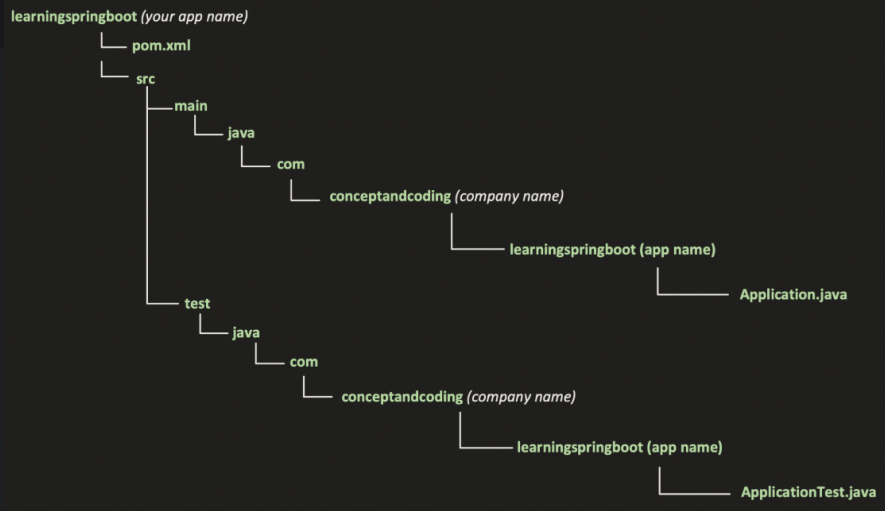
SpringBoot: Maven

"Concept && Coding" YT Video Notes

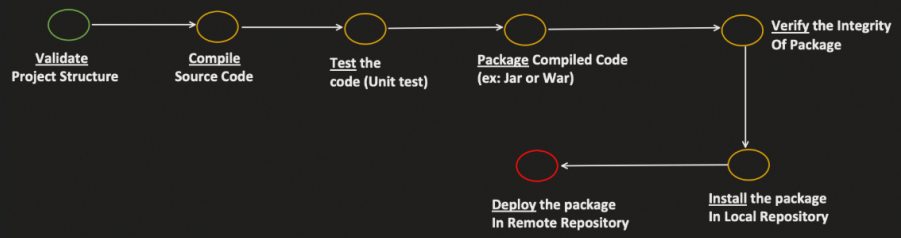
What is Maven:

- It's a project management tool. Helps developers with:
  - Build generation
  - Dependency resolution
  - Documentation etc.
- Maven uses POM (Project Object Model) to achieve this.
- When "maven" command is given, it looks for "pom.xml" in the current directory & get needed configuration.



Maven Build lifecycle phases:

- If you want to run "package" phase, all its previous phase will get executed first.
- And if you want to run specific goal of a particular phase, then all the goals of previous phases + current phase goals before the one you defined will get run.

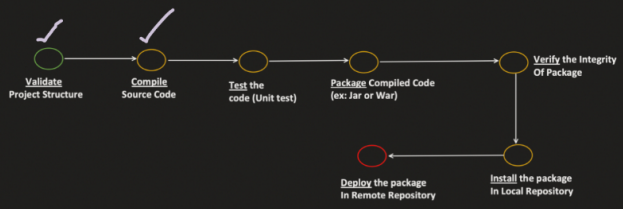


Maven already has Validate phase defined and its goal, but if we want to add more goals or task, then we can use <build> element. And add the goal to specific phase.

Validate : **mvn validate**

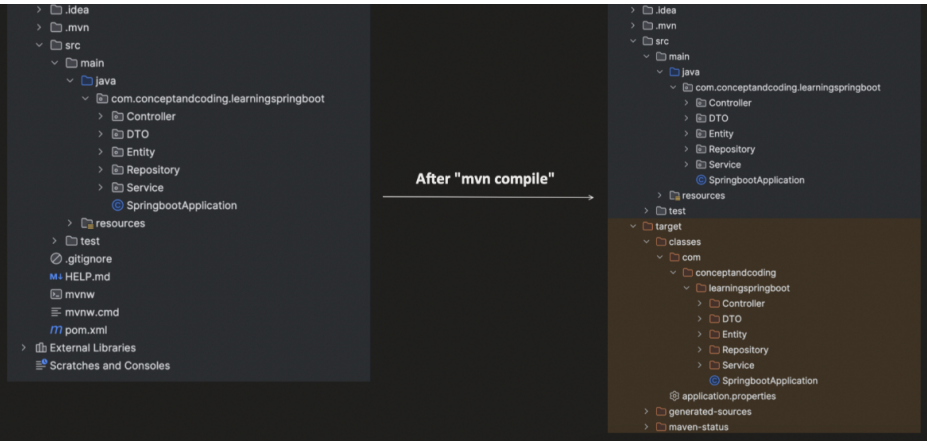
```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-checkstyle-plugin</artifactId>
    <version>3.1.2</version>
    <executions>
        <execution>
            <id>validate-checkstyle</id>
            <phase>validate</phase>
            <goals>
                <goal>check</goal>
            </goals>
        </execution>
    </executions>
    <configuration>
        <configLocation>myCodeStyle.xml</configLocation>
    </configuration>
</plugin>
```

