

Maven Overview



You will learn how to ...

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- Create Maven projects with Eclipse

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- Add dependencies to Maven pom.xml file

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- Create Maven projects with Eclipse
- Add dependencies to Maven pom.xml file
- Build and run Maven projects

Practical Results

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- Cover the most common Maven tasks that you will need on daily projects

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- Not an A to Z reference ... for that you can see Maven Reference Manual

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- But don't worry, I will to

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- B
- Maven Reference Manual

Free Maven Resources

What is Maven?

What is Maven?

- Maven is a Project Management tool

What is Maven?

- Maven is a Project Management tool
- Most popular use of Maven is for build management and dependencies

What Problems Does Maven Solve?

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- When building your Java project, you may need additional JAR files
- For example: Spring, Hibernate, Commons Logging, JSON etc...

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- One approach is to download the JAR files from each project web site

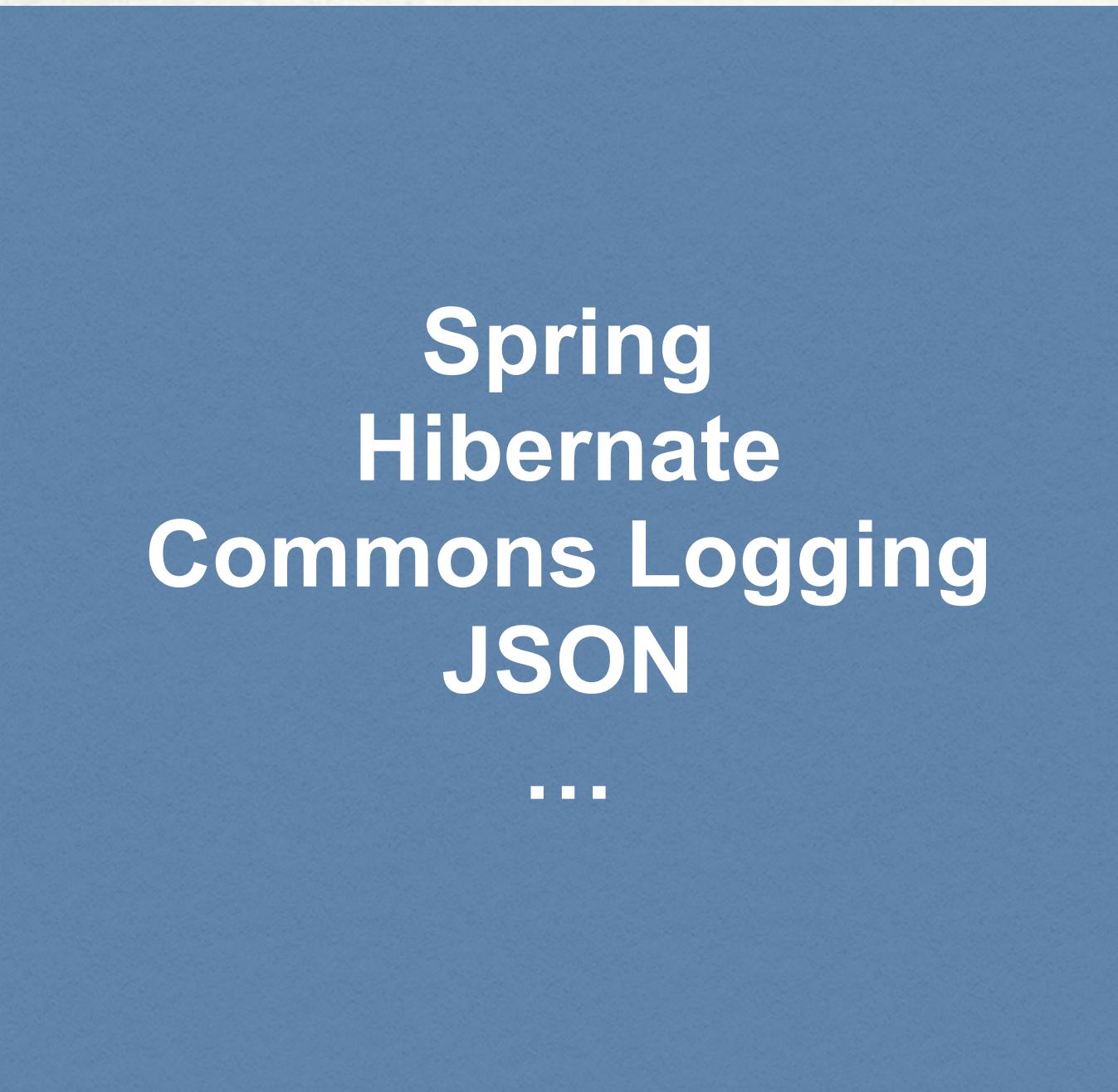
What Problems Does Maven Solve?

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 - For example: Spring, Hibernate, Commons Logging, JSON etc...
- One approach is to download the JAR files from each project web site
- Maven files to your build path / classpath

My Project without Maven

My Project without Maven

My Super Cool App



Spring
Hibernate
Commons Logging
JSON

...

My Project without Maven

My Super Cool App



↔ developer

My Project without Maven

My Super Cool App

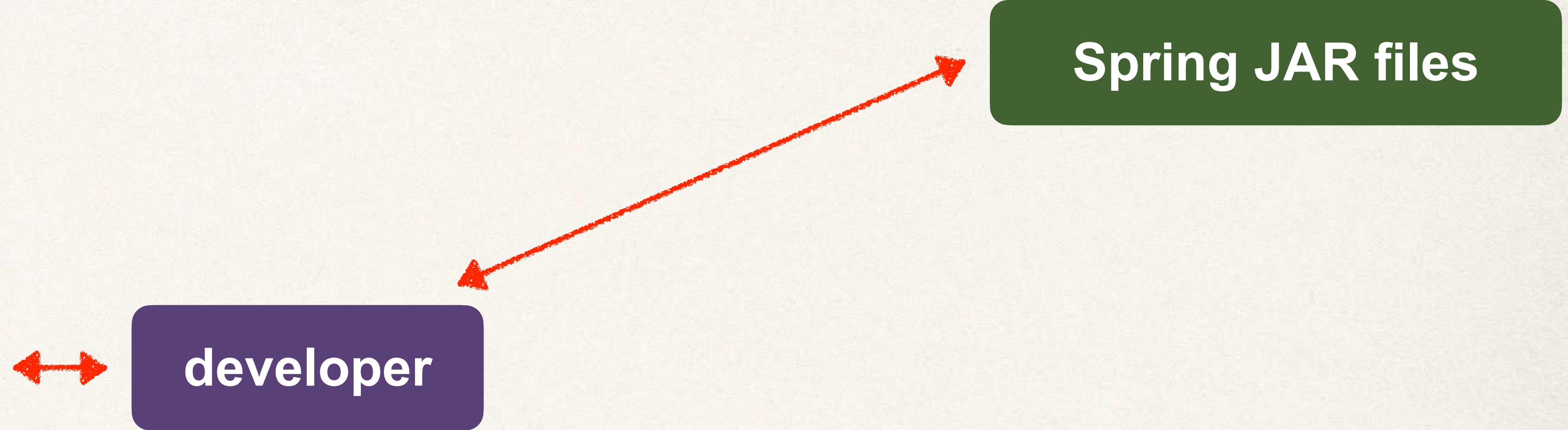


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My Project without Maven

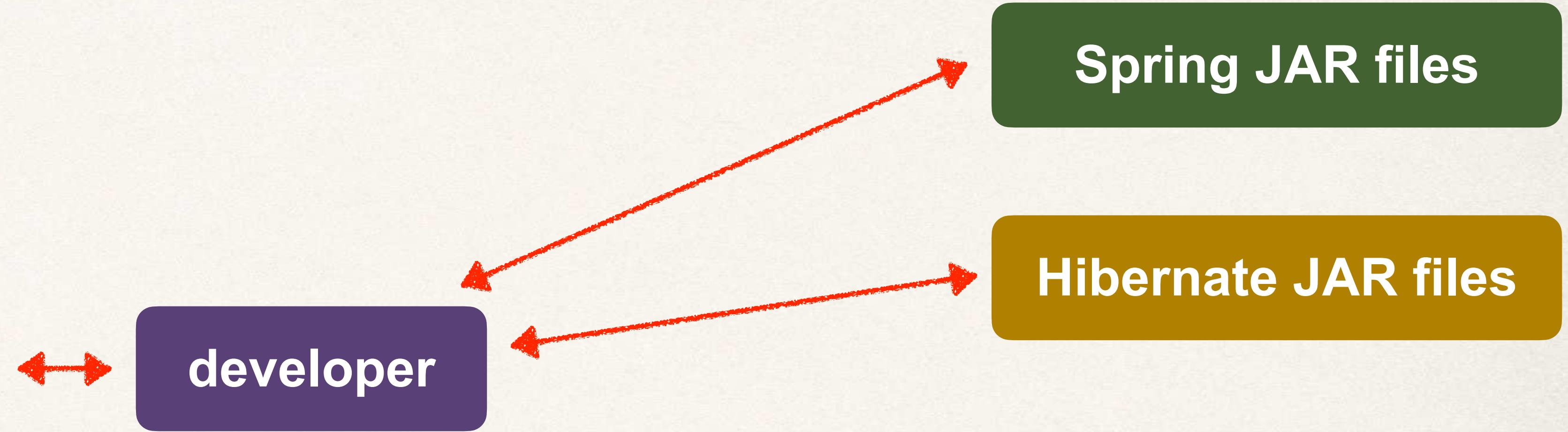
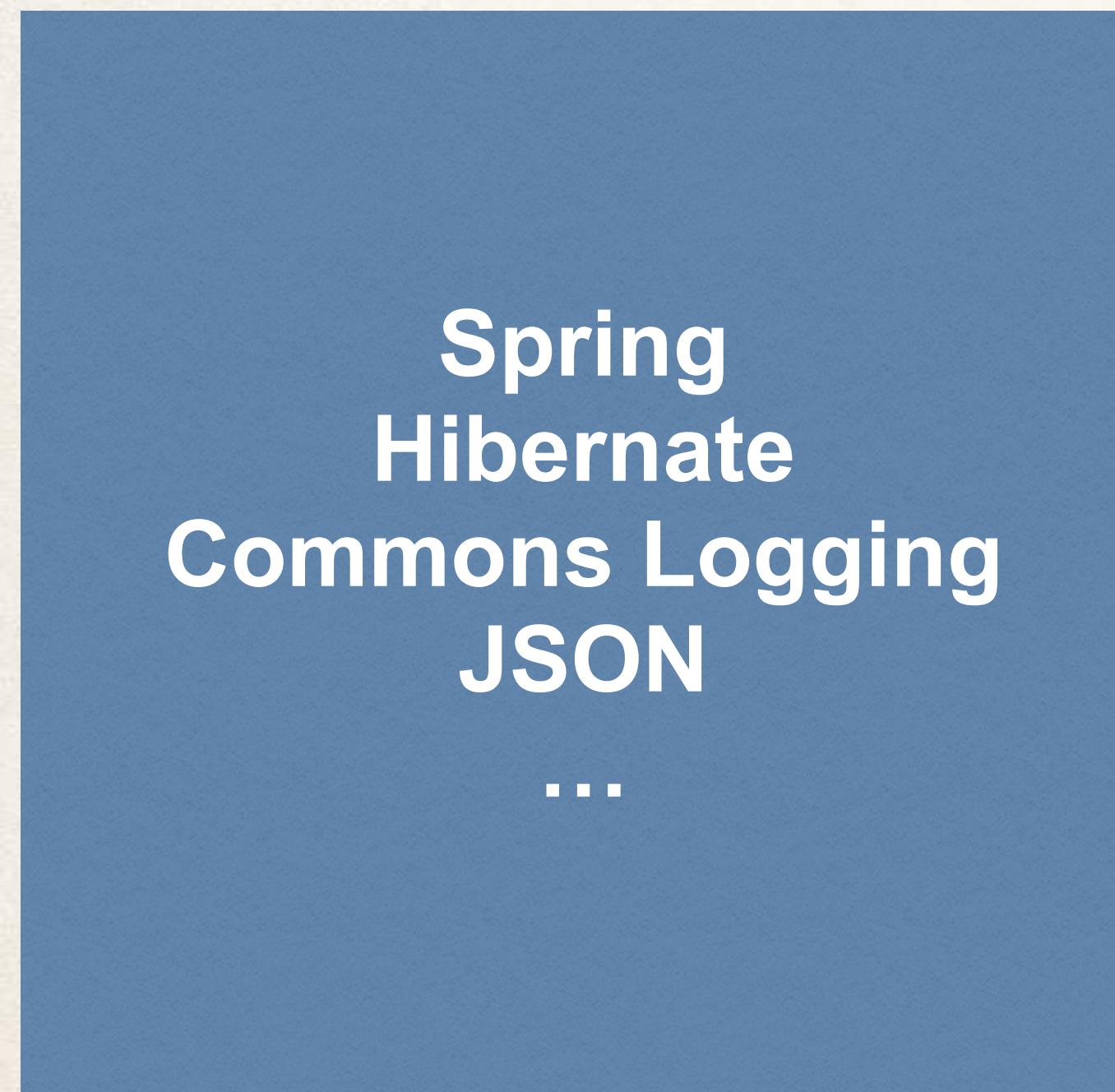
My Super Cool App

Spring
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JSON
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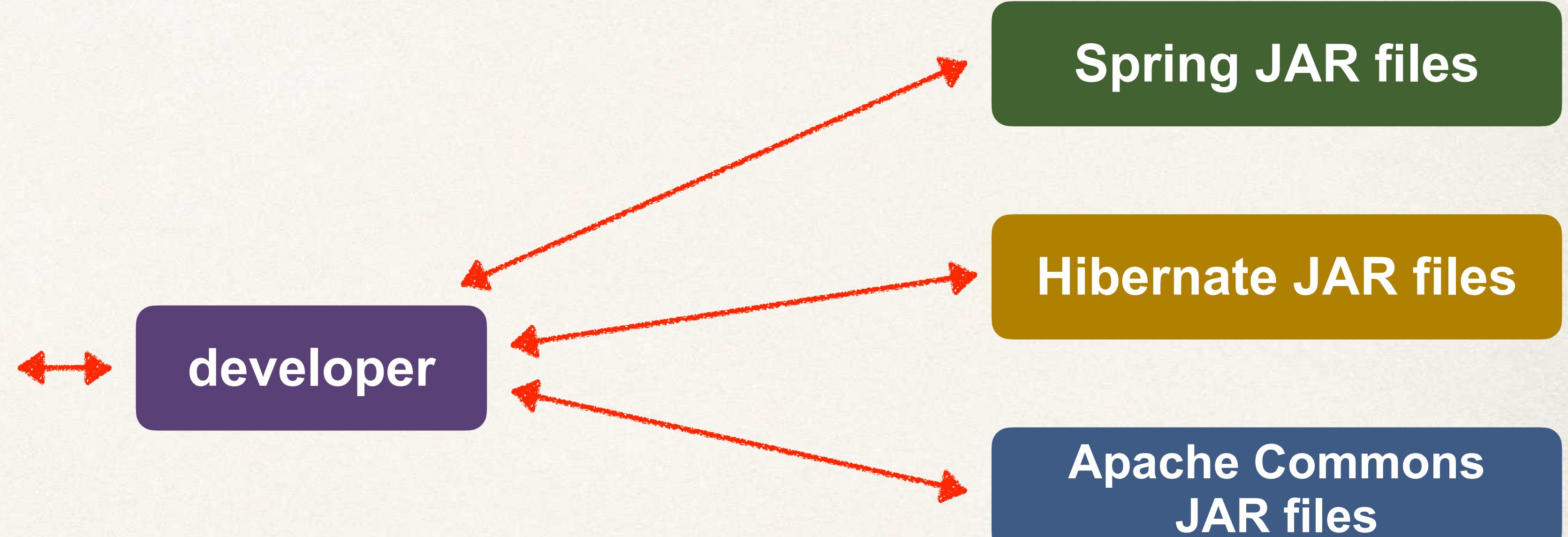
My Project without Maven

