buy IntelliJ Idea since other IDE's don't have or only provide limited support. You have to learn Groovy coding, and the integration process is complicated. (*The pros and cons of Play and Grails Java Framework, 2021*)

Since I want to code in Java, grails instantly becomes a lot less interesting. Although I do see how someone with the right interest could choose to learn Groovy, and make use of the rapid development cycle and easy environment Grails can work with.

**Play:** Play receive a lot of love since it is easily programmable, scalable and powerful. You often make small changes in coding during the development and testing phase to identify the best possible solution. Generally, you would need to restart the system to see the changes you made. However, if you use Play, all you need to do is refresh the browser to see the recent changes immediately. This makes the testing of your application an easier process. (*The pros and cons of Play and Grails Java Framework, 2021*)

Some disadvantages of using play would be; the use of the programming language Scala. It is a complicated programming language and can be challenging for novice programmers. Besides, it does not support backward compatibility to an older version of the framework. Last but not least, it is hard to understand the architecture and things going on behind the scene. (*The pros and cons of Play and Grails Java Framework, 2021*)

Just like Grails, the use of another language than Java makes it less interesting. The easy configuration and start up that Spring Boot offer are not matched by Play. Making it a less suitable solution for our project.

## Conclusion:

After my research I can conclude that Spring Boot will be a suitable framework for building the back-end of the Smoke-It web shop. Since it is build on top of the Spring framework, it comes with a lot of powerful modules that improve the development process, saving you a lot of time. The added benefits of the Spring Initializer and the auto configuration make this framework even more powerful. Since I already have some object-oriented development experience, I should be able to keep track of the configuration Spring Boot does for me, without having to completely understand it.

## Recommendation:

Spring Boot can be a powerful framework to build a Java backend for every developer that has some coding experience with object-oriented development, but does not yet have the required knowledge, or the will to gain this knowledge, to configure and use Spring.



## References

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## Version History

When?	What?
05/10/2021	First draft of document. Chosen subject (Spring Boot)
07/10/2021	Added research method for sub questions
11/11/2021	Started research for sub-question 1
18/11/2021	Added results for sub-question 2
21/11/2021	Finished first finished version of report
14/12/2021	Added question titles for each sub-question. Added a conclusive part to each sub-question