

SPRING BOOT IN DEMAND

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ABSTRACT

Spring Boot, an open-source Java framework has gained massive popularity in the Java development community in recent times. Spring Boot came as a revolution as it's a convention-over-configuration extension for the Spring Java Platform. This approach has made Spring Boot a good choice for many companies. Java is widely used for around in market for building Embedded Systems, Scientific Applications, Game Development and now days with Artificial Intelligence and Machine Learning. Now, Spring Boot made it easier to create production ready spring-based Java Applications that is "just ready run". This paper discusses on why Spring Boot is in demand and best choice for building a backend for applications to be more scalable and efficient. Also, its added benefits to Java framework.

Keywords: Java, Spring Boot, Spring Framework.

1. INTRODUCTION

In early days of application development using Java was tedious ,complex and time consuming. Developer spend most of their time working on the project configurations and environment setups. Over the time new tools were discovered that manages these configurations. But, Spring Boot became the first choice and most used gigantic environment by developers. Development of new applications in terms of quality, scalability, multithreaded has been improved effectively. Spring Framework as it offers a dependency injection feature that allows objects to define their own dependencies that the spring container later injects into them. This feature enables developers to create modular applications consisting of loosely coupled components that are ideal for micro services and distributed network applications.

Spring Framework also offers built-in support for typical tasks that an application needs to perform, such as data binding, type conversion, validation, exception handling, resource and event management, internationalization and more. It integrates with various Java EE technologies such as RMI (Remote Method Invocation), AMQP (Advanced Message Queuing Protocol) and Java Web Services and others. It was created to simplify the configurations for web applications, however developers still configured a lot of xml files, which did not manage to meet objective.

Spring Boot was released in April, 2024 developed by VMware. It is built on top of the Spring Framework, which made easier to create Java applications by mitigating much of the setup and configuration effort. It follows the software paradigm of "convention-over-configuration". In simple terms the efforts if developers are minimized as it helps developers create standalone applications that are ready for production with minimal configuration.

2. SPRING BOOT & ITS CAPABILITIES

Spring Boot has three important capabilities which provide it the advantage over traditional Spring Framework.

2.1 Auto configuration

Autoconfiguration initializes applications with pre-set

Dependencies so that you don't have to configure manually. Java Spring Boot comes with built-in autoconfiguration capabilities, which automatically configure both the underlying Spring Framework and third-party packages based on your settings. For example, Spring Boot automatically creates an in-memory database & beans for a ready-to-use JDBC Template after adding it to the class path and include the H2.jar. So for DAO layer, you do not need to write the code.

2.2 Opinionated Approach

Spring Boot uses an opinionated approach to adding and configuring starter dependencies, based on the needs of your project. Using its own judgment, Spring Boot chooses which packages to install and which default values to use, rather than requiring you to make all those decisions yourself and set up everything manually. By

defining the needs of the project during the initialization process, during which we can choose among multiple starter dependencies known as Spring Starters.

Spring Boot's initializer solves the problem of project structure. Maven or Gradle can be generated from the website using Java, Kotlin, Groovy, or Spring Boot.

Each Spring Boot project has POM file which needs to be provided with dependencies, name, group, artifact, etc. Additionally, a variety of starter dependencies can be selected, such as web, JPA, and security.

Spring Boot also includes built-in servers like Tomcat and Jetty, in order to run the application without setting up a separate servers.

For example, the 'Spring Web' starter dependency simplifies building Spring-based web applications. It requires minimal configuration by adding all the necessary dependencies—such as the Apache Tomcat web server—to your project. 'Spring Security' is another popular starter dependency that automatically adds authentication and access-control features to your application.

3. STAND-ALONE APPLICATION

Spring Boot helps developers to create applications that just run. Specifically, you can create stand-alone applications that run on their own, without relying on an external web server. You can create stand-alone applications by embedding a web server such as Tomcat or Netty into your app during the initialization process. As a result, you can start your application on any platform by pressing the Run command. It is even ideal for building lightweight, independent services known as microservices.

4. TECHNOLOGY DEVELOPMENT

Spring Boot has been used in multiple areas with different technologies, which make it more in demand.