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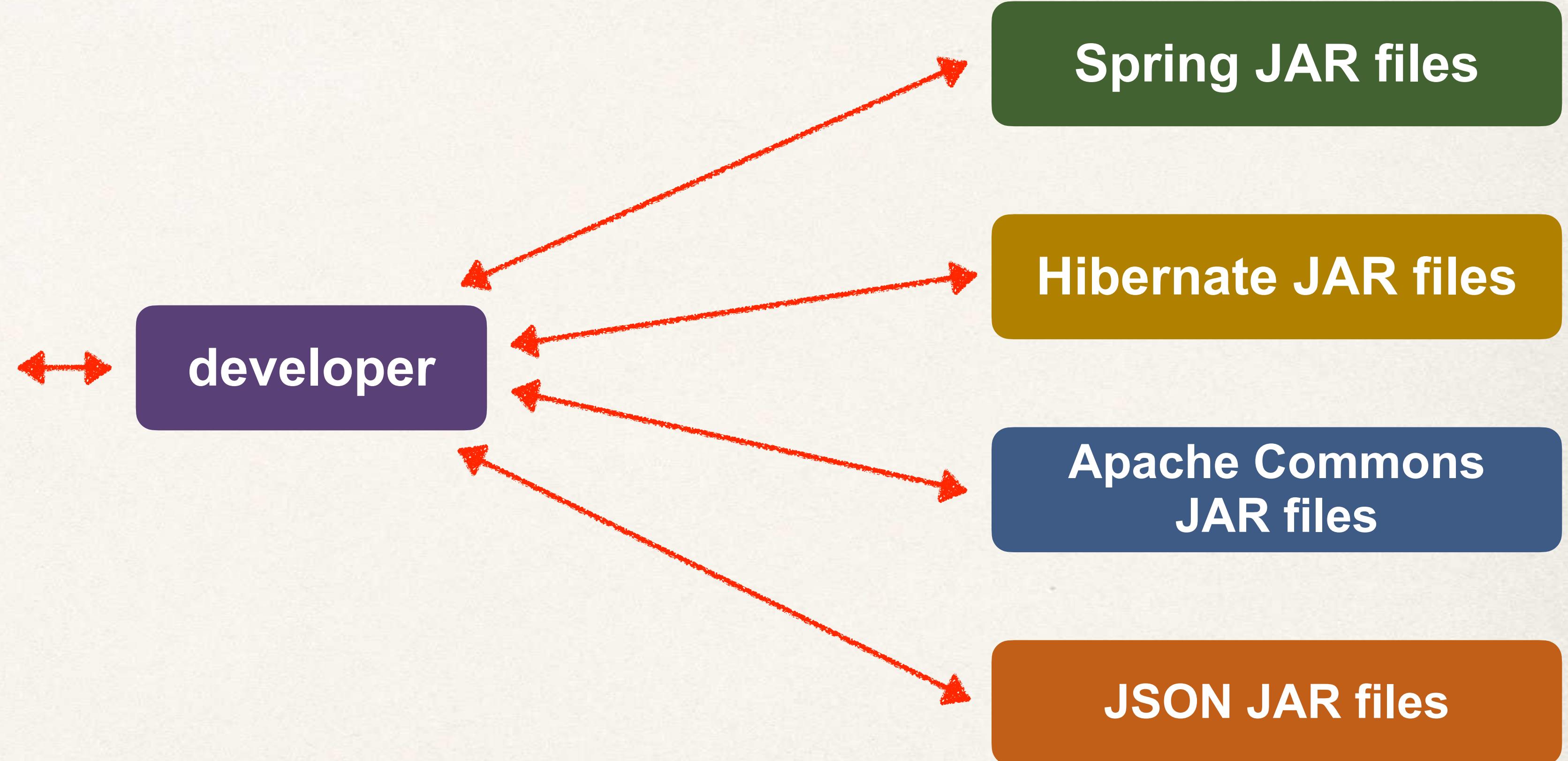
My Project without Maven

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Maven Solution

Maven Solution

- Tell Maven the projects you are working with (dependencies)
 - Spring, Hibernate etc

Maven Solution

- Tell Maven the projects you are working with (dependencies)
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Maven Solution

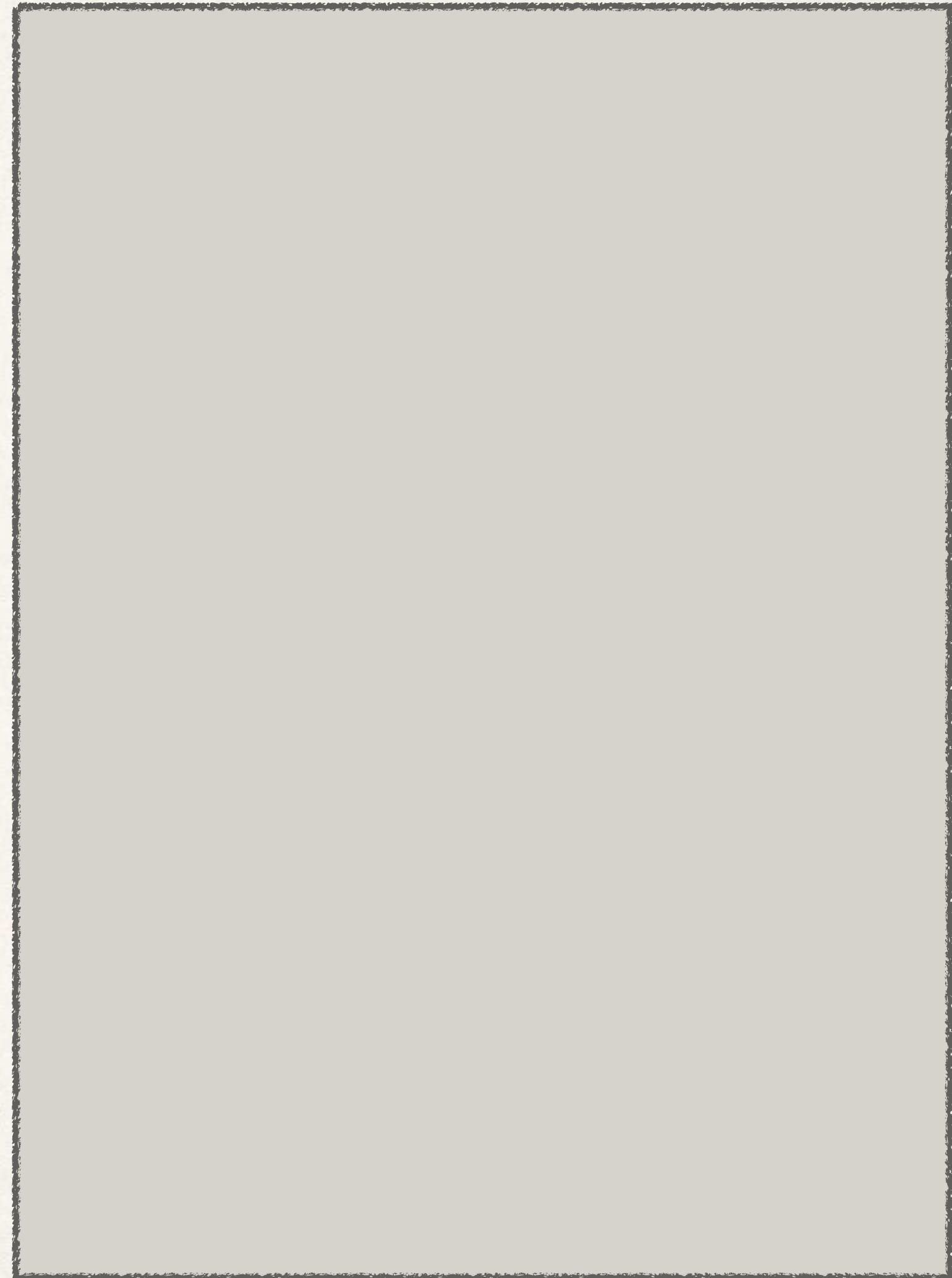
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- And Maven will make
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Maven Solution

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My Project with Maven

Maven Central Repository (remote)



My Project with Maven

My Super Cool App

Spring
Hibernate
Commons Logging
JSON
...

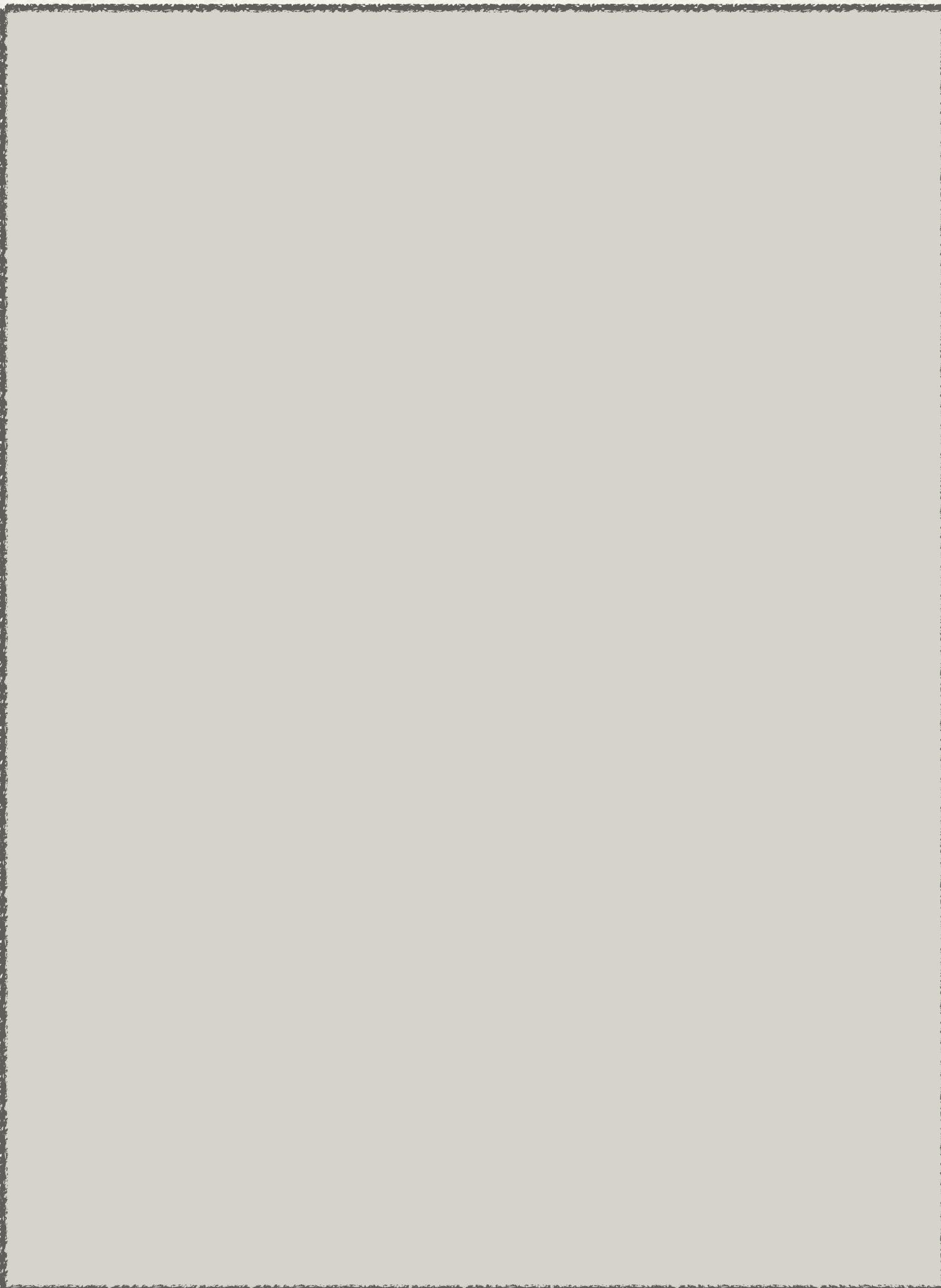
Maven Central Repository (remote)

My Project with Maven

My Super Cool App



Maven Central Repository (remote)



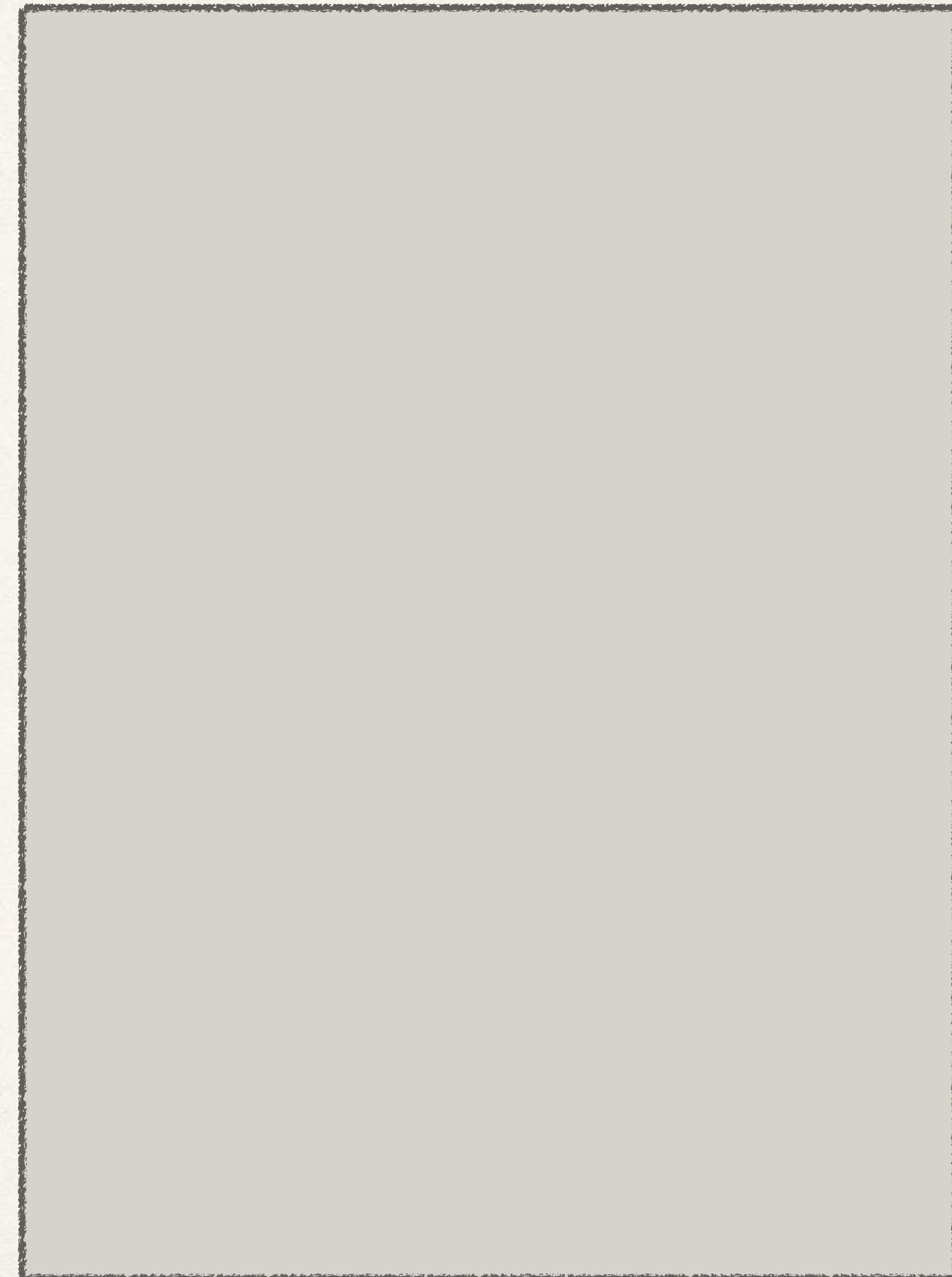
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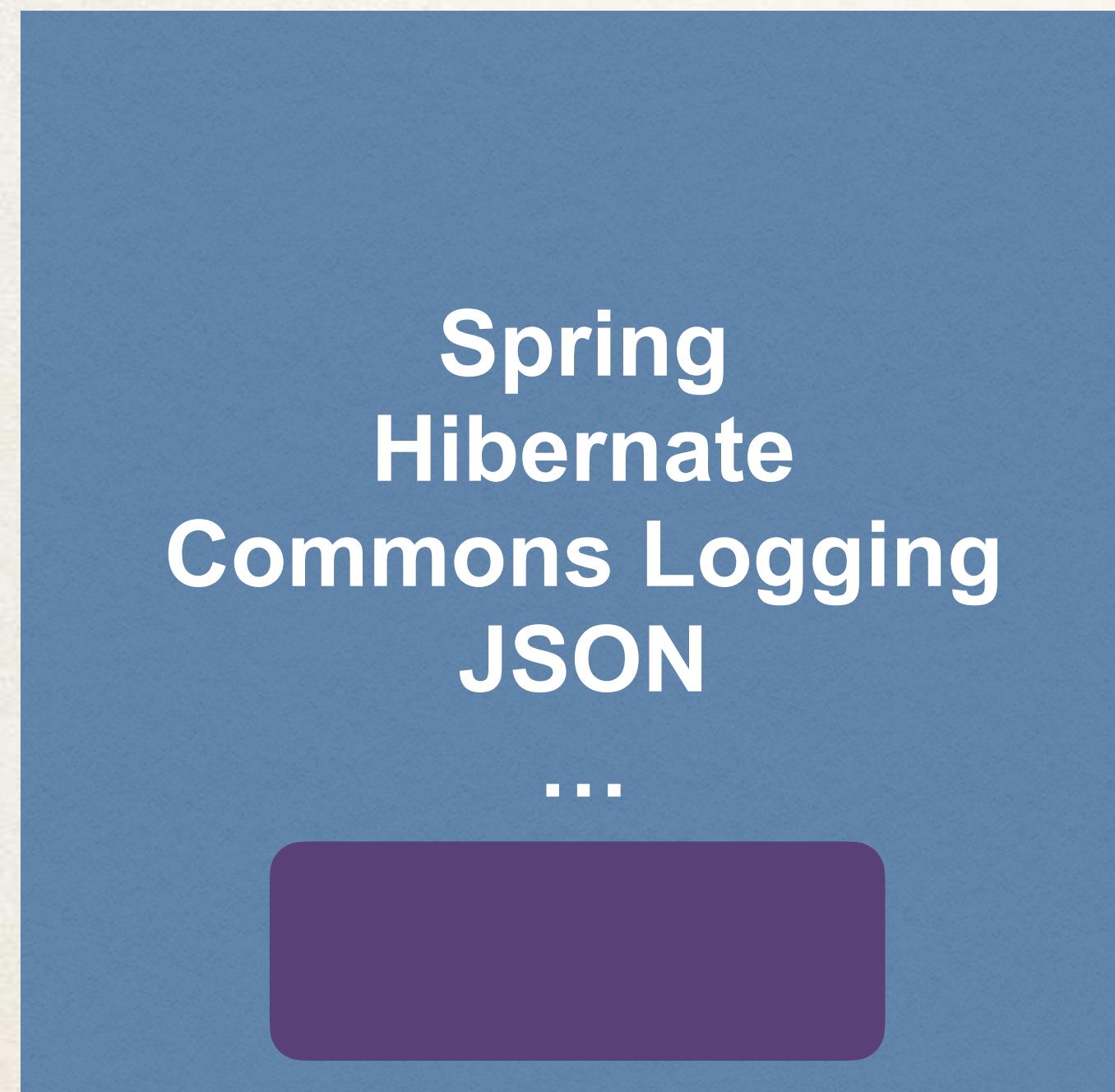
Maven

