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Spring Boot Deep Dive

Understanding Spring App Lifecycle Phases

Pat Witt

Victor He

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About us

Pat Witt

- Software Engineer at Lexicon for 2 years.
- Worked mostly with backend technologies for 6 years.
- Current stack: Java, Kotlin, React
- Play in local AFL footy team.

Victor He

- Software Engineer at Lexicon for 1 year
- Backend Java engineer for 2+ years prior
  - Microservices, Spring Boot
- Current stack: Java, Kotlin, React
- Play in a metal and rock cover band 🎸

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Agenda

- Why this talk?
- What is Spring?
- Life without Spring
- Spring boot life cycle
- Spring Boot app demo
- Questions

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Why this talk?

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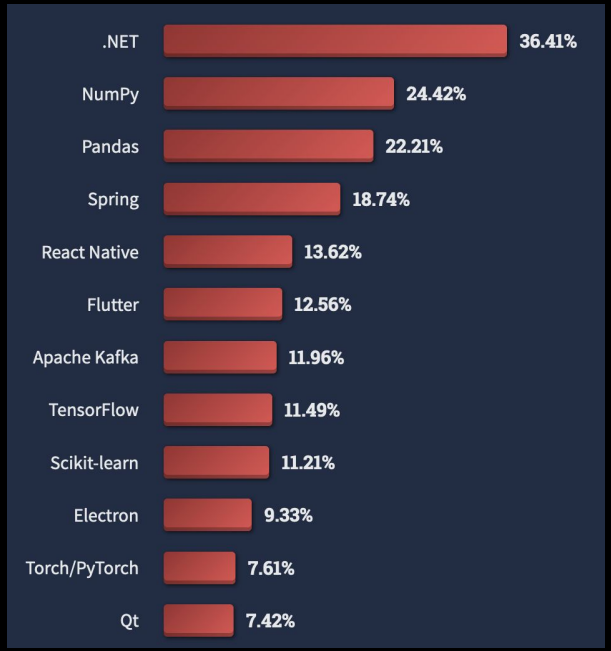
Statistics from all developers

Other frameworks and libraries



- 18.74% of professional developers use Spring.
- A third (33.4%) of professional developers use Java.
- Almost half (48.97%) of professional developers using microservices

Sources from StackOverflow's 2022 Developer Survey: https://survey.stackoverflow.co/2022/#most-popular-technologies-language-prof.

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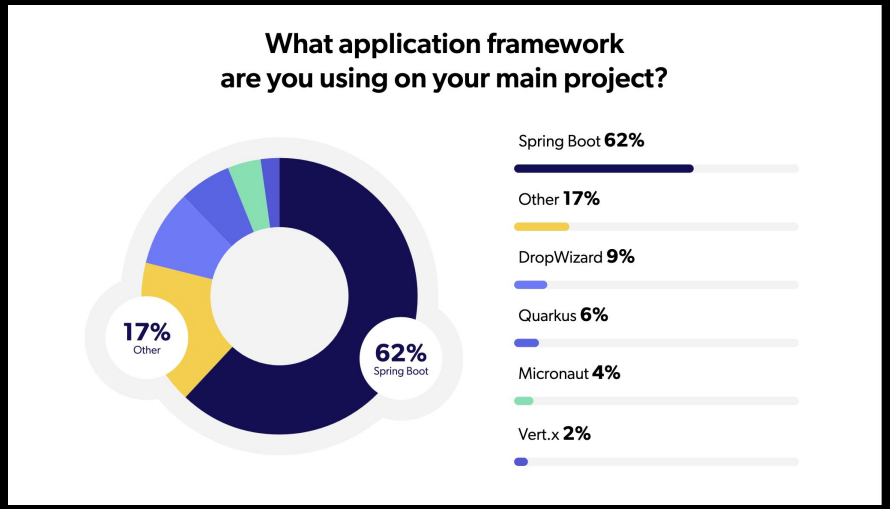
Statistics from Java developers



- 62% Java developers use Spring Boot in 2021.
- Down from 83% in 2020, but still a dominant choice.
- 49% have microservices as the architecture for main app.

