

# Getting Started

## Getting Started

Spring Boot helps you to create stand-alone, production-grade Spring-based Applications that you can run. We take an opinionated view of the Spring platform and third-party libraries, so that you can get started with minimum fuss. Most Spring Boot applications need very little Spring configuration.

 <https://docs.spring.io/spring-boot/docs/2.4.3/reference/html/getting-started.html>

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## 1. Introducing Spring Boot

- 스프링 부트를 사용하면 요란 떨지 않고 괜찮은 어플리케이션을 개발할 수 있다
- 대부분의 스프링 부트 애플리케이션은 스프링 configuration 을 작성할 필요가 거의 없기 때문에 쉽다.

Spring boot's primary goal

- 빠르고
- 여기저기 널리 쓰이고
- xml 설정이 필요 없도록!

## 2. System Requirements

<https://docs.spring.io/spring-boot/docs/2.4.3/reference/html/getting-started.html#getting-started-system-requirements>

# 3. Installing Spring Boot

1. Maven or Gradle
2. Spring Boot CLI

여느 다른 표준 자바 라이브러리와 마찬가지로 .jar 를 이용해서 스프링 부트를 실행할 수 있다.

Spring Boot 을 이용해 만든 Jar 파일을 복붙해서 써도 되지만 gradle 이나 maven 같은 툴을 이용하는 것을 추천한다

## Quick-start Spring CLI Example

```
// app.groovy

@RestController
class ThisWillActuallyRun {

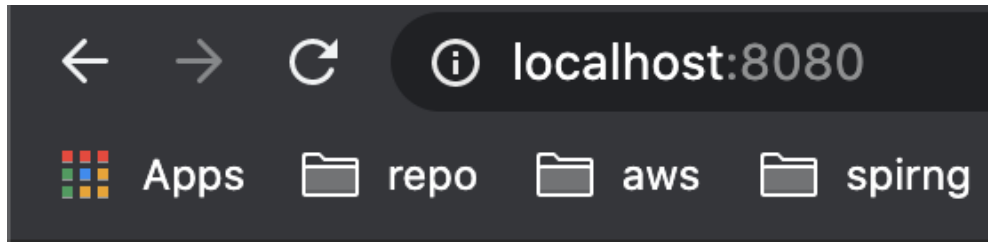
    @RequestMapping("/")
    String home() {
        "Hello World!"
    }
}
```

```
$ spring run app.groovy
```

```
+ 1. Getting Started nano app.groovy
+ 1. Getting Started spring --version
Spring CLI v2.4.4
+ 1. Getting Started spring run app.groovy
Resolving dependencies.....

:: Spring Boot ::
(v2.4.4)

2021-04-13 16:28:42.728 INFO 24914 --- [ runner-0] o.s.boot.SpringApplication : Starting application using Java 15.0.1 on Hoyojeongs-MacBook-Pro.local with PID 24914 (started by hoyojeongyu in /Users/hoyojeongyu/Desktop/study/meetecoder/spring/1. Getting Started)
2021-04-13 16:28:42.728 INFO 24914 --- [ runner-0] o.s.boot.SpringApplication : No active profile set, falling back to default profiles: default
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.codehaus.groovy.reflection.CachedClass (jar:file:/usr/local/Cellar/spring-boot/2.4.4/lib/spring-boot-cli-2.4.4.jar!/BOOT-INF/lib/groovy-2.5.14.jar!) to method java.lang.Object.finalize()
WARNING: Please consider reporting this to the maintainers of org.codehaus.groovy.reflection.CachedClass
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
2021-04-13 16:28:43.558 INFO 24914 --- [ runner-0] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2021-04-13 16:28:43.568 INFO 24914 --- [ runner-0] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2021-04-13 16:28:43.568 INFO 24914 --- [ runner-0] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.44]
2021-04-13 16:28:43.583 INFO 24914 --- [ runner-0] org.apache.catalina.loader.WebappLoader : Unknown class loader [org.springframework.boot.cli.compiler.ExtendedGroovyClassLoader$DefaultScopeParentClassLoader@2d6e9952] of class [class org.springframework.boot.cli.compiler.ExtendedGroovyClassLoader$DefaultScopeParentClassLoader]
2021-04-13 16:28:43.683 INFO 24914 --- [ runner-0] o.s.a.c.g.c.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2021-04-13 16:28:43.688 INFO 24914 --- [ runner-0] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 745 ms
2021-04-13 16:28:43.749 INFO 24914 --- [ runner-0] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2021-04-13 16:28:44.826 INFO 24914 --- [ runner-0] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2021-04-13 16:28:44.838 INFO 24914 --- [ runner-0] o.s.boot.SpringApplication : Started application in 1.702 seconds (JVM running for 37.846s)
```