Compile: **Run the command:** mvn compile



It will validate and compile your code and put it under ${project.basedir}/target/classes

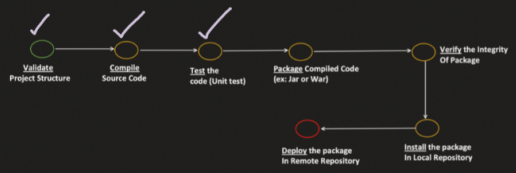
```
[INFO] Scanning for projects...
[INFO]
[INFO] --------------< com.conceptandcoding:learningspringboot >--------------
[INFO] Building springboot application 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ learningspringboot ---
[INFO] Copying 1 resource from src/main/resources to target/classes
[INFO] Copying 0 resource from src/main/resources to target/classes
[INFO]
[INFO] --- compiler:3.11.0:compile (default-compile) @ learningspringboot ---
[INFO] Changes detected - recompiling the module! :source
[INFO] Compiling 7 source files with javac [debug release 17] to target/classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  0.812 s
[INFO] Finished at: 2024-03-09T16:35:24+05:30
[INFO] ------------------------------------------------------------------------
```



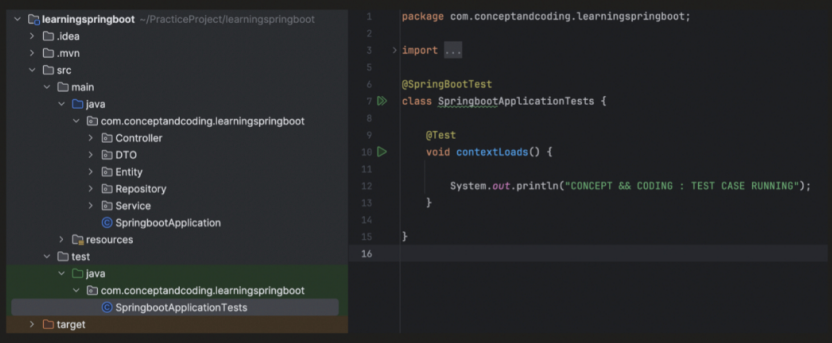
Previously, "Ant" was popular, there we have to tell what to do and also how to do.

```
<project default="compile">
<target name="compile">
//some other properties here
<javac destdir="{provide your destination directory}">
<src>
<pathelement location="src/main/java"/>
</src>
//some other properties here
</javac>
</target>
</project>
```

Test: mvn test



It will validate, compile and then run the TEST cases in your project.




```
[INFO] Scanning for projects...
[INFO]
[INFO] --------------< com.conceptandcoding:learningspringboot >--------------
[INFO] Building springboot application 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ learningspringboot ---
[INFO] Copying 1 resource from src/main/resources to target/classes
[INFO] Copying 0 resource from src/main/resources to target/classes
```

```
[INFO]
[INFO] --- compiler:3.11.0:compile (default-compile) @ learningspringboot ---
[INFO] Nothing to compile - all classes are up to date
[INFO] --- surefire:3.1.2:test (default-test) @ learningspringboot ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.conceptandcoding.learningspringboot.SpringbootApplicationTests
38:50:22.606 [main] INFO org.springframework.test.context.support.AnnotationConfigContextLoaderUtils --
tApplicationTests does not declare any static, non-private, non-final, nested classes annotated with @Co
38:50:22.655 [main] INFO org.springframework.boot.test.context.SpringBootTestContextBootstrapper -- Four
ot.SpringbootApplicationTests

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 :: Spring Boot ::                (v3.2.3)

2024-03-10T08:50:22.806+05:30  INFO 37695 --- [           main] c.c.l.SpringbootApplicationTests
gboot)
2024-03-10T08:50:22.806+05:30  INFO 37695 --- [           main] c.c.l.SpringbootApplicationTests
2024-03-10T08:50:23.292+05:30  INFO 37695 --- [           main] c.c.l.SpringbootApplicationTests
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
CONCEPT && CODING : TEST CASE RUNNING
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 1.235 s -- in com.conceptandcoding.learningspringboot.SpringbootApplicationTests
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  3.824 s
[INFO] Finished at: 2024-03-10T08:50:23+05:30
[INFO] ------------------------------------------------------------------------
```
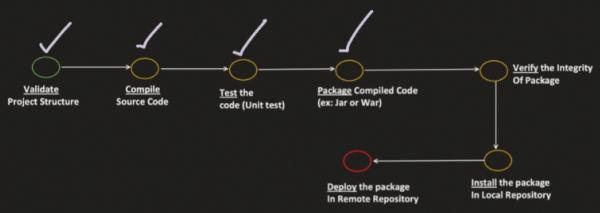