Sources from JRebel's 2021 Java Developer productivity report: https://www.jrebel.com/resources/java-developer-productivity-report-2021.

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What is Spring Boot?

- A module built on the Spring framework that allows you to build Java microservices quickly and cleanly.
- Takes an opinionated approach to creating Spring applications with out-of-box features like auto-configuration and embedded server.
- A great choice for setting up a web application with API's that "just runs".

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Life without Spring

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Dependency Injection

```java
package com.microsoft.ps;

public class MyClass {
    2 usages
    private final MyService myService;

    1 super
    public MyClass() {
        myService = new MyService();
    }

    public void doSomething() {
        myService.doSomething();
    }
}
```

Without DI

```java
package com.microsoft.ps;

import org.springframework.beans.factory.annotation.Autowired;

public class MyClassSpring {
    2 usages
    private final MyService myService;

    @Autowired
    1 super
    public MyClassSpring(MyService myService) {
        this.myService = myService;
    }

    public void doSomething() {
        myService.doSomething();
    }
}
```

With DI

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Handling Requests

```java
package com.microsoft.ps;

import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import java.io.IOException;
import java.io.PrintWriter;

public class MyServlet extends HttpServlet {
    @Override
    1 super
    protected void doGet(HttpServletRequest req, HttpServletResponse resp) throws IOException {
        if (req.getServletPath().equals("/test")) {
            resp.setContentType("text/html");
            PrintWriter out = resp.getWriter();
            out.println("<h1>Hello World!</h1>");
            out.close();
        }
    }
}
```

Java Servlet

```java
package com.microsoft.ps;

import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RequestMapping;

@Controller
@RequestMapping(value="/controller")
public class MyController {
    @GetMapping
    public String handleRequest() {
        //handle the request here
        return "hello world";
    }
}
```

Spring MVC Controller

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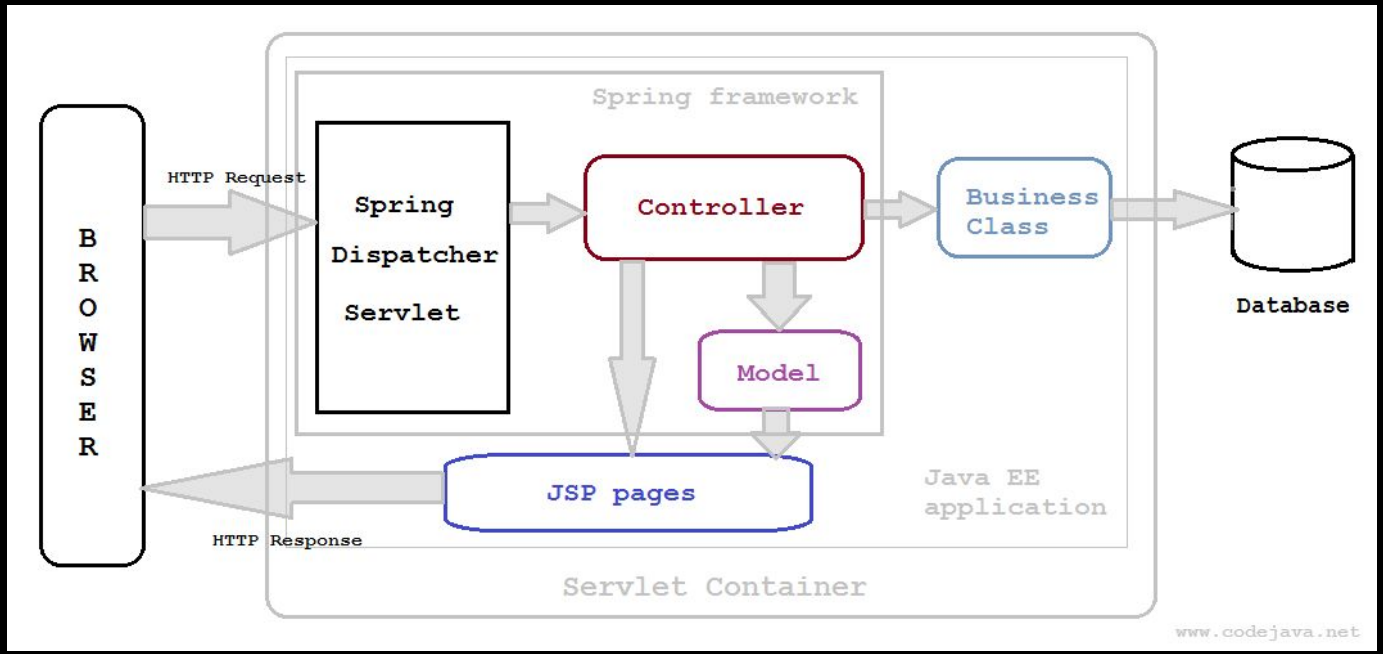
Configuration