Hello World!

## 4. Developing Your First Spring Boot Application

간단한 "Hello World" 웹 어플리케이션을 만들어보자

우선 자바와 메이븐이 설치되어 있어야 한다

```
$ java -version  
$ mvn -v
```

1. POM 작성
2. Classpath Dependencies 추가
3. 코드 작성하기

@RestController, @RequestMapping, @EnableAutoConfiguration, main method

4. Run
5. 실행 가능한 jar 파일 만들기

### 4.1. POM.xml 작성하기

pom.xml: 애플리케이션 빌드에 사용되는 레서피

```
<?xml version="1.0" encoding="UTF-8"?>  
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
```

```

<modelVersion>4.0.0</modelVersion>

<groupId>com.example</groupId>
<artifactId>myproject</artifactId>
<version>0.0.1-SNAPSHOT</version>

<parent>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-parent</artifactId>
  <version>2.4.3</version>
</parent>

<description/>
<developers>
  <developer/>
</developers>
<licenses>
  <license/>
</licenses>
<scm>
  <url/>
</scm>
<url/>

<!-- Additional lines to be added here... -->

</project>

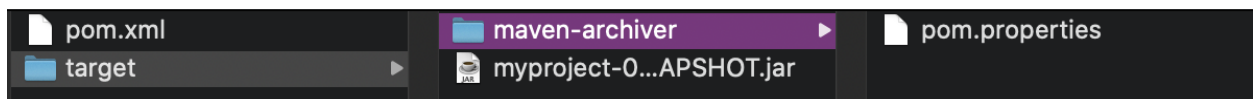
```

```
$ mvn package
```

```

[INFO] --- maven-jar-plugin:3.2.0:jar (default-jar) @ myproject ---
[WARNING] JAR will be empty - no content was marked for inclusion!
[INFO] Building jar: /Users/hyojeongyu/Desktop/study/meetcoder/spring/1. Getting S
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 16.656 s
[INFO] Finished at: 2021-04-13T16:40:09+09:00
[INFO] -----
→ hello_world █

```



성공적으로 빌드 가능. 이 상태에서는 IDE에서 프로젝트를 import 할 수 있다.

## 4.2 Classpath Dependencies 추가

스프링 부트는 여러 Starter 들을 제공하는데 starter 로 jar들을 classpath에 추가 할 수 있다.

pom.xml 의 parent 부분에서 `spring-boot-starter-parent` 를 사용하고 있다.

이후 추가할 스프링 dependency 들이 있을 때 version 을 명시해야 할 필요가 없어진다.

이외에 여러 starter 들은 특정 타입의 어플리케이션 개발 시 필요한 의존성들을 한방에 제공해주는데

예를 들어 우리가 추가해 볼 `spring-boot-starter-web` 은 web 개발 시 필요한 라이브러리 의존성을 제공한다

현재 프로젝트 의존성

```
$ mvn dependency:tree
```

```
[INFO] com.example:myproject:jar:0.0.1-SNAPSHOT
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 14.031 s
[INFO] Finished at: 2021-04-13T16:43:10+09:00
[INFO] -----
[→ hello_world mvn dependency:tree
[INFO] Scanning for projects...
[INFO] -----< com.example:myproject >-----
[INFO] Building myproject 0.0.1-SNAPSHOT
[INFO] -----[ jar ]-----
[INFO] --- maven-dependency-plugin:3.1.2:tree (default-cli) @ myproject ---
[INFO] com.example:myproject:jar:0.0.1-SNAPSHOT
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 0.821 s
[INFO] Finished at: 2021-04-13T16:43:17+09:00
[INFO] -----
→ hello_world
```

spring-boot-starter-parent 는 의존성을 제공해주지는 않는다.