Package: mvn package



First complete Validate, Compile, Test phase and then run Package phase in which it Generates .jar or .war file.

```
[INFO] Scanning for projects...
[INFO]
[INFO] --------------< com.conceptandcoding:learningspringboot >---------------
[INFO] Building springboot application 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ learningspringboot ---
[INFO] Copying 1 resource from src/main/resources to target/classes
[INFO] Copying 0 resource from src/main/resources to target/classes
[INFO]
[INFO] --- compiler:3.11.0:compile (default-compile) @ learningspringboot ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ learningspringboot ---
[INFO] --- compiler:3.11.0:testCompile (default-testCompile) @ learningspringboot ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- surefire:3.1.2:test (default-test) @ learningspringboot ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformPr
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------

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 :: Spring Boot ::                (v3.2.3)

2024-03-10T09:05:27.378+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
gboot)
2024-03-10T09:05:27.378+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
2024-03-10T09:05:27.847+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
OpenJDK 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstra
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
CONCEPT && CODING : TEST CASE RUNNING
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 1.177 s -- in com.conceptandcoding.learningspringboot.
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.3.0:jar (default-jar) @ learningspringboot ---
[INFO] Building jar: /Users/PracticeProject/learningspringboot/target/learningspringboot-0.0.1-SNAPSHOT.jar
```
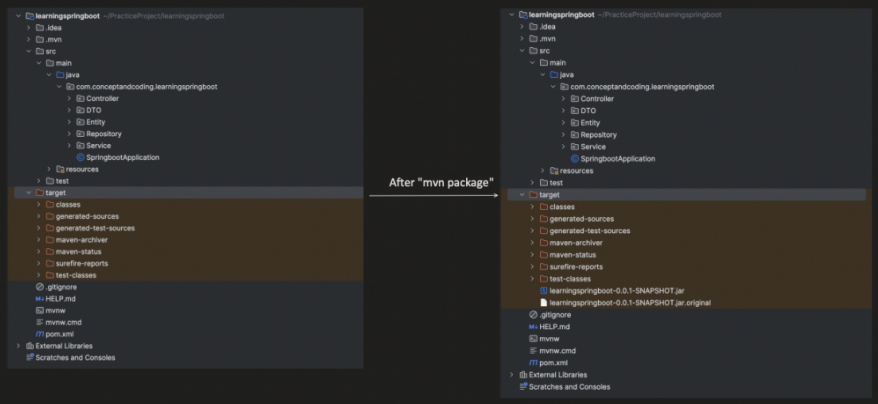
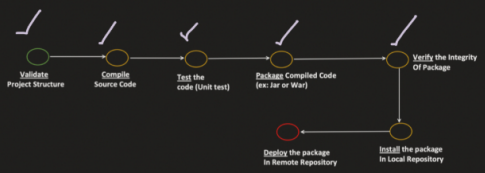



Verify: mvn verify



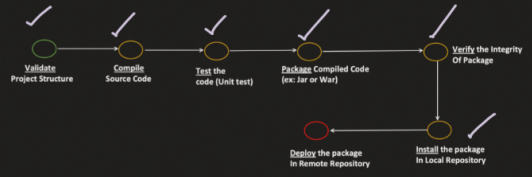
It can perform some additional checks apart from unit test cases like:
- **STATIC CODE ANALYSIS**
- **CHECKSUM VERFICATION etc...**

STATIC CODE ANALYSIS:

```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-pmd-plugin</artifactId>
    <version>3.21.2</version>
    <executions>
        <execution>
            <id>pmd-analysis</id>
            <phase>verify</phase>
            <goals>
                <goal>pmd</goal>
            </goals>
        </execution>
    </executions>
</plugin>
```

PMD is a source code analyzer:
- **Finds unused variable**
- **Finds unused imports**
- **Empty Catch block**
- **No usage of object**
- **Finds duplicate code etc...**