Maven Central Repository (remote)



My Project with Maven

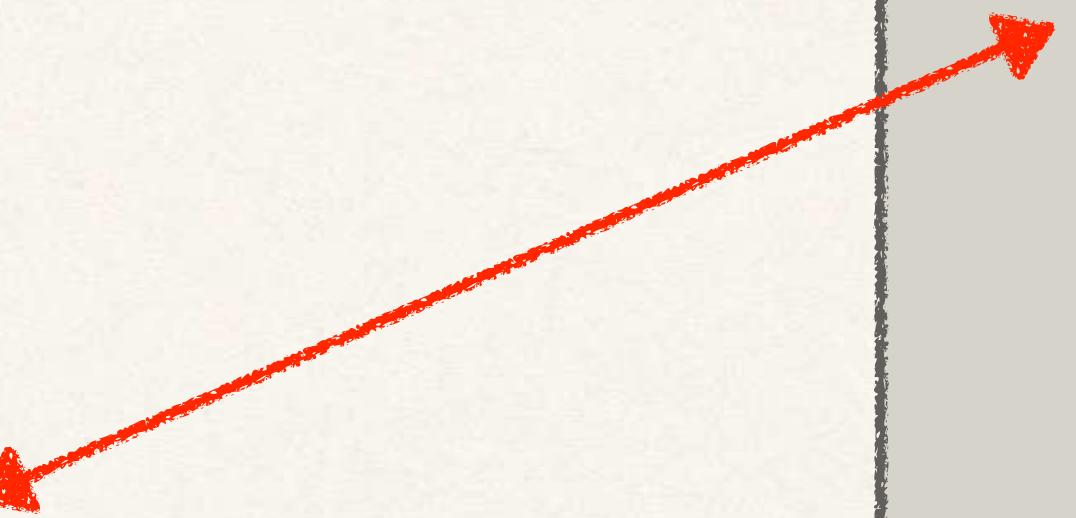
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Maven

Maven Central Repository (remote)

Spring JAR files



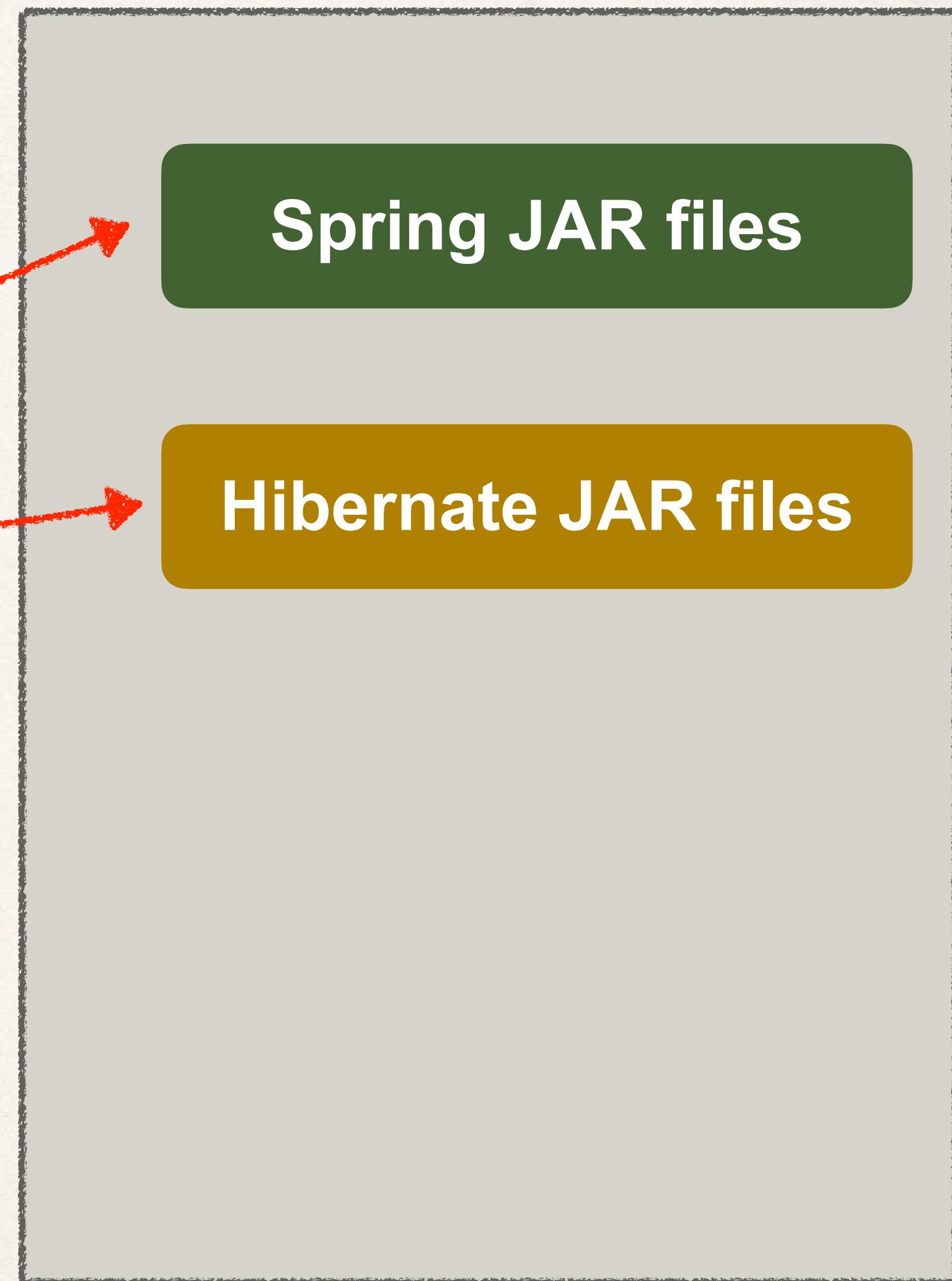
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My Super Cool App



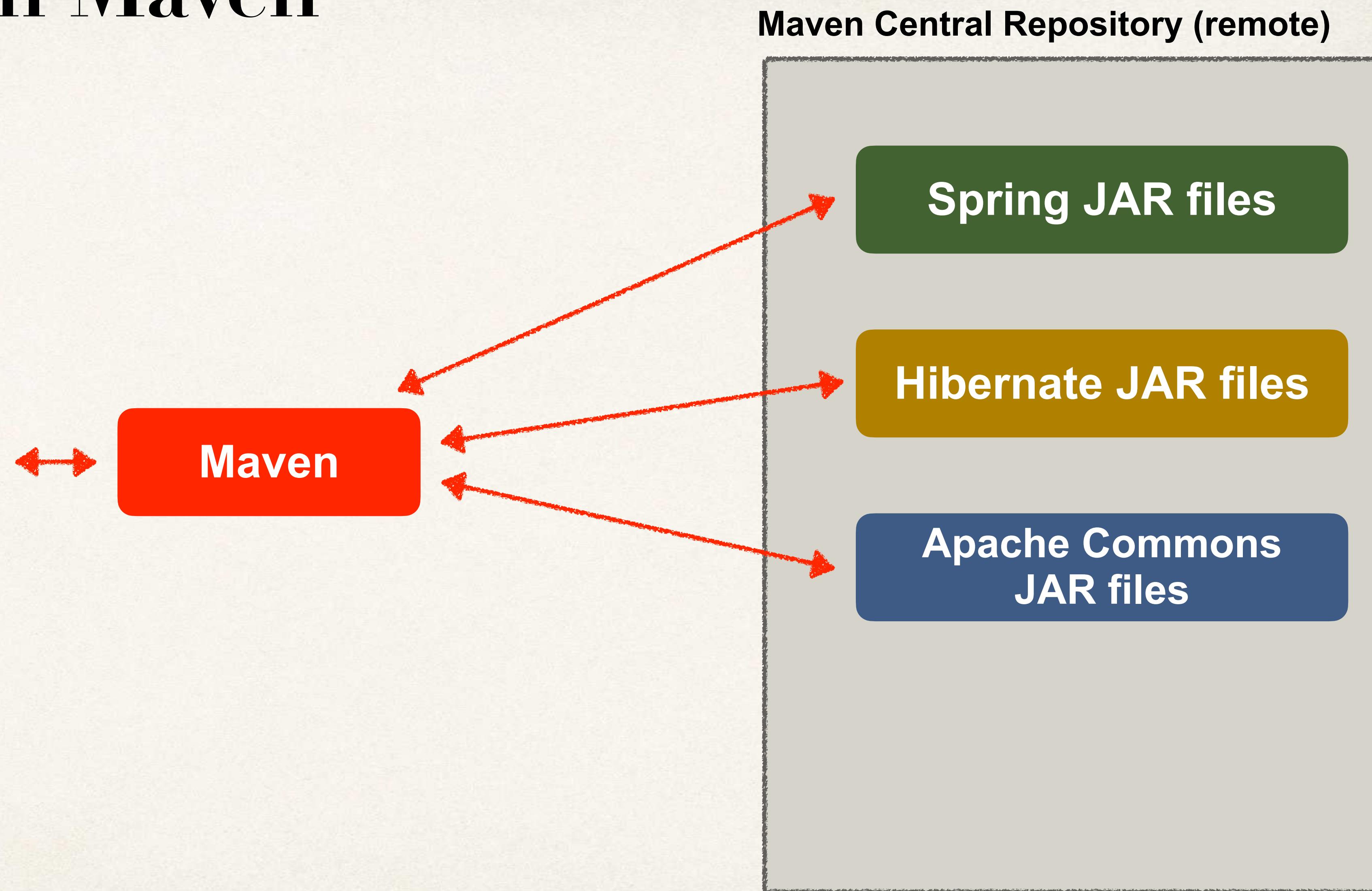
Maven

Maven Central Repository (remote)



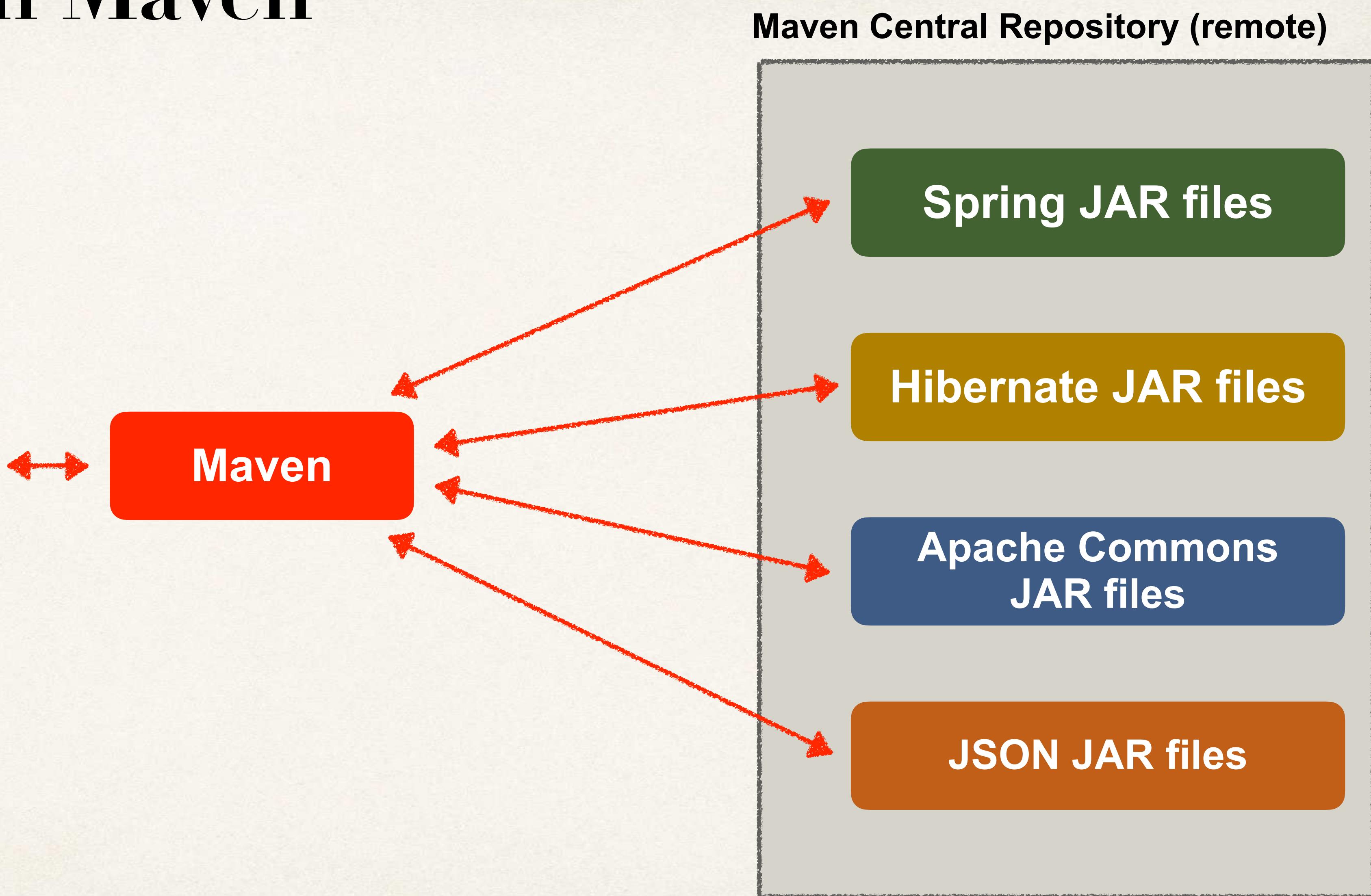
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My Super Cool App



My Project with Maven

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Maven - How It Works

Maven - How It Works

Project Config file

Spring
Hibernate

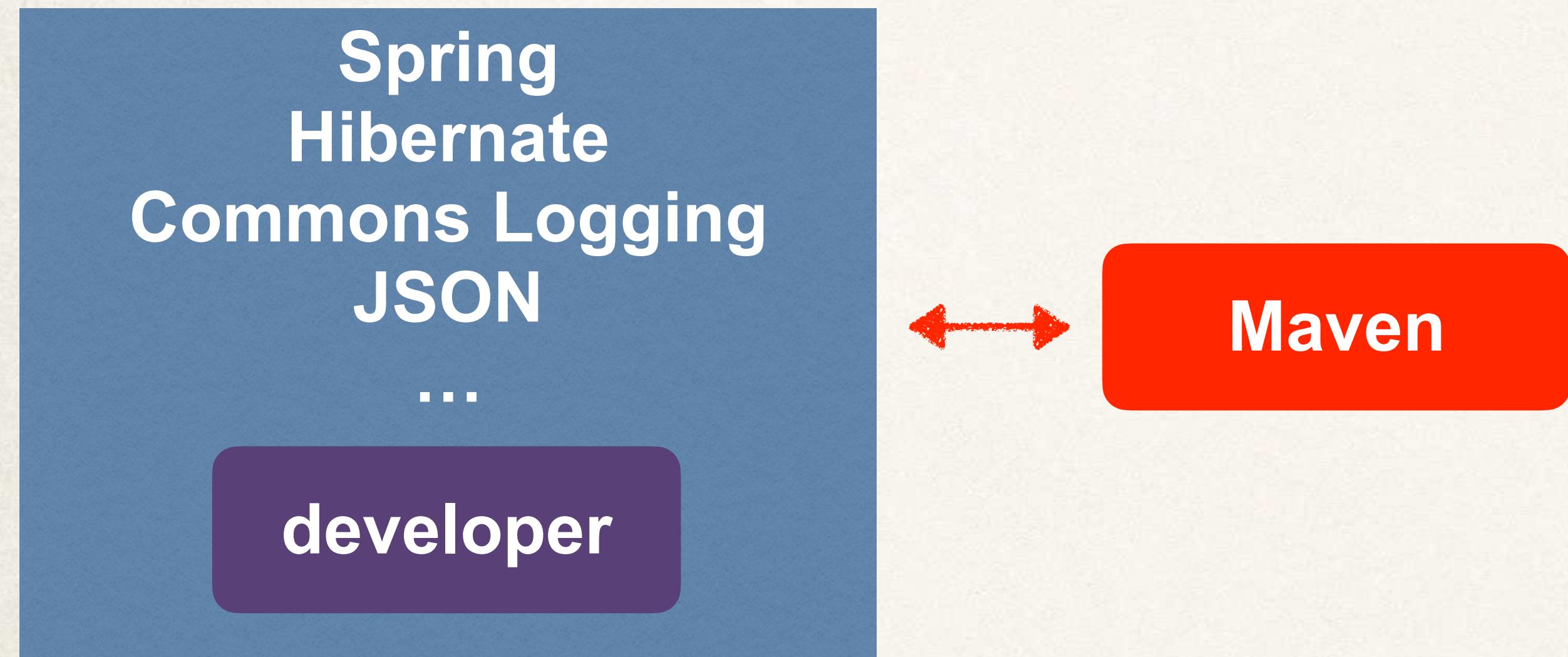
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...