pom.xml 수정

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>
```

```

<groupId>com.example</groupId>
<artifactId>myproject</artifactId>
<version>0.0.1-SNAPSHOT</version>

<parent>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-parent</artifactId>
  <version>2.4.3</version>
</parent>

<dependencies>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
  </dependency>
</dependencies>

<description/>
<developers>
  <developer/>
</developers>
<licenses>
  <license/>
</licenses>
<scm>
  <url/>
</scm>
<url/>

<!-- Additional lines to be added here... -->

</project>

```

다시

```
$ mvn dependency:tree
```

```

+ hello_world mvn dependency:tree
[INFO] Scanning for projects...
[INFO] -----[ com.example:myproject ]-----
[INFO] Building myproject 0.0.1-SNAPSHOT
[INFO] -----[ jar ]-----
Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter-web/2.4.3/spring-boot-starter-web-2.4.3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter-web/2.4.3/spring-boot-starter-web-2.4.3.pom (3.0 kB at 3.2 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter/2.4.3/spring-boot-starter-2.4.3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter/2.4.3/spring-boot-starter-2.4.3.pom (3.1 kB at 11 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot/2.4.3/spring-boot-2.4.3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot/2.4.3/spring-boot-2.4.3.pom (2.2 kB at 7.7 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/spring-core/5.3.4/spring-core-5.3.4.pom

```

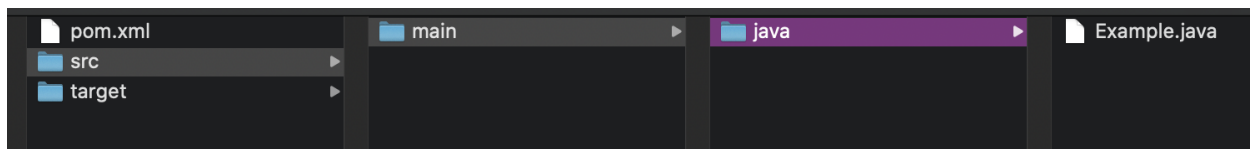
```