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
     Copyright 2002 Sun Microsystems, Inc. All rights reserved.
-->
<!DOCTYPE web-app PUBLIC '-//Sun Microsystems, Inc.//DTD Web
     Application 2.3//EN' 'http://java.sun.com/dtd/web-app_2_3.dtd'>

<web-app>
    <display-name>Test</display-name>
    <servlet>
        <servlet-name>MyServlet</servlet-name>
        <servlet-class>MyServlet</servlet-class>
    </servlet>
    <servlet-mapping>
        <servlet-name>MyServlet</servlet-name>
        <url-pattern>/test</url-pattern>
    </servlet-mapping>
        <servlet-mapping>
        <servlet-name>MyServlet</servlet-name>
        <url-pattern>/myServlet/test</url-pattern>
    </servlet-mapping>
</web-app>
```

Mapping a Java Servlet route

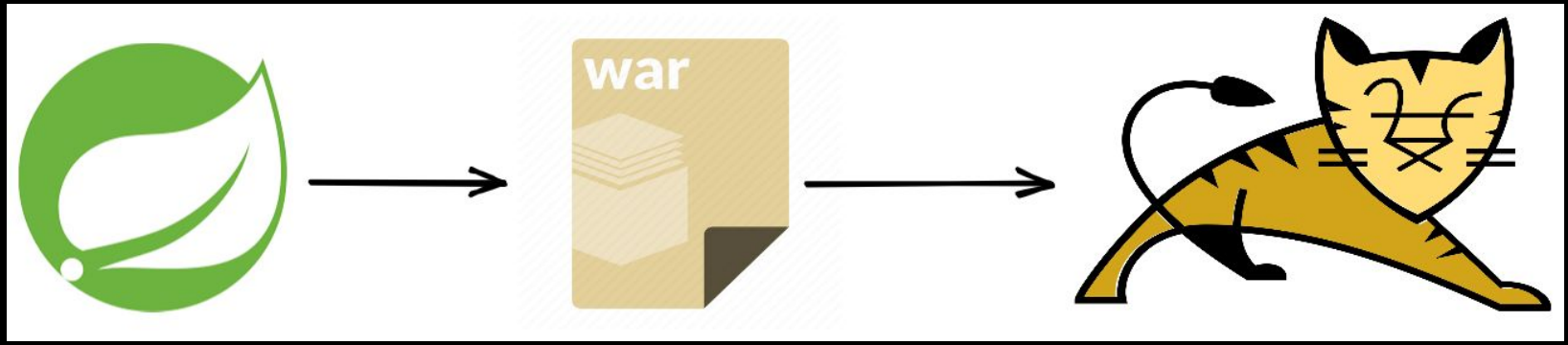
```xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
     Copyright 2002 Sun Microsystems, Inc. All rights reserved.
-->
<!DOCTYPE web-app PUBLIC '-//Sun Microsystems, Inc.//DTD Web
     Application 2.3//EN' 'http://java.sun.com/dtd/web-app_2_3.dtd'>