developer

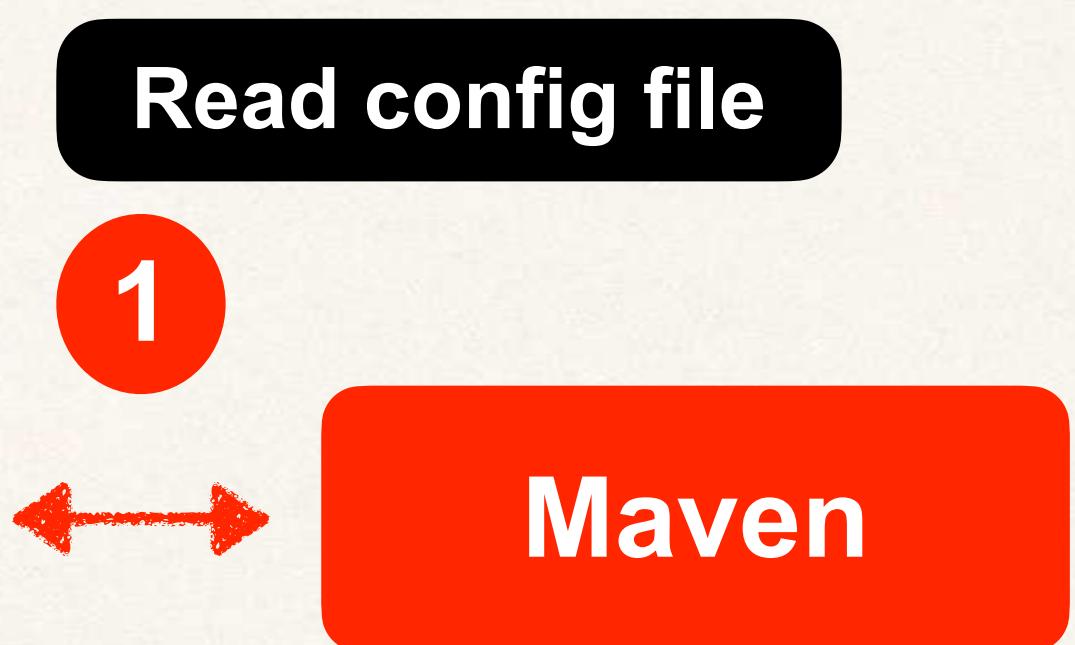
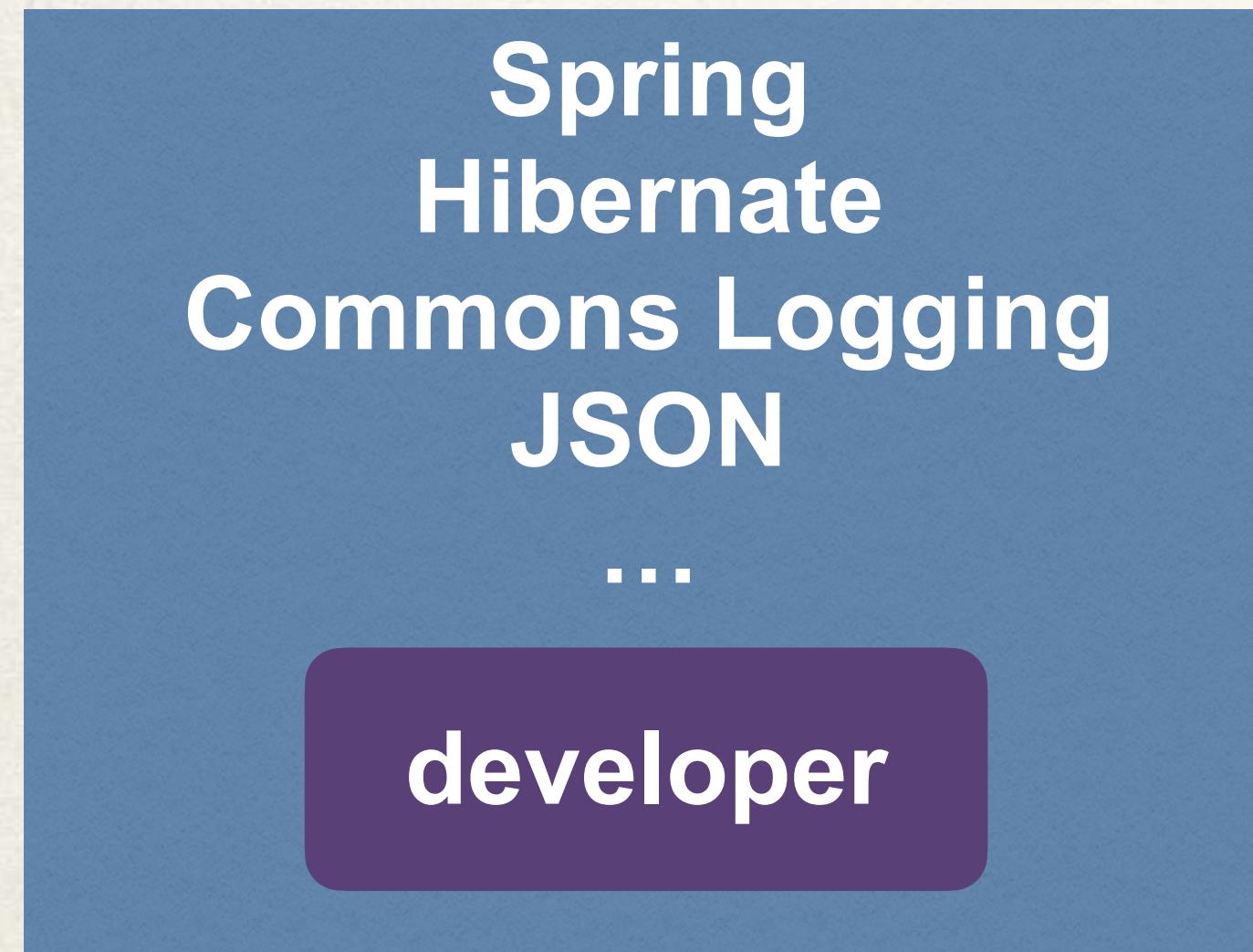
Maven - How It Works

Project Config file



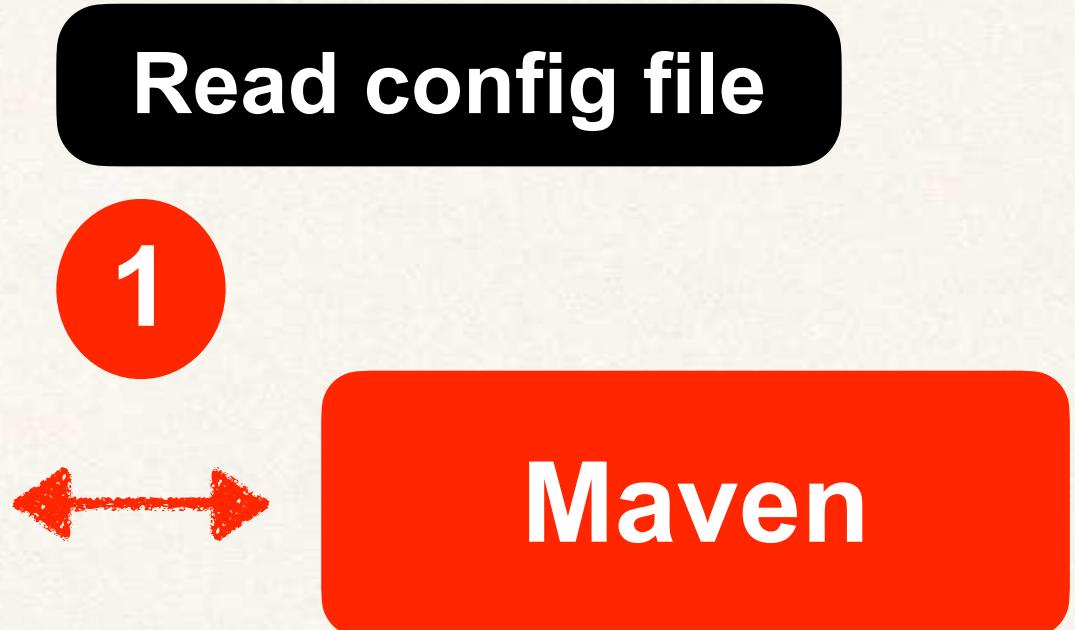
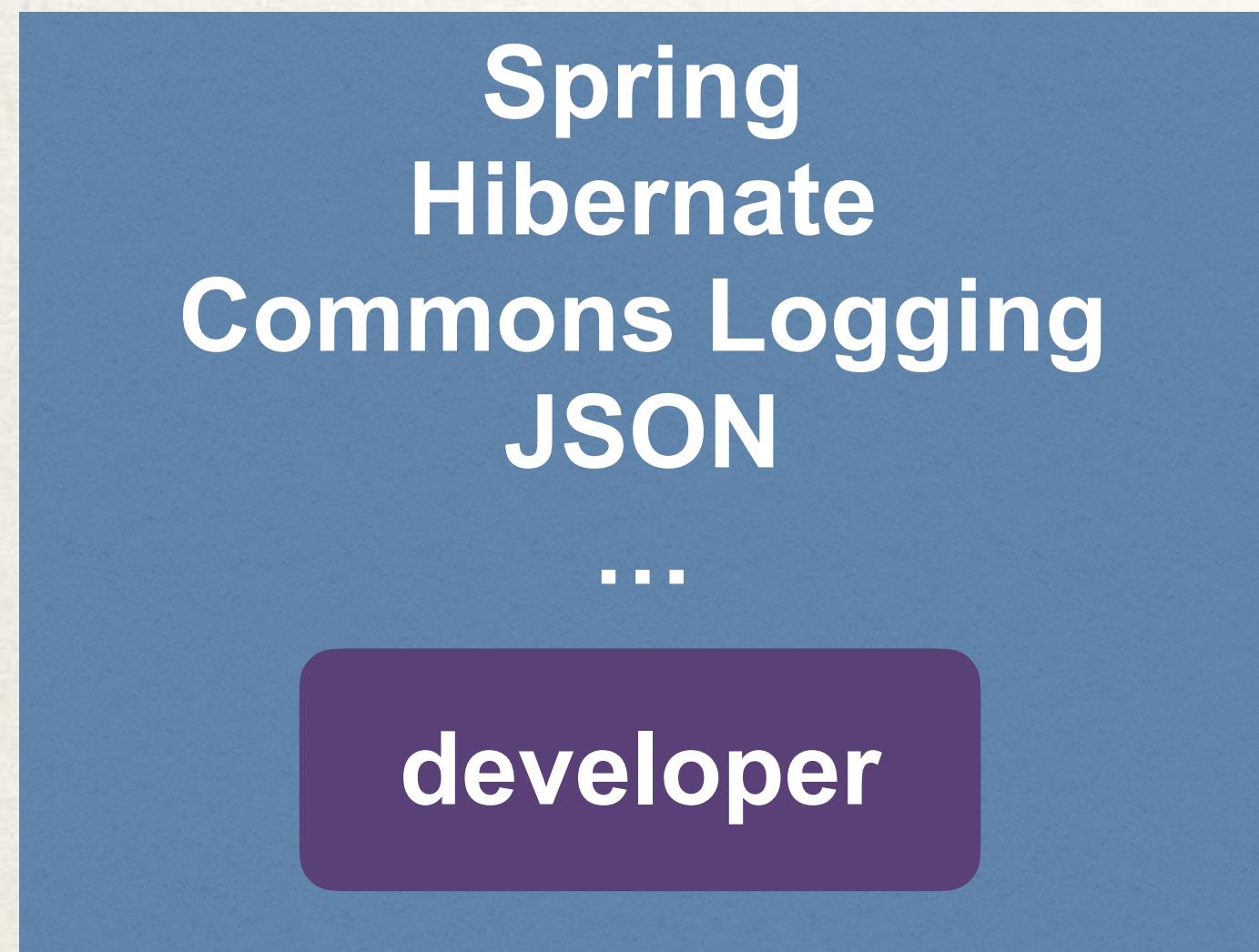
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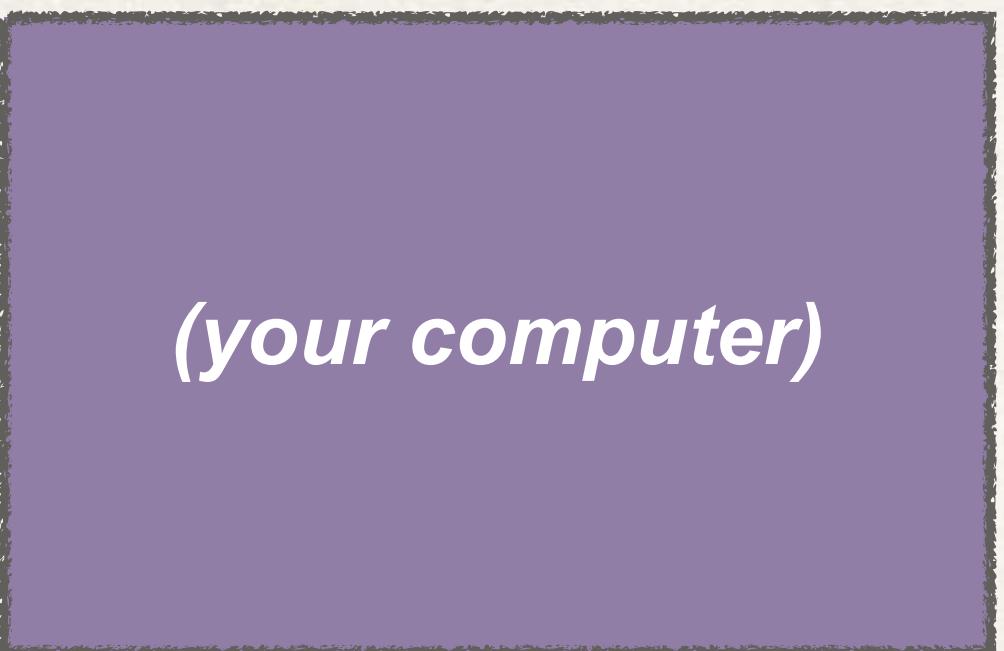