[INFO] com.example:myproject:jar:0.0.1-SNAPSHOT
[INFO] \- org.springframework.boot:spring-boot-starter-web:jar:2.4.3:compile
[INFO]   +- org.springframework.boot:spring-boot-starter:jar:2.4.3:compile
[INFO]     +- org.springframework.boot:spring-boot:jar:2.4.3:compile
[INFO]     +- org.springframework.boot:spring-boot-autoconfigure:jar:2.4.3:compile
[INFO]     +- org.springframework.boot:spring-boot-starter-logging:jar:2.4.3:compile
[INFO]       +- ch.qos.logback:logback-classic:jar:1.2.3:compile
[INFO]       | +- ch.qos.logback:logback-core:jar:1.2.3:compile
[INFO]       | \- org.slf4j:slf4j-api:jar:1.7.30:compile
[INFO]       +- org.apache.logging.log4j:log4j-to-slf4j:jar:2.13.3:compile
[INFO]       | \- org.apache.logging.log4j:log4j-api:jar:2.13.3:compile
[INFO]       \- org.slf4j:jul-to-slf4j:jar:1.7.30:compile
[INFO]   +- jakarta.annotation:jakarta.annotation-api:jar:1.3.5:compile
[INFO]   +- org.springframework:spring-core:jar:5.3.4:compile
[INFO]   | \- org.springframework:spring-jcl:jar:5.3.4:compile
[INFO]   \- org.yaml:snakeyaml:jar:1.27:compile
[INFO] +- org.springframework.boot:spring-boot-starter-json:jar:2.4.3:compile
[INFO] | +- com.fasterxml.jackson.core:jackson-databind:jar:2.11.4:compile
[INFO] | +- com.fasterxml.jackson.core:jackson-annotations:jar:2.11.4:compile
[INFO] | \- com.fasterxml.jackson.core:jackson-core:jar:2.11.4:compile
[INFO] +- com.fasterxml.jackson.datatype:jackson-datatype-jdk8:jar:2.11.4:compile
[INFO] +- com.fasterxml.jackson.datatype:jackson-datatype-jsr310:jar:2.11.4:compile
[INFO] \- com.fasterxml.jackson.module:jackson-module-parameter-names:jar:2.11.4:compile
[INFO] +- org.springframework.boot:spring-boot-starter-tomcat:jar:2.4.3:compile
[INFO] | +- org.apache.tomcat.embed:tomcat-embed-core:jar:9.0.43:compile
[INFO] | +- org.glassfish:jakarta.el:jar:3.0.3:compile
[INFO] | \- org.apache.tomcat.embed:tomcat-embed-websocket:jar:9.0.43:compile
[INFO] +- org.springframework:spring-web:jar:5.3.4:compile
[INFO] | \- org.springframework:spring-beans:jar:5.3.4:compile
[INFO] \- org.springframework:spring-webmvc:jar:5.3.4:compile
[INFO]   +- org.springframework:spring-aop:jar:5.3.4:compile
[INFO]   +- org.springframework:spring-context:jar:5.3.4:compile
[INFO]   \- org.springframework:spring-expression:jar:5.3.4:compile
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 9.308 s
[INFO] Finished at: 2021-04-13T16:46:29+09:00
[INFO] -----
→ hello_world

```

톰캣 웹 서버를 비롯해 여러 다른 의존성들이 추가되었다.

## 4.3 코드 작성하기



maven 이 사용하는 구조 src/main/java

```

// Example.java

import org.springframework.boot.*;

```

```
import org.springframework.boot.autoconfigure.*;
import org.springframework.web.bind.annotation.*;

@RestController
@EnableAutoConfiguration
public class Example {

    @RequestMapping("/")
    String home() {
        return "Hello World!";
    }

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

}
```

### @RestController

stereotype annotation 중 하나(특별한 역할을 하는 클래스라는 힌트를 주는 어노테이션)

해당 클래스는 web controller 라는 역할을 한다는 것을 알려준다

웹 요청이 들어올 때 해당 클래스를 사용한다

### @RequestMapping

라우팅 정보를 준다: / 로 HTTP 요청이 들어오면 home() 메소드로 매핑한다

### @RestController

return 되는 문자열을 그대로 요청을 보낸 사람한테 보여준다

### @EnableAutoConfiguration

이 어노테이션을 사용하면 jar dependency 에 기반해서 스프링부트가 스프링을 어떻게 설정해야 하는지를 추측하게 한다.

우리는 spring-boot-starter-web 이 톰캣과 스프링MVC 의존성을 추가했기 때문에 웹 어플리케이션으로 자동 설정한다.





### Starters and Auto-configuration

starter 를 사용하지 않고 우리가 jar dependency 를 원하는 대로 추가하더라도 스프링 부트는 애플리케이션 자동설정을 알아서 잘 할 것이다. 꼭 starter 를 사용해야만 자동 설정이 되는 것은 아니다.

## 4.4 Run