<web-app>
    <display-name>Test</display-name>
    <servlet>
        <servlet-name>dispatcher</servlet-name>
        <servlet-class>
            org.springframework.web.servlet.DispatcherServlet
        </servlet-class>
    </servlet>

    <servlet-mapping>
        <servlet-name>dispatcher</servlet-name>
        <url-pattern>/</url-pattern>
    </servlet-mapping>
</web-app>
```

Mapping Spring MVC Controller



https://www.codejava.net/images/articles/frameworks/spring/config/Spring%20MVC%20workflow%20diagram.png

Deployment of Spring MVC App



apache-tomcat-9.0.73 › webapps

Spring boot !

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Spring Boot

- It provides an embedded server to run the application.
- It provides production-ready features such as metrics, health checks and externalised configuration.
- It provides an easy way to package and deploy the application.

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Spring boot Life-cycle phases

- Phase 1 : Initialisation
- Phase 2 : Configuration
- Phase 3: Running
- Phase 4 : Shutdown

Phase 1: Initializing the Spring Environment

- Configure application.properties
- Initializing dependencies (Beans)
- Create application context

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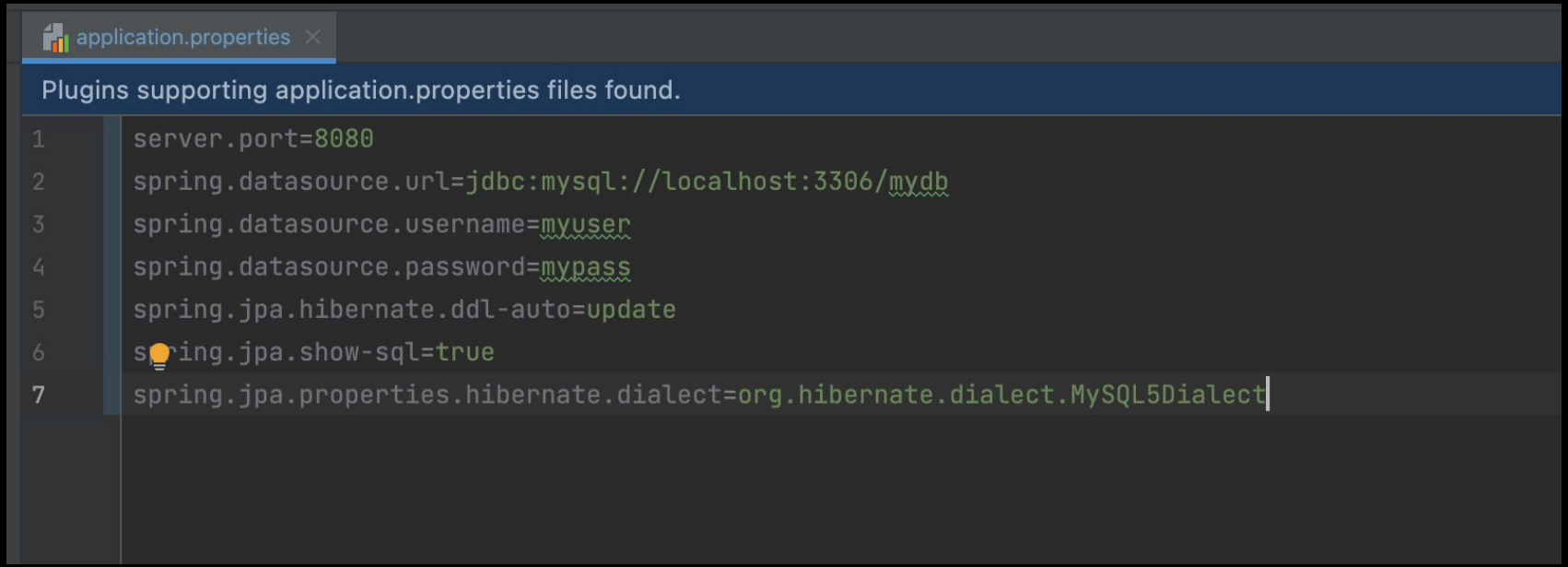
Application properties



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Spring Beans