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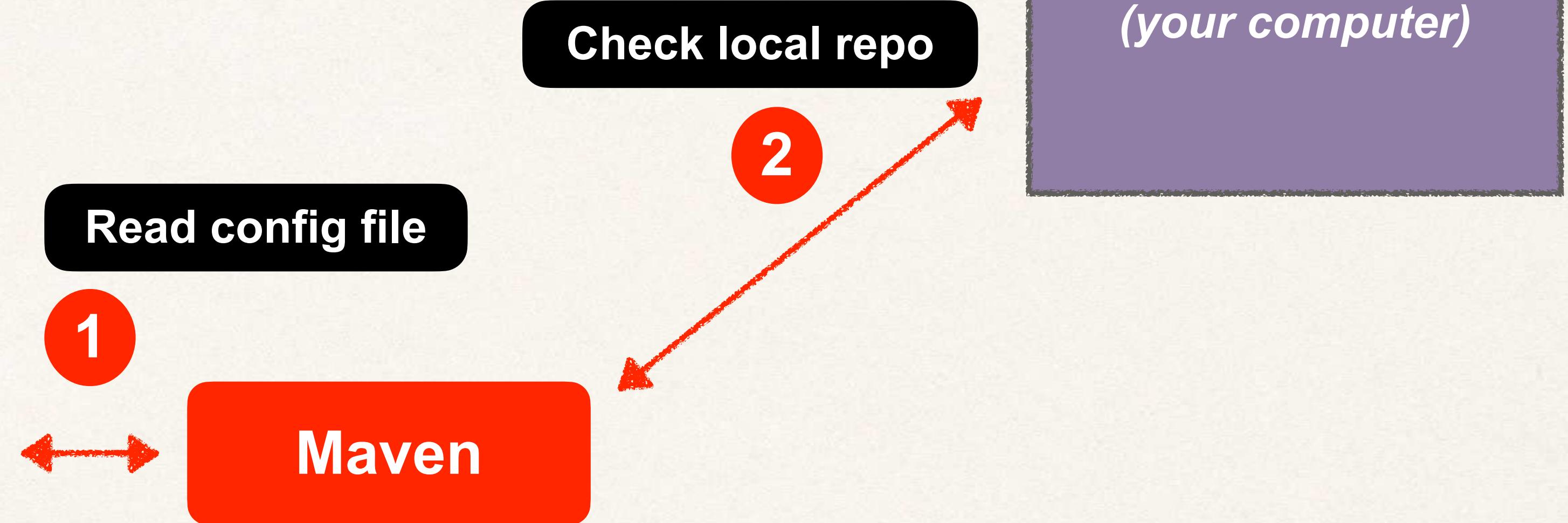
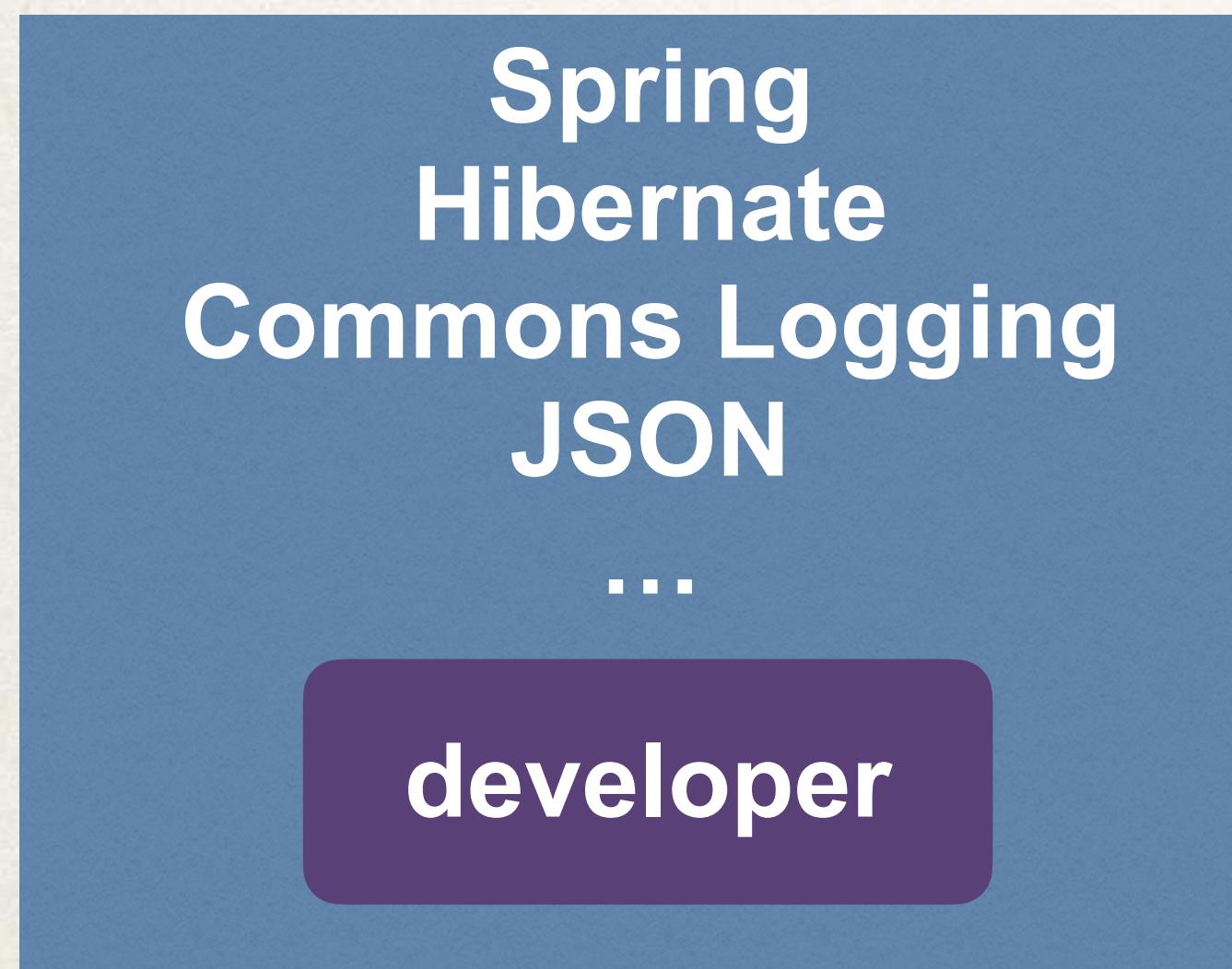


Maven Local Repository



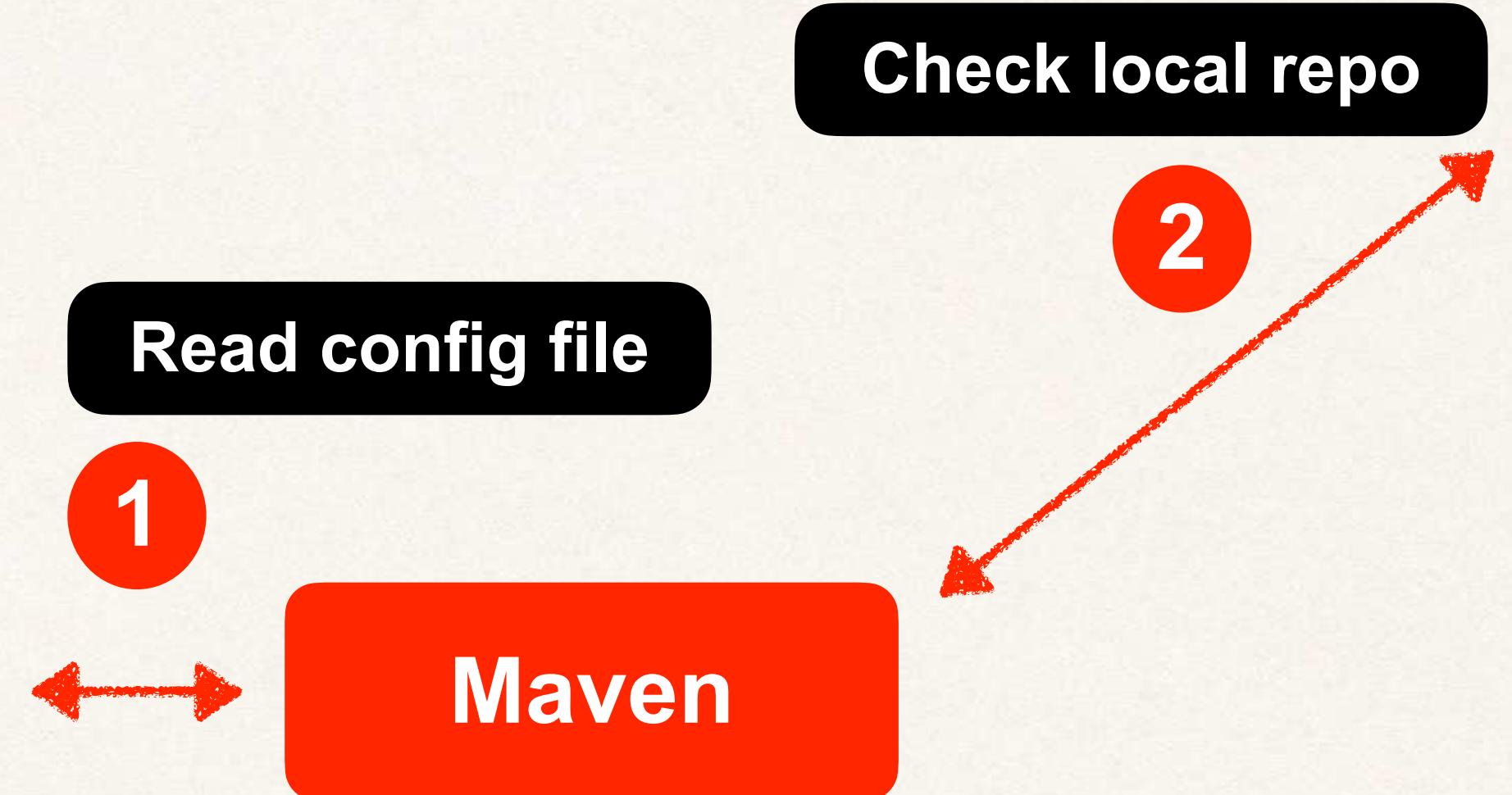
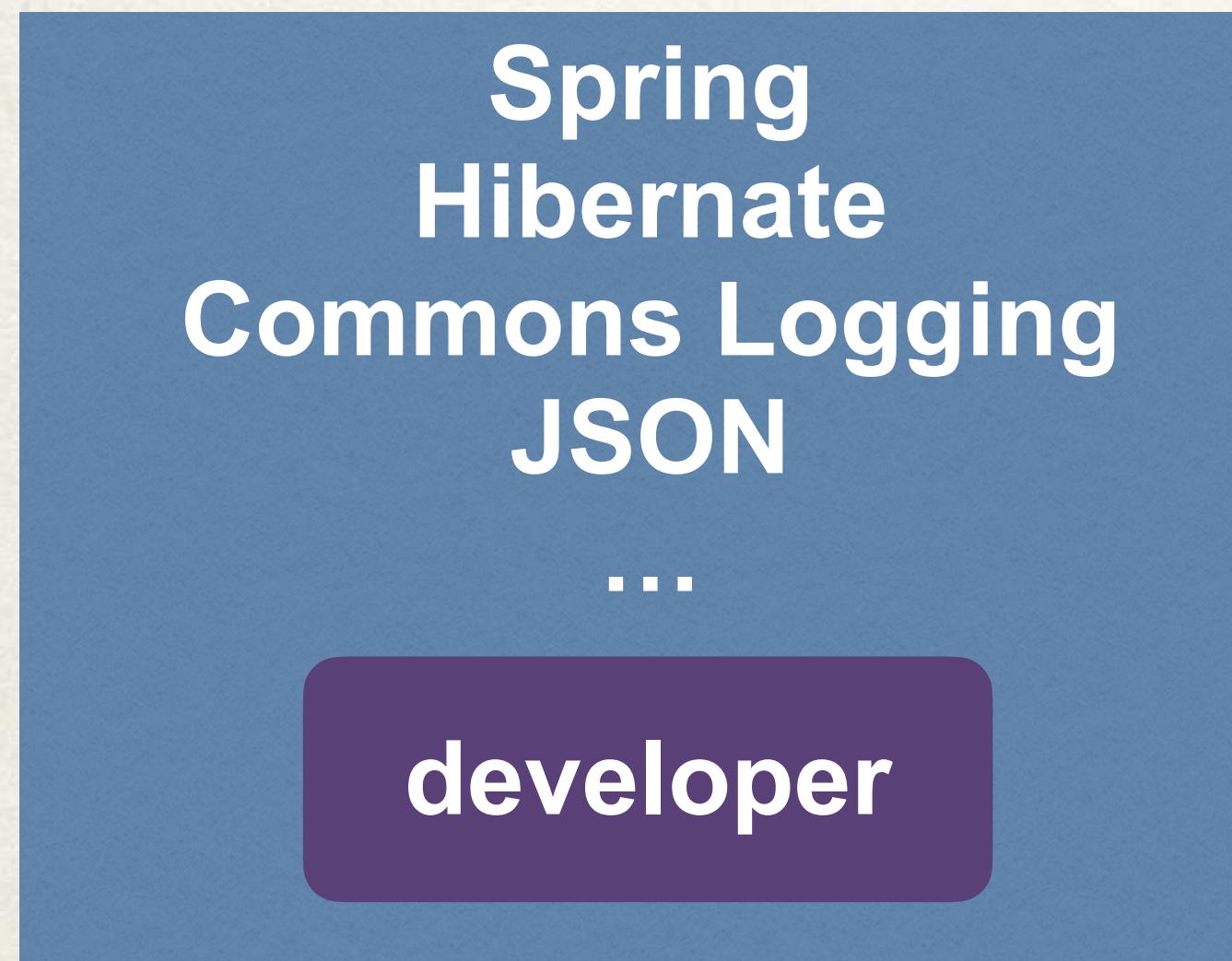
Maven - How It Works