```
$ mvn spring-boot:run
```

```
→ hello_world ls -al
total 8
drwxr-xr-x  5 hyojeongyu  staff   160 Apr 13 16:49 .
drwxr-xr-x  4 hyojeongyu  staff   128 Apr 13 16:39 ..
-rw-r--r--  1 hyojeongyu  staff  1014 Apr 13 16:45 pom.xml
drwxr-xr-x  3 hyojeongyu  staff    96 Apr 13 16:49 src
drwxr-xr-x  4 hyojeongyu  staff   128 Apr 13 16:40 target
→ hello_world mvn spring-boot:run
[INFO] Scanning for projects...
Downloading from central: https://repo.maven.apache.org/maven2/org
Downloaded from central: https://repo.maven.apache.org/maven2/org/
Downloading from central: https://repo.maven.apache.org/maven2/org/
```

[illegible]

이제 스프링이 떠 있는 `localhost:8080` 으로 접속하면 `Hello World!` 문자열이 보인다

## 4.5 Creating an Executable jar

self-contained executable jars, Fat jars

(컴파일한 클래스 + 애플리케이션 구동에 필요한 jar dependency)를 아카이빙한 파일

spring-boot-maven-plugin 을 pom.xml 에 추가하면 executable jar 를 만들 수 있다.

```

<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <groupId>com.example</groupId>
  <artifactId>myproject</artifactId>
  <version>0.0.1-SNAPSHOT</version>

  <parent>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-parent</artifactId>
    <version>2.4.3</version>
  </parent>

  <dependencies>
    <dependency>
      <groupId>org.springframework.boot</groupId>
      <artifactId>spring-boot-starter-web</artifactId>
    </dependency>
  </dependencies>

  <build>
    <plugins>
      <plugin>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-maven-plugin</artifactId>
      </plugin>
    </plugins>
  </build>

  <description/>
  <developers>
    <developer/>
  </developers>
  <licenses>
    <license/>
  </licenses>
  <scm>
    <url/>
  </scm>
  <url/>