Install: mvn install



It will install the .jar package in local Maven Repository.
which is typically located in your user home directory (~/.m2/repository)

settings.xml (in .m2 folder)

```
<settings xmlns="http://maven.apache.org/SETTINGS/1.0.0"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:schemaLocation="http://maven.apache.org/SETTINGS/1.0.0
                              http://maven.apache.org/xsd/settings-1.0.0.xsd">

    <!-- Local Repository: Location where Maven stores downloaded artifacts -->
    <localRepository>${user.home}/.m2/repository</localRepository>
```

```
  <!— some other configurations goes here —>

</settings>
```

```
[INFO] Scanning for projects...
[INFO]
[INFO] -------------< com.conceptandcoding:learningspringboot >--------------
[INFO] Building springboot application 0.0.1-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ learningspringboot ---
[INFO] Copying 1 resource from src/main/resources to target/classes
[INFO] Copying 0 resource from src/main/resources to target/classes
[INFO]
[INFO] --- compiler:3.11.0:compile (default-compile) @ learningspringboot ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ learningspringboot ---
[INFO] --- compiler:3.11.0:testCompile (default-testCompile) @ learningspringboot ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- surefire:3.1.2:test (default-test) @ learningspringboot ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformPr
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------

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 :: Spring Boot ::                (v3.2.3)

2024-03-10T09:05:27.378+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
gboot)
2024-03-10T09:05:27.378+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
2024-03-10T09:05:27.847+05:30  INFO 38242 --- [           main] c.c.l.SpringbootApplicationTests
OpenJDK 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstra
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
CONCEPT && CODING :: TEST CASE RUNNING
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 1.177 s -- in com.conceptandcoding.learningspringboot.
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.3.0:jar (default-jar) @ learningspringboot ---
[INFO] Building jar: /Users/PracticeProject/learningspringboot/target/learningspringboot-0.0.1-SNAPSHOT.jar
[INFO] --- install:3.1.1:install (default-install) @ learningspringboot ---
[INFO] Installing /Users/       /PracticeProject/learningspringboot/pom.xml to [redacted]/Users/.m2/repository/com/conceptandcoding/learningspringboot/0.0.1-SNAPSHOT/learningspringboot-0.0.1-SNAPSHOT.pom
[INFO] Installing /Users/       /PracticeProject/learningspringboot/target/learningspringboot-0.0.1-SNAPSHOT.jar to [redacted] /Users/.m2/repository/com/conceptandcoding/learningspringboot/0.0.1-SNAPSHOT/learningspringboot-0.0.1-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  4.314 s
[INFO] Finished at: 2024-03-10T10:21:50+05:30
[INFO] ------------------------------------------------------------------------
```
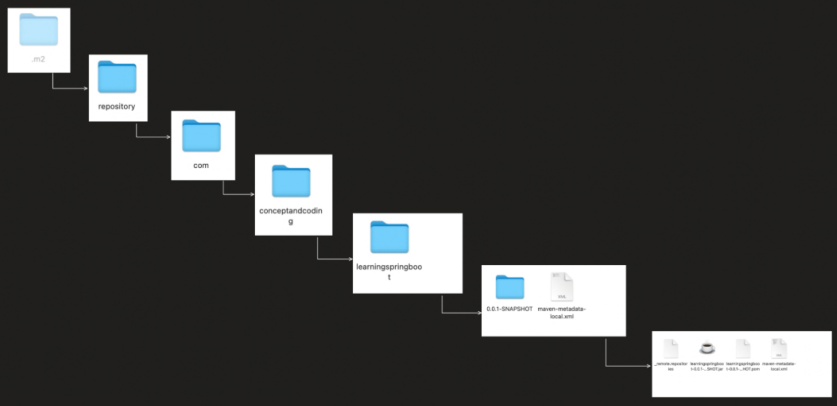
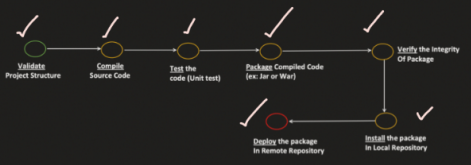



Deploy: mvn deploy



It will deploy the .jar to REMOTE Repository

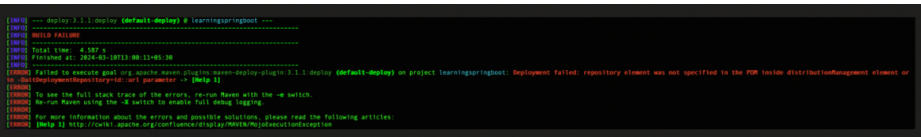
pom.xml

```
<project>
    <!-- ... other project configurations ... -->

    <distributionManagement>
        <repository>
            <id>remote repository id</id>
            <url>https://remote-repository-url</url>
        </repository>
    </distributionManagement>

    <!-- ... other pom.xml configurations ... -->
</project>
```

settings.xml

```
<settings>
    <!--  other settings configurations  -->

    <servers>
        <server>
            <id>remote repository id</id>
            <username>remote-repository-username</username>
            <password>remote-repository-password</password>
        </server>
    </servers>

    <!--  other settings configurations -->
</settings>
```

If we do not define the remote repository, then MAVEN during "mvn deploy" command we will face below error



If we want to deploy the manifest to Maven central repository : https://repo.maven.apache.org/maven2.
Since its public, we do not need username and password in settings.xml