Project Config file

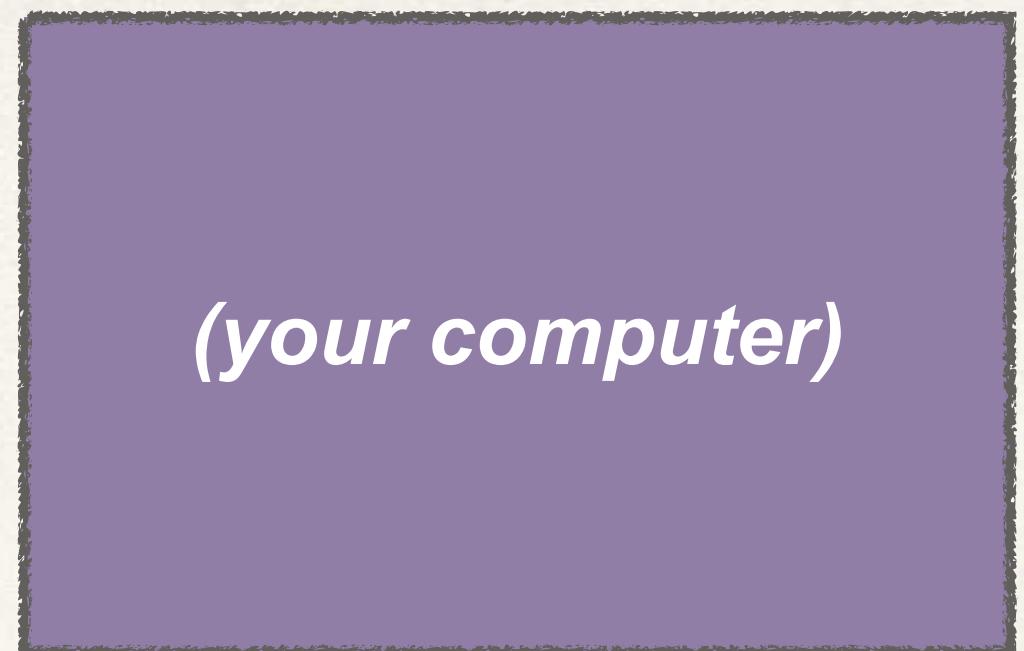


Maven - How It Works

Project Config file



Maven Local Repository

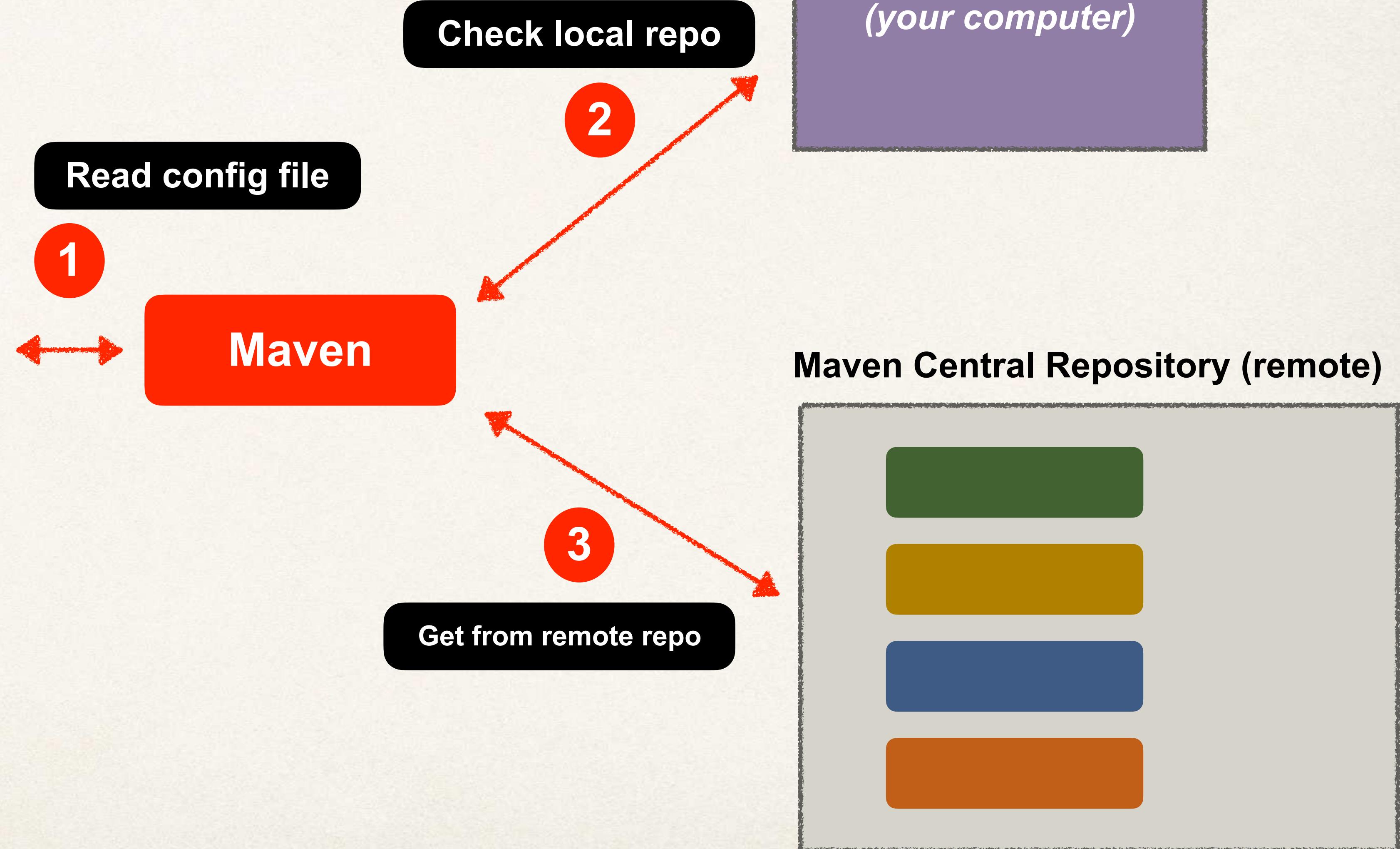
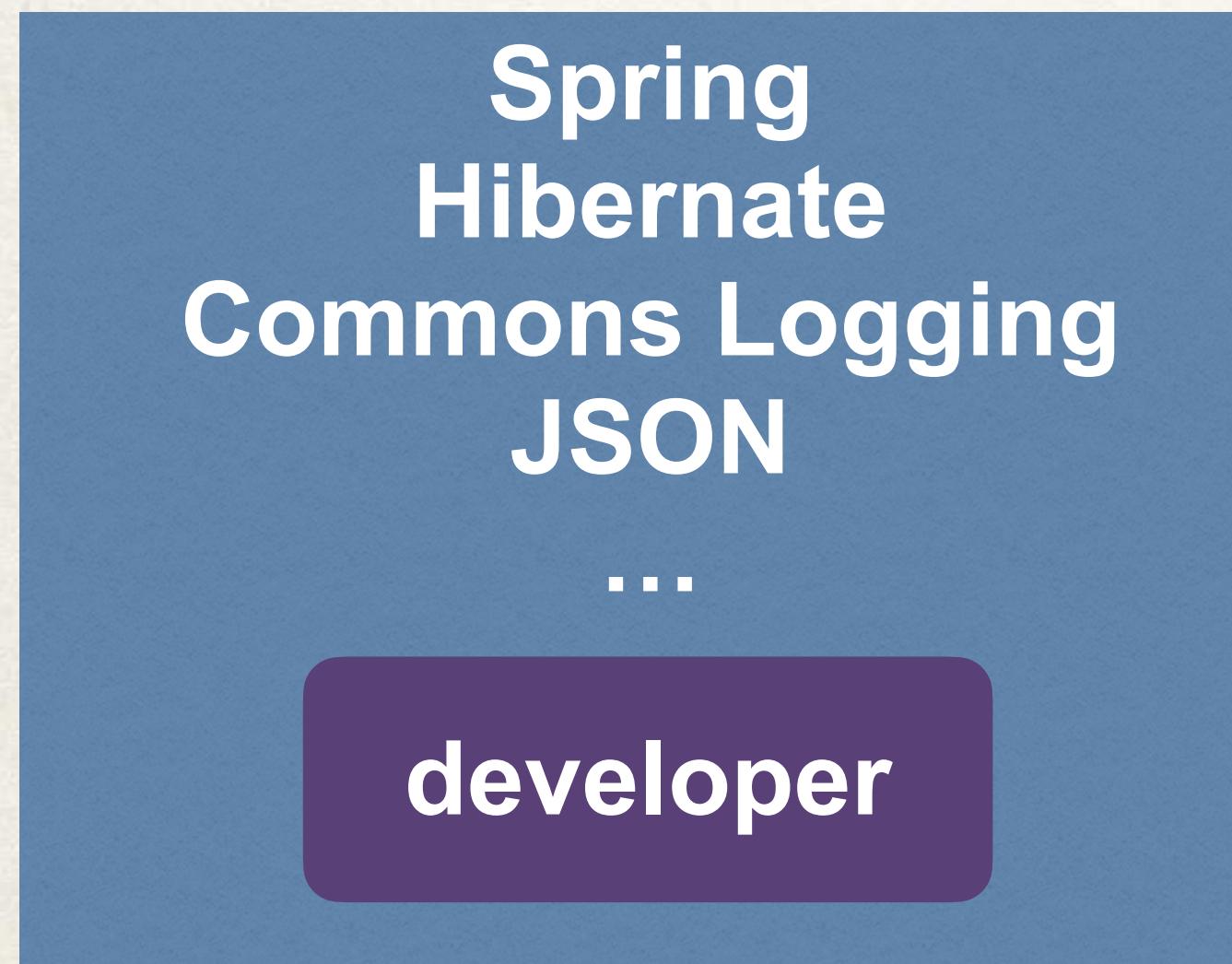


Maven Central Repository (remote)



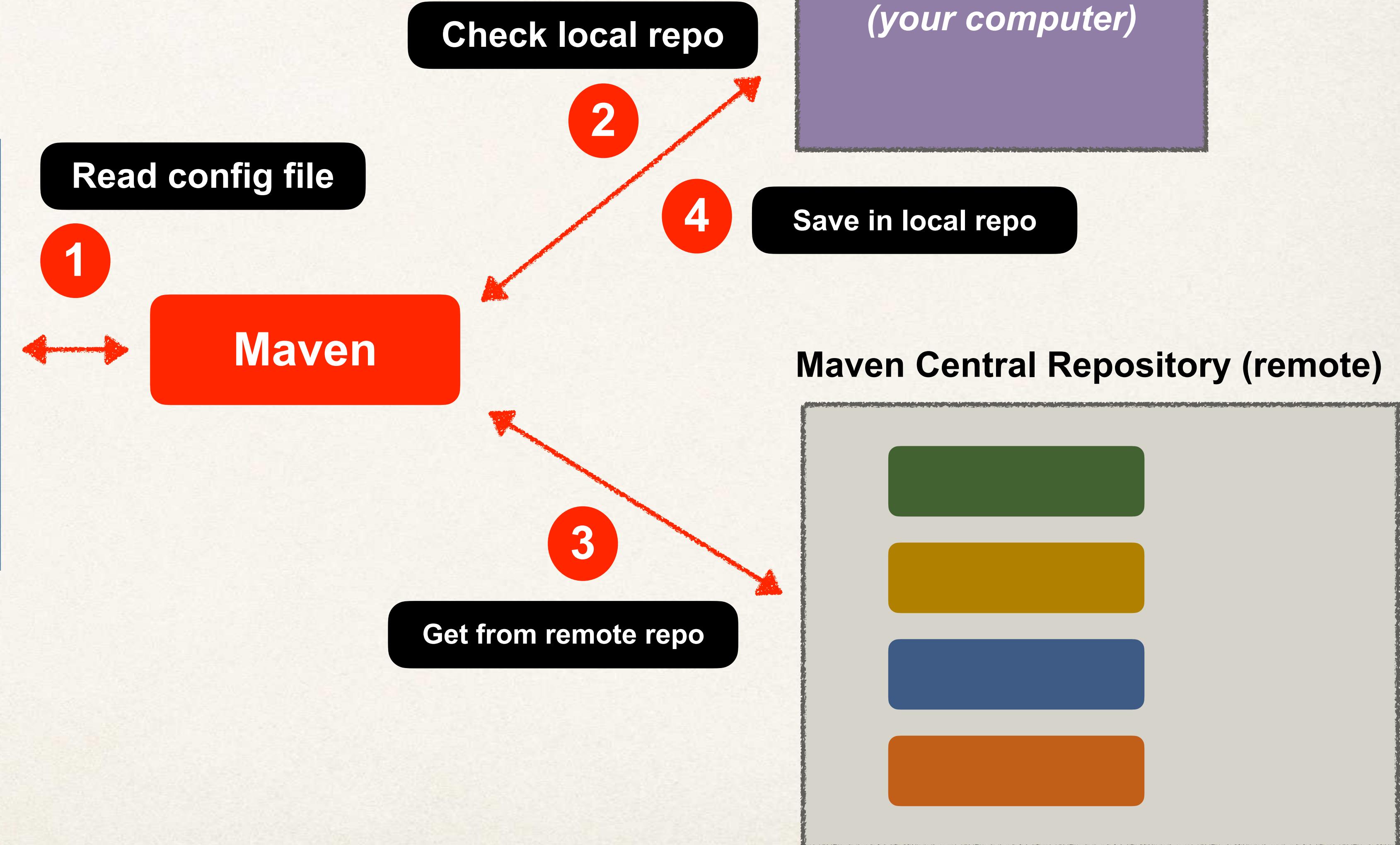
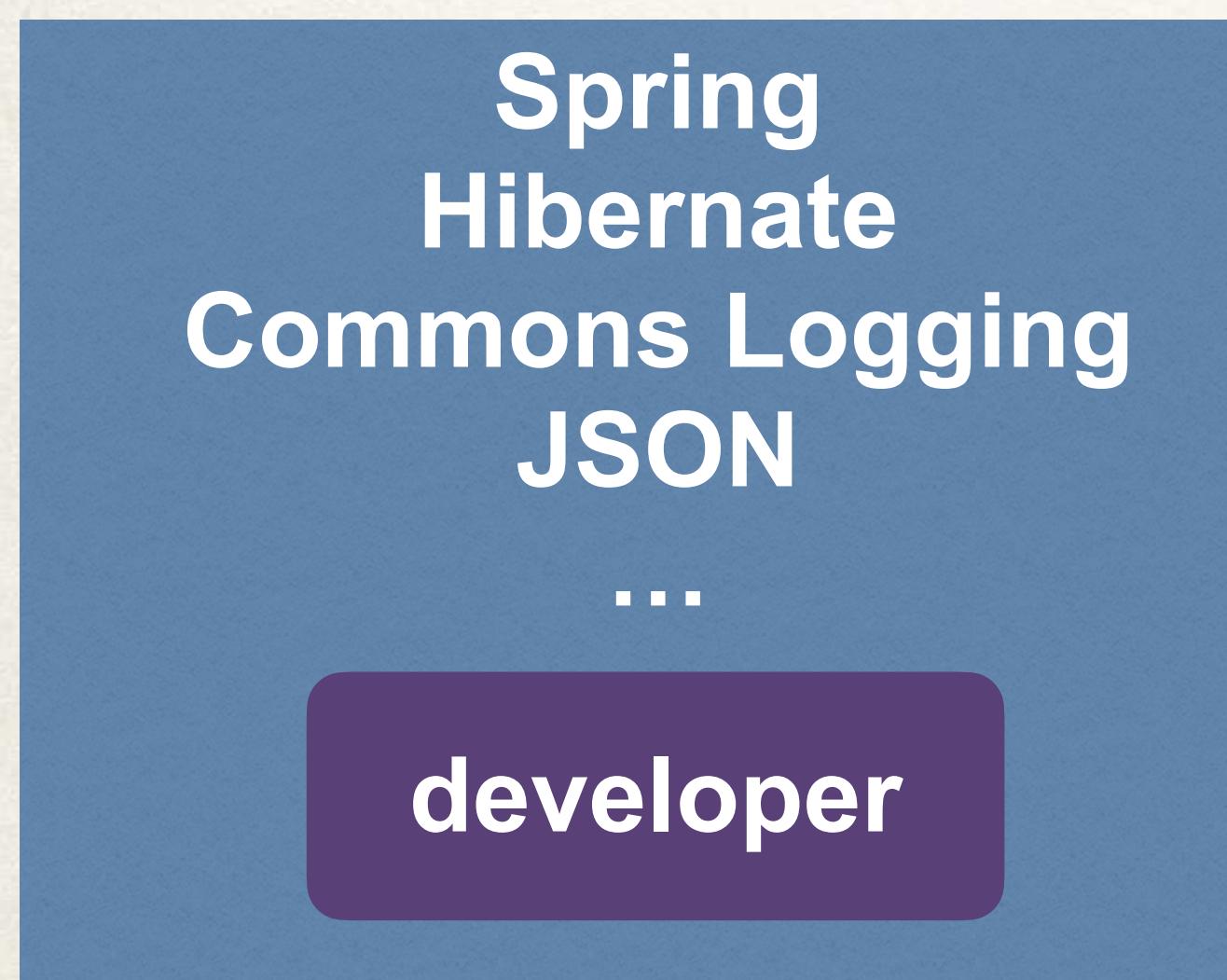
Maven - How It Works

Project Config file



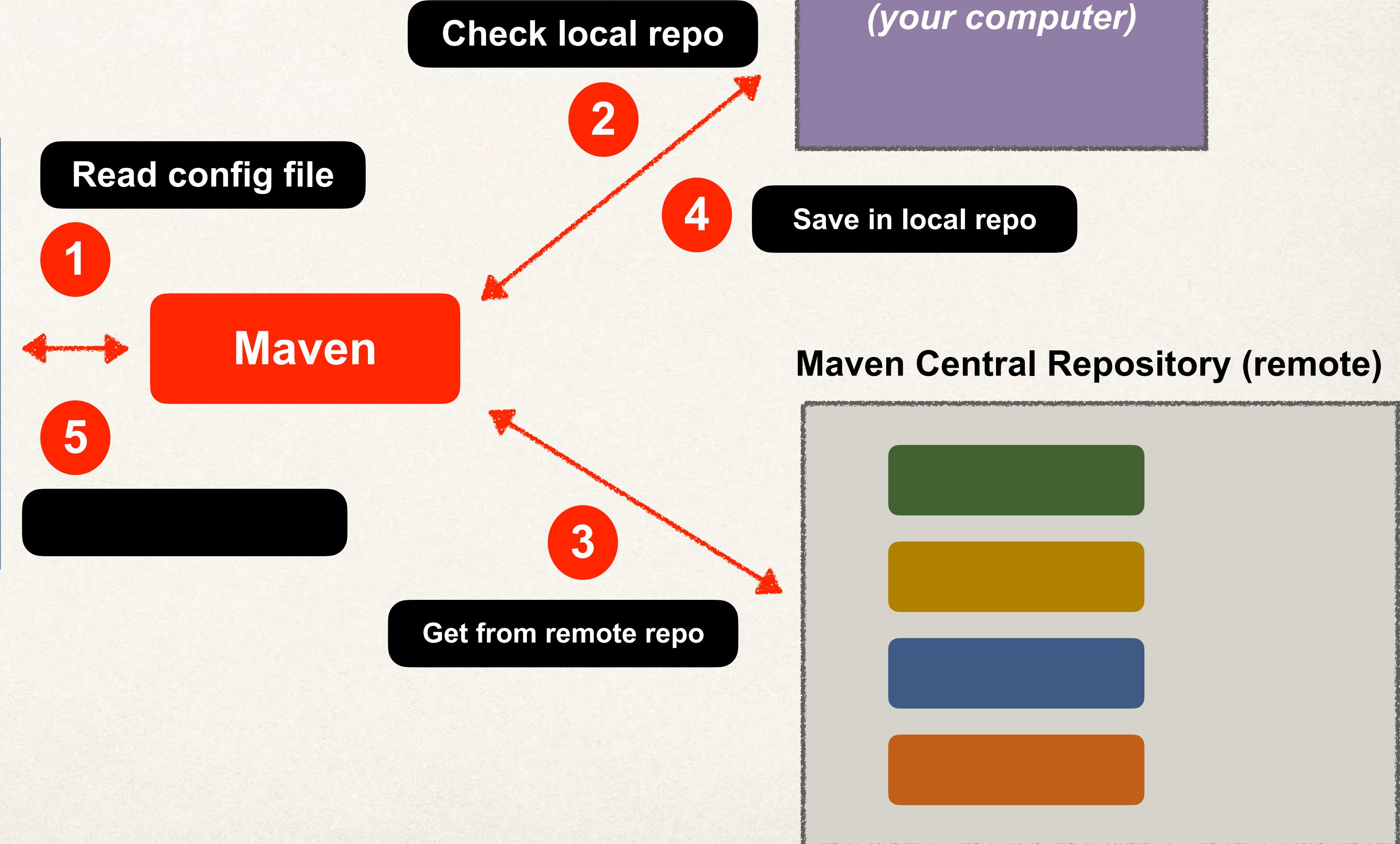
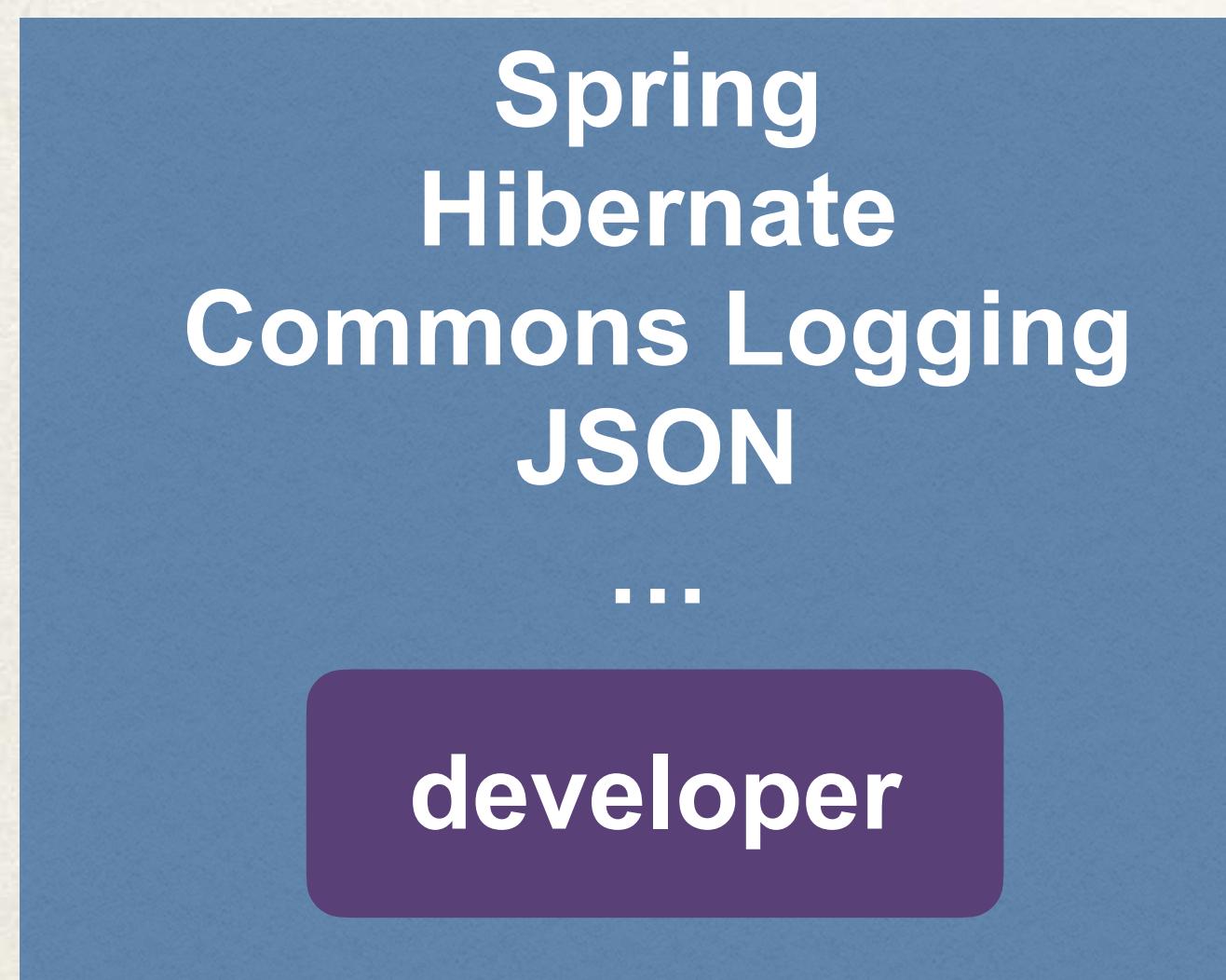
Maven - How It Works