  <!-- Additional lines to be added here... -->

</project>

```

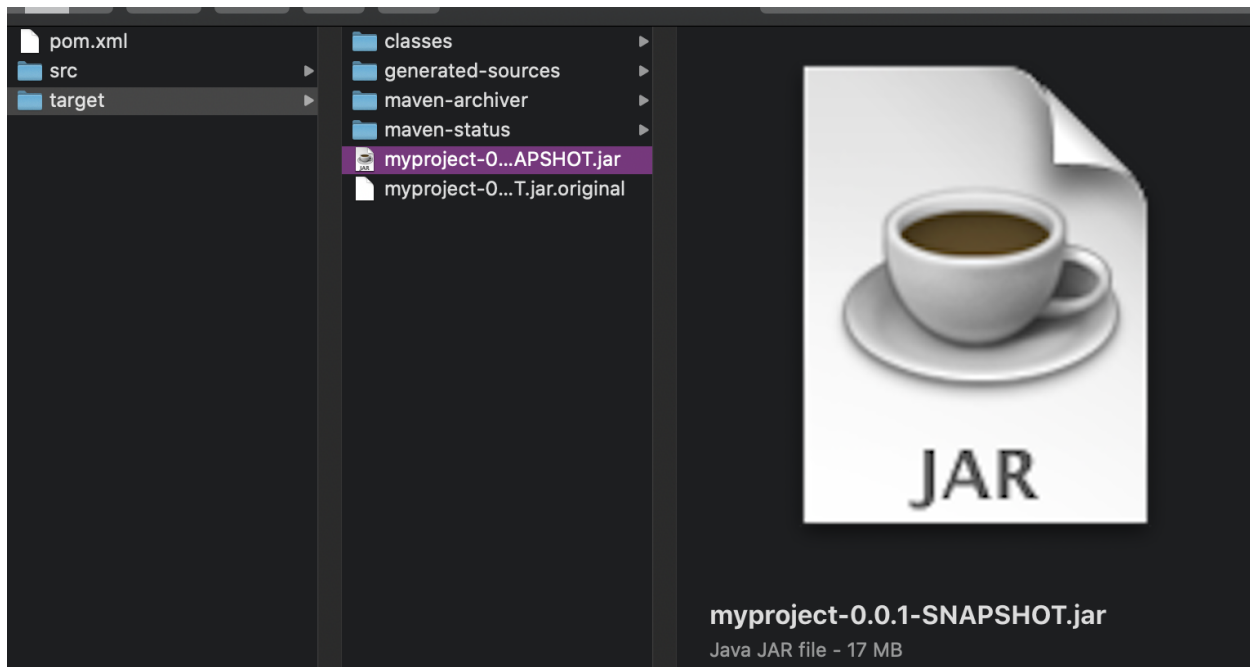
## jar 아카이빙 하기

```
$ mvn package
```

```

+ hello_world mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.example:myproject >-----
[INFO] Building myproject 0.0.1-SNAPSHOT
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- maven-resources-plugin:3.2.0:resources (default-resources) @ myproject ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] Using 'UTF-8' encoding to copy filtered properties files.
[INFO] skip non existing resourceDirectory /Users/hyojeongyu/Desktop/study/meetcoder/spring/1. Getting Started/hello_world/src/main/resources
[INFO] skip non existing resourceDirectory /Users/hyojeongyu/Desktop/study/meetcoder/spring/1. Getting Started/hello_world/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.8.1:compile (default-compile) @ myproject ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:3.2.0:testResources (default-testResources) @ myproject ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] Using 'UTF-8' encoding to copy filtered properties files.
[INFO] skip non existing resourceDirectory /Users/hyojeongyu/Desktop/study/meetcoder/spring/1. Getting Started/hello_world/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.8.1:testCompile (default-testCompile) @ myproject ---
[INFO] No sources to compile
[INFO]
[INFO] --- maven-surefire-plugin:2.22.2:test (default-test) @ myproject ---
[INFO] No tests to run.
[INFO]
[INFO] --- maven-jar-plugin:3.2.0:jar (default-jar) @ myproject ---
[INFO] Building jar: /Users/hyojeongyu/Desktop/study/meetcoder/spring/1. Getting Started/hello_world/target/myproject-0.0.1-SNAPSHOT.jar
[INFO]
[INFO] --- spring-boot-maven-plugin:2.4.3:repackage (repackage) @ myproject ---
[INFO] Replacing main artifact with repackaged archive
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 1.127 s
[INFO] Finished at: 2021-04-13T16:53:58+09:00
[INFO]

```



target 폴더에 `myproject-0.0.1-SNAPSHOT.jar` 이 생겨난다

peek inside jar

```
$ jar tvf target/myproject-0.0.1-SNAPSHOT.jar
```

run

```
$ java -jar target/myproject-0.0.1-SNAPSHOT.jar
```

```
+ hello_world java -jar target/myproject-0.0.1-SNAPSHOT.jar

  ____ _
 / ___| | | |
| |___| | | |
 \___|_| |_|_|
:: Spring Boot ::
 (v2.4.3)

2021-04-13 16:55:59.899 INFO 25920 --- [main] Example : Starting Example using Java 15.0.1 on Hyeongs-MacBook-Pro.local w
hello_world/target/myproject-0.0.1-SNAPSHOT.jar started by hyeongs in /Users/hyeongs/Desktop/study/meetcode/spring/1. Getting Started/hello_world
2021-04-13 16:55:59.902 INFO 25920 --- [main] Example : No active profile set, falling back to default profiles: default
2021-04-13 16:56:00.617 INFO 25920 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2021-04-13 16:56:00.627 INFO 25920 --- [main] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2021-04-13 16:56:00.628 INFO 25920 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.43]
2021-04-13 16:56:00.682 INFO 25920 --- [main] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2021-04-13 16:56:00.682 INFO 25920 --- [main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 735 ms
2021-04-13 16:56:00.842 INFO 25920 --- [main] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2021-04-13 16:56:00.979 INFO 25920 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2021-04-13 16:56:00.988 INFO 25920 --- [main] Example : Started Example in 1.413 seconds (JVM running for 1.728)
```

ctrl-c 로 종료할 수 있다.