```java
package com.microsoft.ps;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.beans.factory.annotation.Value;
import org.springframework.stereotype.Component;

@Component
public class MyBean {

    @Value("My Bean")
    private String name;

    @Value("21")
    private int age;

    @Autowired
    private DependencyBean dependency;

}
```

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Initializing an application Context

```
4   import org.springframework.context.annotation.AnnotationConfigApplicationContext;
5
6   public class DemoApplication {
7
8       public static void main(String[] args) {
9           AnnotationConfigApplicationContext applicationContext = new AnnotationConfigApplicationContext();
10          applicationContext.register(MyBean.class);
11          applicationContext.refresh();
12
13      }
```

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Spring boot handles this!

```
@SpringBootApplication
public class DemoApplication {

    public static void main(String[] args) { SpringApplication.run(DemoApplication.class, args); }

}
```

Phase 2: Configuration

- Registering the beans.
- Create services (web server, database connection pool etc.).
- @Bean, @Service, @Component, @Configuration, @Autowired and @DependsOn.
- These annotations provide additional context to the beans and can help dictate how the beans are configured and used.

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Phase 3: Running the Application

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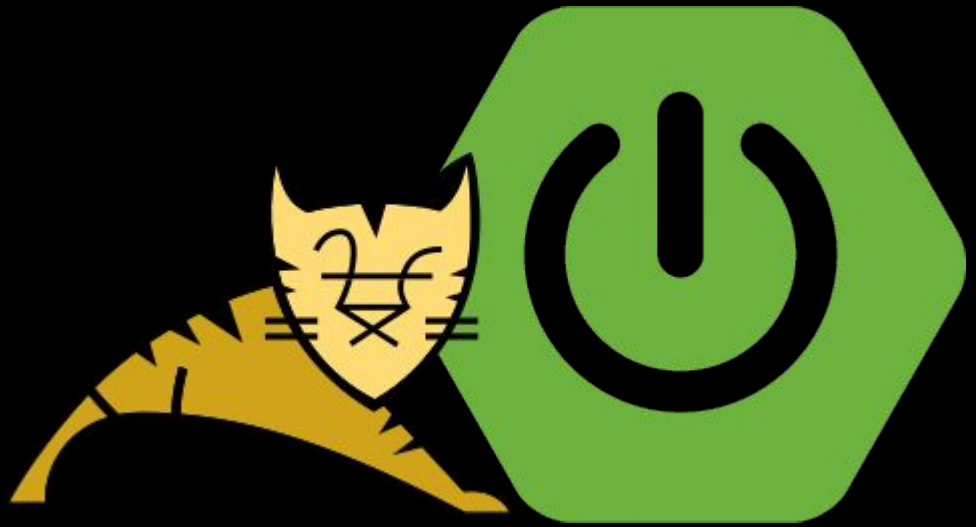
Embedded Apache server



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Phase 4: Shutdown

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DEMO

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Applause break 👏

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Conclusion

- Don’t take the tools you use for granted.
  - Understanding how they work can help you use them more efficiently.
- Spring Boot is just another software - not too different from the ones you write yourself.
  - Don’t be afraid to look under the hood.
- There’s a reason why tools are as popular as they are.
  - Take learnings to apply to your own work.

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Our contacts

Pat Witt

LinkedIn: linkedin.com/in/patjwitt

Email: patrick.witt@lexicondigital.com.au

Victor He

LinkedIn: linkedin.com/in/he-victor

Email: victor.he@lexicondigital.com.au

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Thank you!

Hope you enjoyed our talk!