Project Config file



Maven - How It Works

Project Config file



Handling JAR Dependencies

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- When Maven retrieves a project dependency
 - It will also download supporting dependencies
 - For example: Spring depends on commons-logging ...

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 - It will also download supporting dependencies
 - For example: Spring depends on commons-logging ...
- Maven will handle this for us automagically

Building and Running

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- When you build and run your app ...

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- Maven will handle class / build path for you

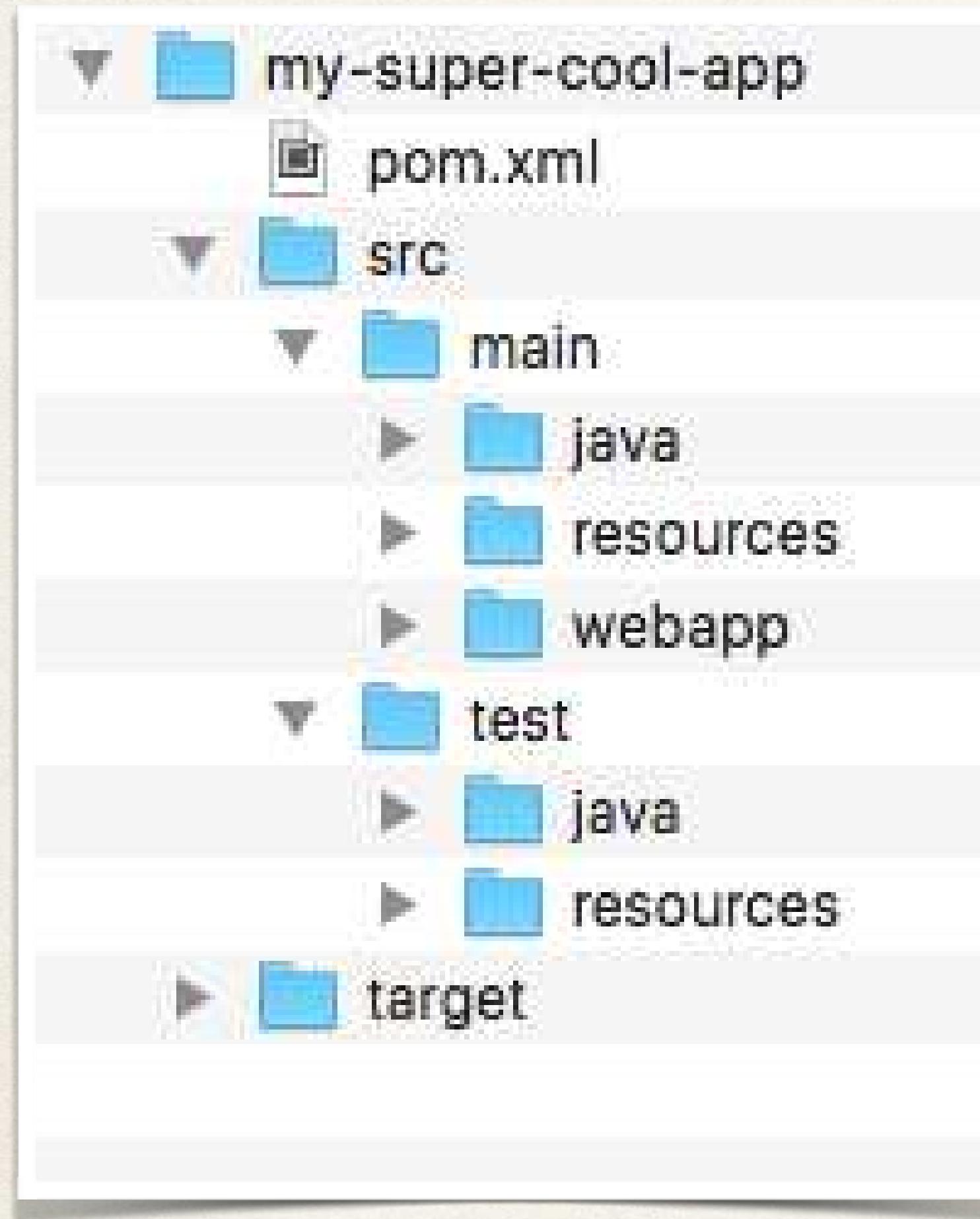
Building and Running

- When you build and run your app ...
- Maven will handle class / build path for you
- Based on config files accordingly

Standard Directory Structure

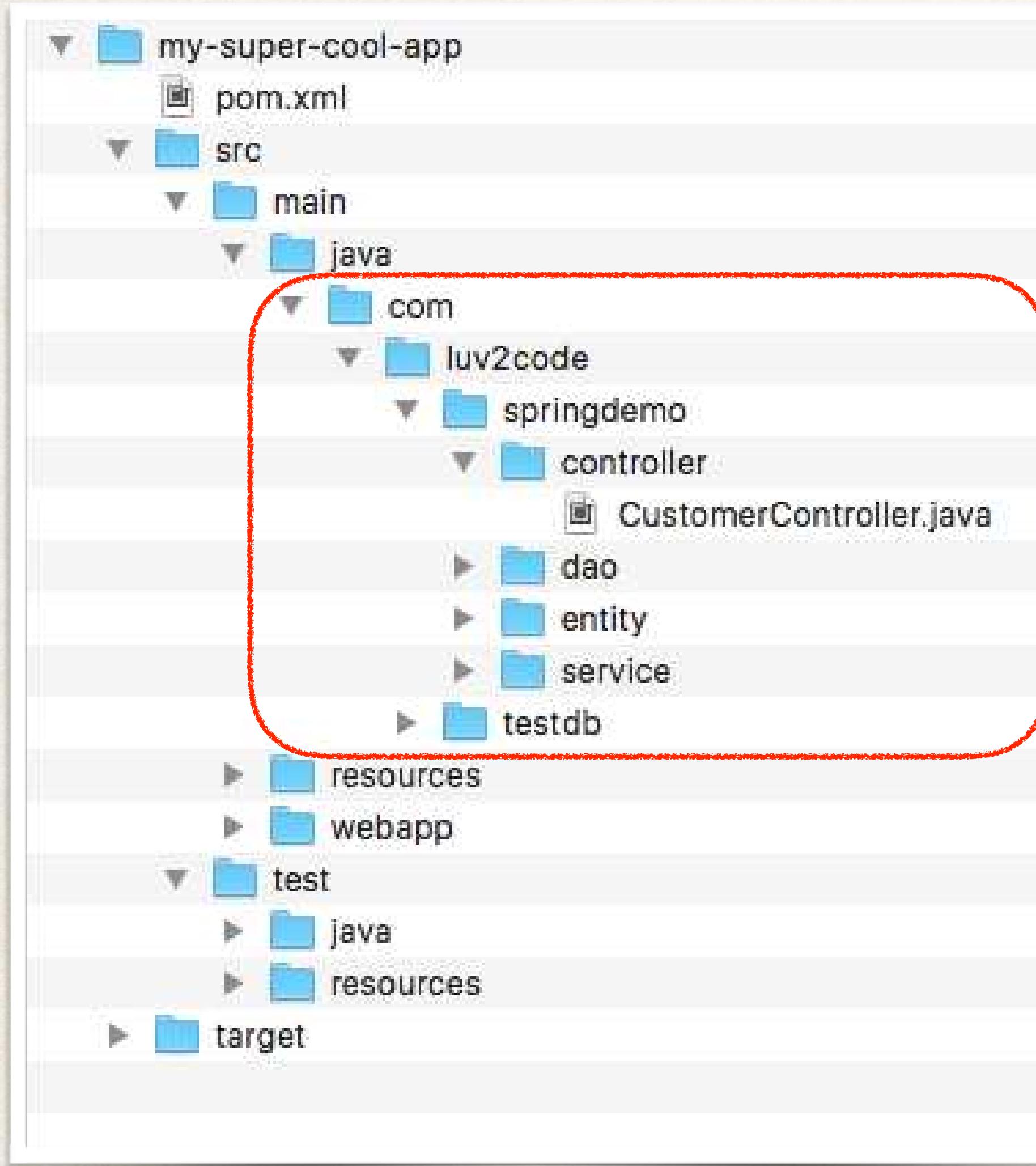
- Normally when you join a new project
 - Each development team dreams up their own directory structure
 - Not ideal for new comers and not standardized
- Maven solves this problem by providing a standard directory structure

Standard Directory Structure



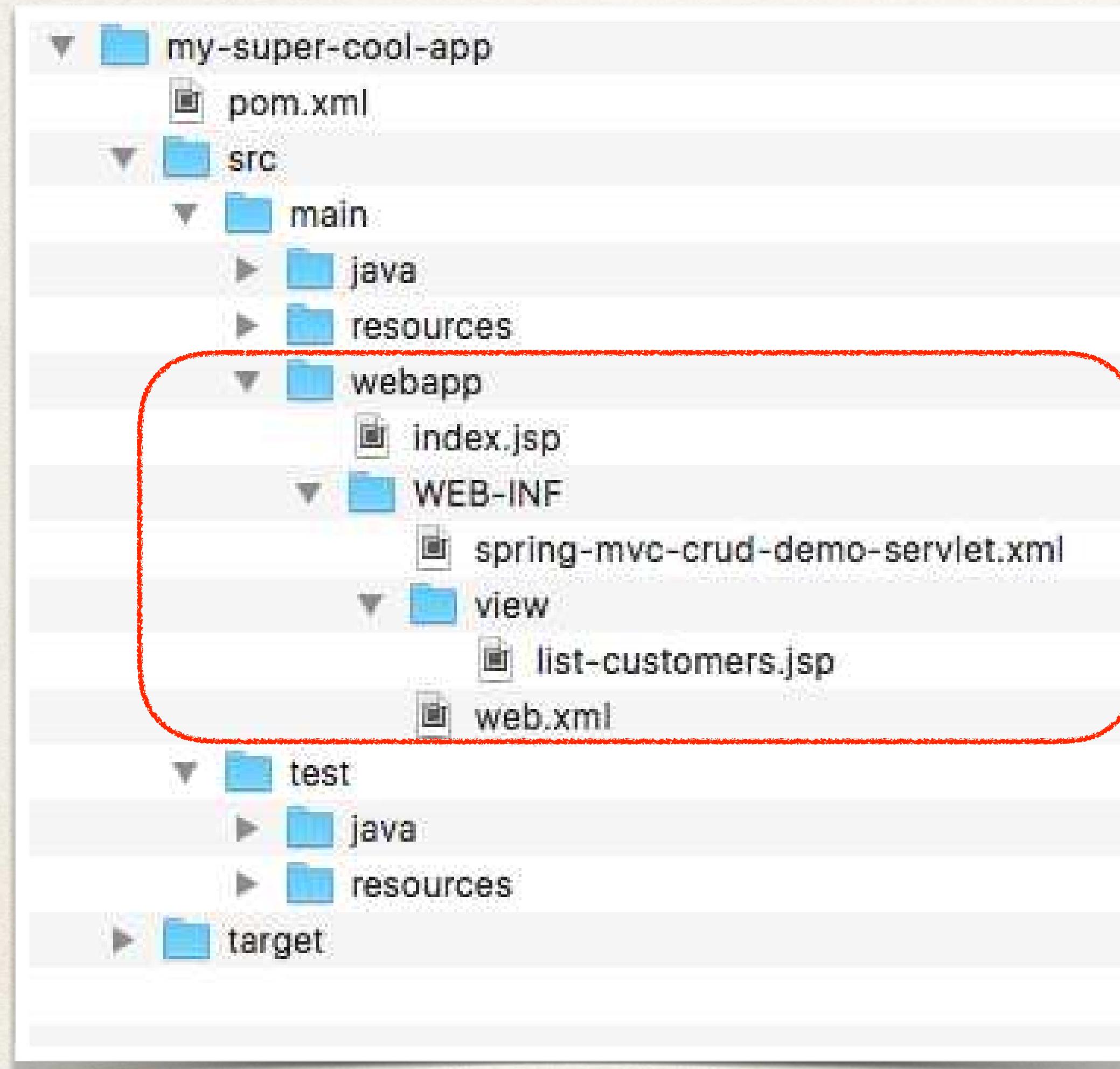
Directory	Description
src/main/java	Your Java source code
src/main/resources	Properties / config files used by your app
	JSP files and web config files other web assets (images, css, js, etc)
src/test	Unit testing code and properties
target	Destination directory for compiled code. Automatically created by Maven

Standard Directory Structure



Place your Java source code here

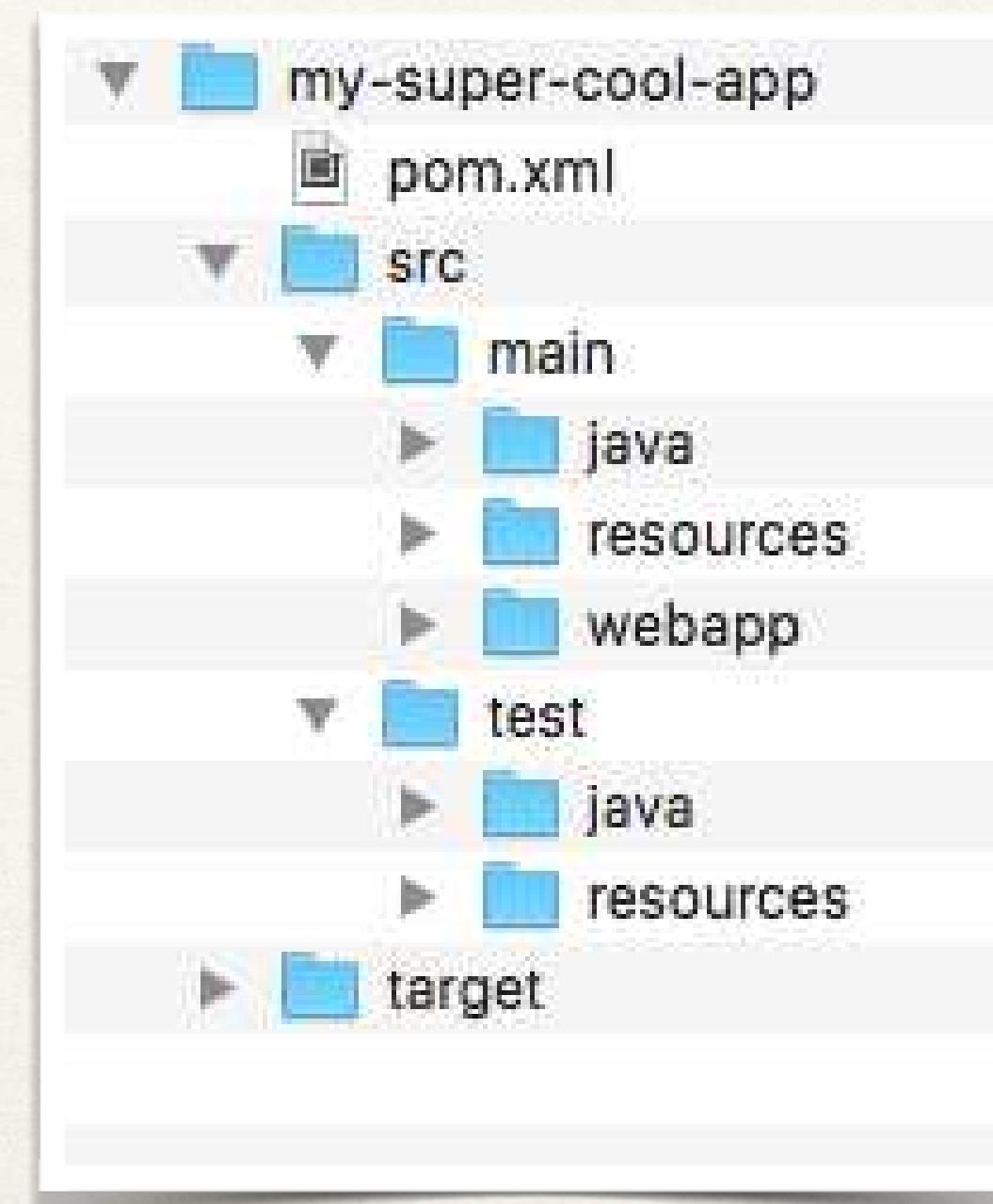
Standard Directory Structure



Place your Web assets here

Standard Directory Structure Benefits

- For new developers joining a project
 - They can easily find code, properties files, unit tests, web files etc ...