4.1 Microservice Architecture

Spring Boot is closely tied to the rise of microservices architecture. Microservices are small, independent services that work together to build a larger application. Companies favour this approach because it allows different parts of an application to be developed, deployed, and scaled independently.

Spring Boot is perfect for building microservices because it's lightweight and has built-in support for creating RESTful services. As more companies adopt microservices, the demand for Spring Boot continues to grow.

4.2 Big Data Integration

Big data systems often require a backend to handle large-scale data processing and ensure efficient data flow between various services. Spring Boot provides various tools to work with big data technologies like Apache Kafka, Apache Hadoop, NoSQL support etc.

Apache Kafka with Spring Boot provide a distributed streaming platform used in big data pipelines. Kafka is used to collect, process, and distribute large volumes of data in real time, which is ideal for big data applications.

Spring Boot applications can be used alongside Apache Hadoop for processing and storing massive amounts of data.

It can also interact with various databases and data lakes, such as MongoDB and Cassandra, which are commonly used in big data ecosystems and makes easier to build data pipelines that ingest, process, and serve data for AI/ML use case.

4.3 Data Stream Processing

Spring Boot's support for stream processing technologies. Spring Integration and Spring Cloud Stream are used to process real time data & to perform predictive Analysis.

Using Spring Cloud real time streams like sensors, IoT devices, etc. Though AI & ML models data can we processed and generate the predictions.

4.4 Machine Learning Integration

Spring Boot can be integrated with several ML and AI frameworks and making it easier to deploy ML models and AI-driven applications. Using spring boot, REST APIs can be exposed which serve in training machine learning models in framework like Tensorflow, Keras or PyTorch. Spring Boot can be used to build the backend services that integrate with Jupyter to expose models and predictions for production systems.

4.5 Security & Authentication to Applications

Spring Boot provides robust security features like OAuth2 & JWT based authentication mechanisms, which can secure APIs that expose machine learning models or data pipelines. Spring Security is a framework that focuses on providing both authentication and authorization to Java applications. Like all spring projects, the real power of Spring Security is found in how easily it can be extended to meet custom requirements. It provide protection against attacks like session fixation, clickjacking, cross site request forgery, etc.

5. INDUSTRY ADOPTION

Spring Boot is used by a wide range of companies, from startups to large enterprises. Many well-known organization use Spring Boot for their backend systems like

- Netflix uses Spring Boot to build microservices that deliver content to millions of users worldwide.
- Amazon Leverages Spring Boot for building scalable and cloud-based applications
- Google Cloud also supports Spring Boot as part of its cloud offerings.
- Walmart, utilize Spring Boot to build microservices architectures for handling customer transactions, inventory management, and customer engagement.

Companies like JPMorgan Chase, Lufthansa, and T-Mobile leverage Spring Boot to automate the deployment and scaling of applications in cloud environments, significantly improving the speed and efficiency of their software delivery pipelines.

These companies favour Spring Boot for its ease of use, speed, and ability to handle complex applications at scale. This widespread adoption makes Spring Boot skills valuable in the job market.

6. CONCLUSION

Spring Boot is in high demand in today's software development world. Its ability to simplify Java development, speed up production, and support modern architectures like microservices makes it an attractive choice for companies. As more businesses adopt microservices and cloud-based applications, the demand for Spring Boot developers will only continue to grow.

Market demand for Spring Boots has remained strong. There is always something new coming out of the spring community and they have created an ecosystem that has gone global. This framework dominates the entire market today.

It can be used to formulate Restful Webservices and API more simply and reduce the developer's efforts by avoiding all the boilerplate code. It is very useful and appropriate, especially for a huge amount of data and processing. While other competitors like NodeJS are faster, it's still ineffective due to its security features, especially in the banking sector. As per analysis, 24% of the market was affected directly by spring boot and 41 % indirectly by spring supported services. It is better to understand the demand and supply of the IT industry to diversify our research focus It can be used to formulate Restful Webservices and API more simply and reduce the developer's efforts by avoiding all the boilerplate code. It is very useful and appropriate, especially for a huge amount of data and processing. While other competitors like NodeJS are faster, it's still ineffective due to its security features, especially in the banking sector. As per analysis, 24% of the market was affected directly by spring boot and 41 % indirectly by spring supported services. It is better to understand the demand and supply of the IT industry to diversify our research focus.

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