Standard Directory Structure Benefits

- Most major IDEs have built-in support for Maven
 - Eclipse, IntelliJ, NetBeans etc
 - IDEs can easily read / import Maven projects
- M
 - Developers can easily share projects between IDEs
 -

Advantages of Maven

- Dependency Management
 - Maven will find JAR files for you
 - No more missing JARs
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My Personal Best Maven Benefit(s)

- Once you learn Maven, you can join a new project and be productive
- You can build and run a project with minimal local configuration

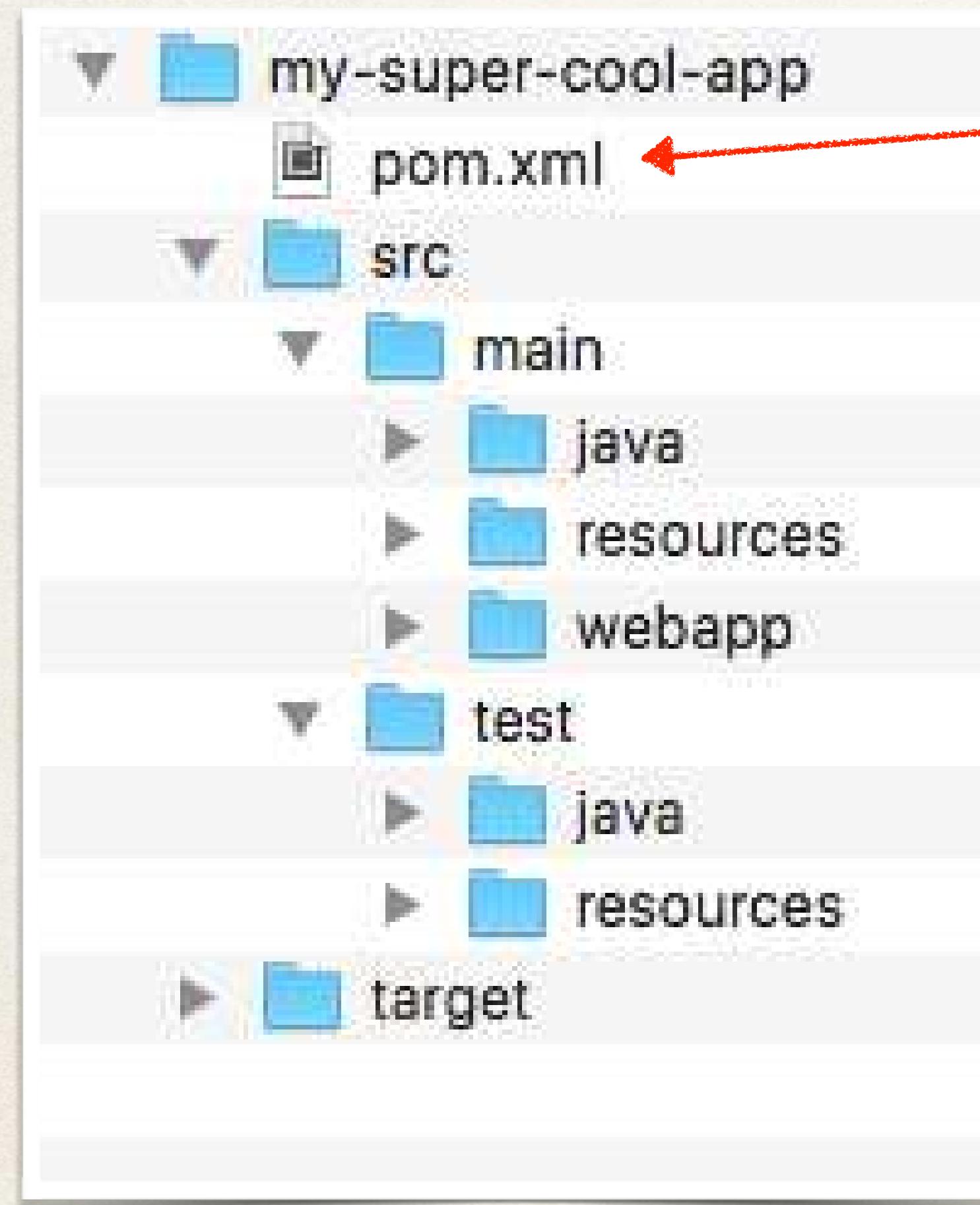
Maven Key Concepts



Maven Key Concepts

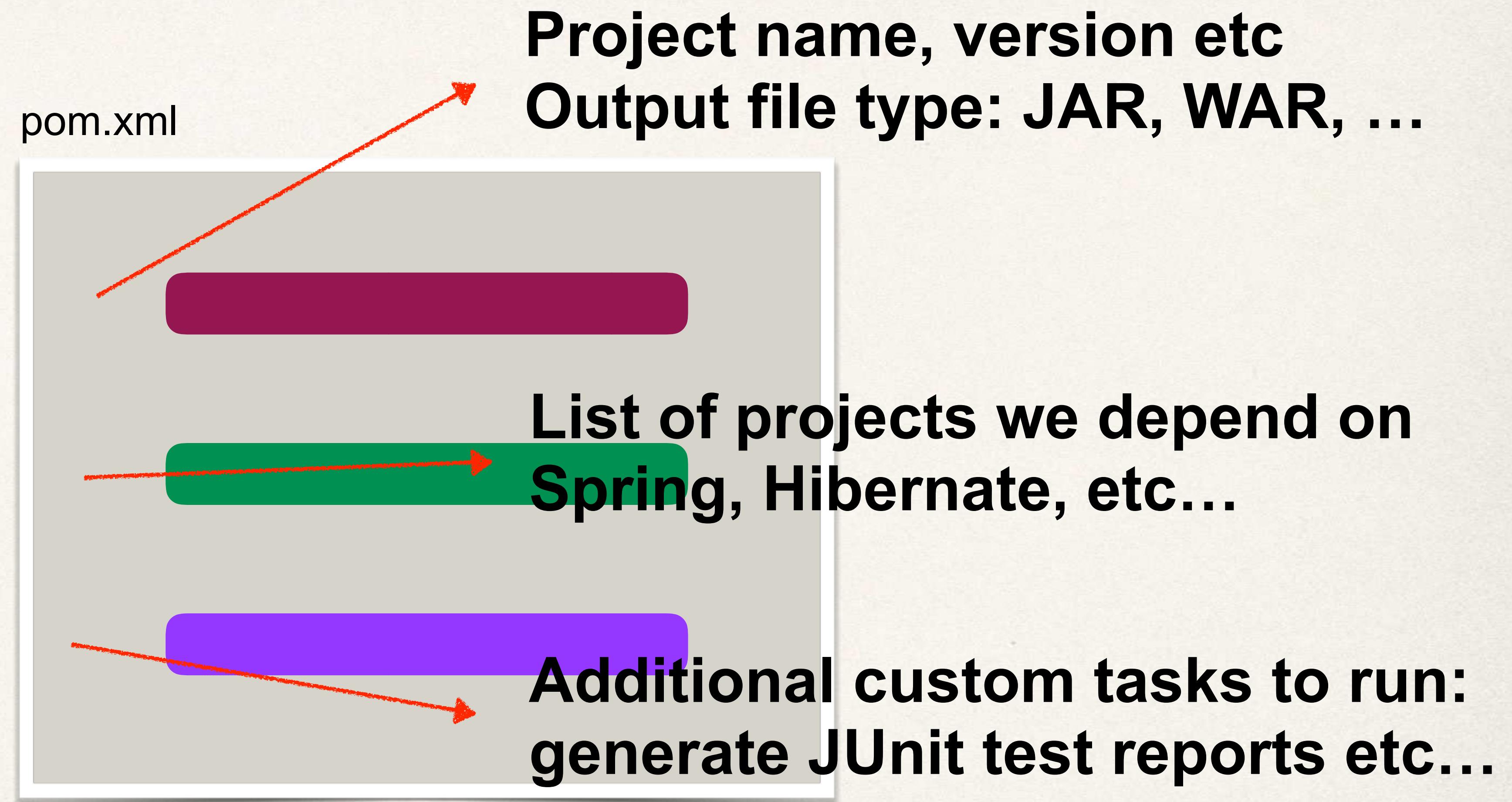
- POM File - pom.xml
- Project Coordinates

POM File - pom.xml



- Project Object Model file: POM file
- Configuration file for your project
- Basically your “shopping list” for Maven :-)
- Located in the root of your Maven project

POM File Structure



Simple POM File

```
<project ...>  
  
  <modelVersion>4.0.0</modelVersion>  
  
  <groupId>com.luv2code</groupId>  
  <artifactId>mycoolapp</artifactId>  
  <version>1.0.FINAL</version>  
  <packaging>jar</packaging>  
  
  <name>mycoolapp</name>  
  
  <dependencies>  
    <dependency>  
      <groupId>junit</groupId>  
      <artifactId>junit</artifactId>  
      <version>3.8.1</version>  
      <scope>test</scope>  
    </dependency>  
  </dependencies>  
  
</project>
```

Project name, version etc
Output file type: JAR, WAR, ...

List of projects we depend on
Spring, Hibernate, etc...

Additional custom tasks to run:
generate JUnit test reports etc...

Project Coordinates

- Project Coordinates uniquely identify a project
 - Similar to GPS coordinates for your house: latitude / longitude
 - Precise information for finding your house (city, street, house #)



Project Coordinates - Elements

Name	Description
Group ID	Name of company, group, or organization. Convention is to use reverse domain name: com.luv2code
Artifact ID	Name for this project: mycoolapp
Version	As 1.0, 1.6, 2.0 ... If 1.0-SNAPSHOT

```
<groupId>com.luv2code</groupId>
<artifactId>mycoolapp</artifactId>
<version>1.0.FINAL</version>
```

Example of Project Coordinates

```
<groupId>com.luv2code</groupId>
<artifactId>mycoolapp</artifactId>
<version>1.0.RELEASE</version>
```

```
<groupId>org.springframework</groupId>
<artifactId>spring-context</artifactId>
<version>5.0.0.RELEASE</version>
```

```
<groupId>org.hibernate</groupId>
<artifactId>hibernate-core</artifactId>
<version>5.2.11.Final</version>
```

Adding Dependencies

```
<project ...>
...
<dependencies>

    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
        <version>5.0.0.RELEASE</version>
    </dependency>

    <dependency>
        <groupId>org.hibernate
        <artifactId>hibernate-core
        <version>5.2.11.Final
    </dependency>
```

Dependency Coordinates

- To add given dependency project, we need
 - **Group ID, Artifact ID**
 - **Version** is optional ...
 - Best practice is to include the version (repeatable builds)
- May see this referred to as: **GAV**
 - G _rtifact ID and Version

DevOps

How to Find Dependency Coordinates

- Option 1: Visit the project page (spring.io, hibernate.org etc)
- Option 2: Visit <http://search.maven.org> (easiest approach)

Maven - How to Find Dependencies



How to Find Dependency Coordinates

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Maven Archetypes



Maven Archetypes

- Archetypes can be used to create new Maven projects
- Contains template files for a given Maven project
- T
-

archetype := starter project

Common Archetypes

Archetype Artifact ID	Description
maven-archetype-quickstart	An archetype to generate a sample Maven project.
maven-archetype-webapp	An archetype to generate a sample Maven Webapp project.
... others ...	

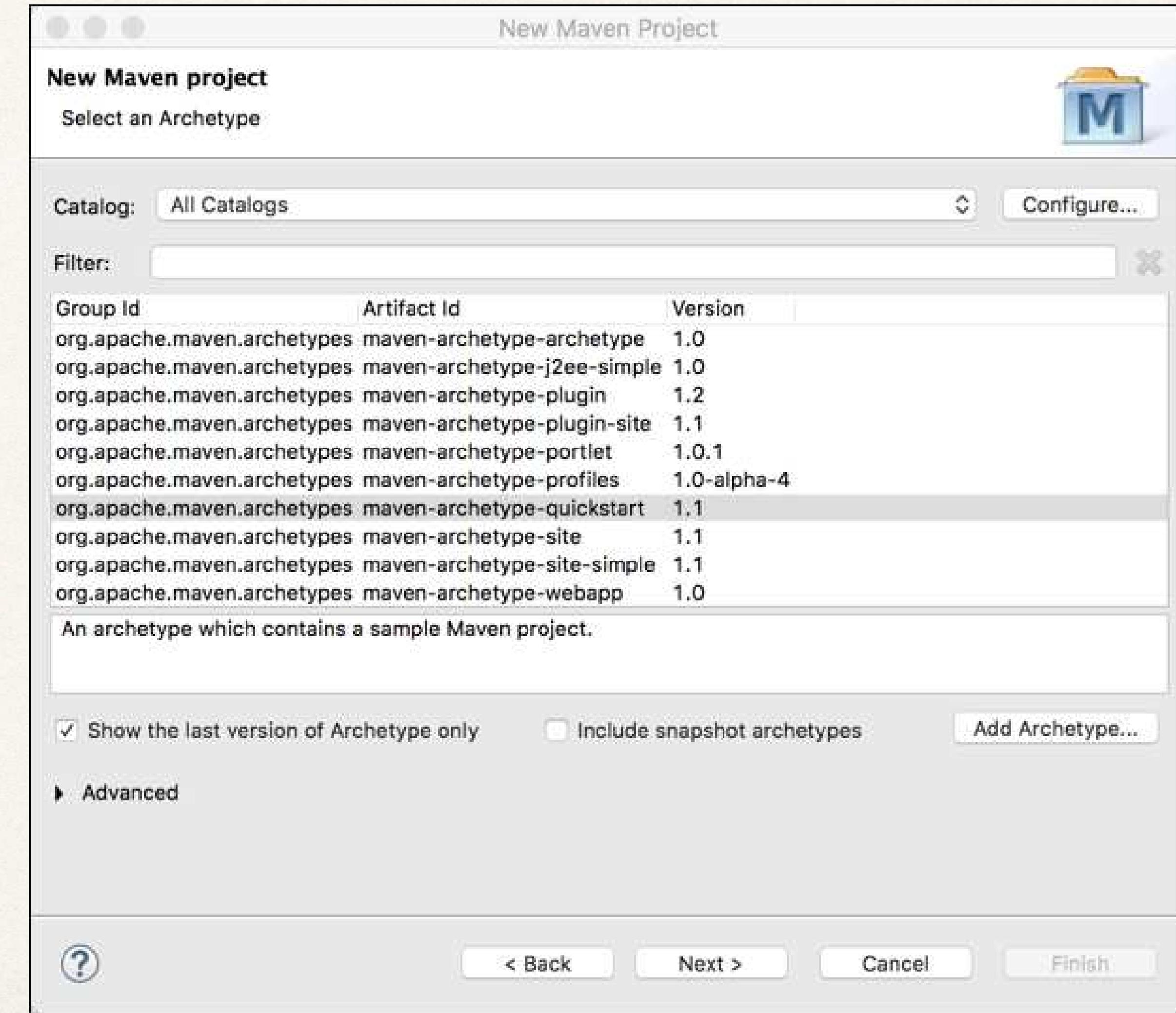
<http://maven.apache.org/archetypes>

Archetypes

- You can create new projects using Maven Archetypes (starter project)
 - From the command-line with Maven
 - From an IDE
 - Ec

List of Archetypes - Eclipse

File > New Maven Project



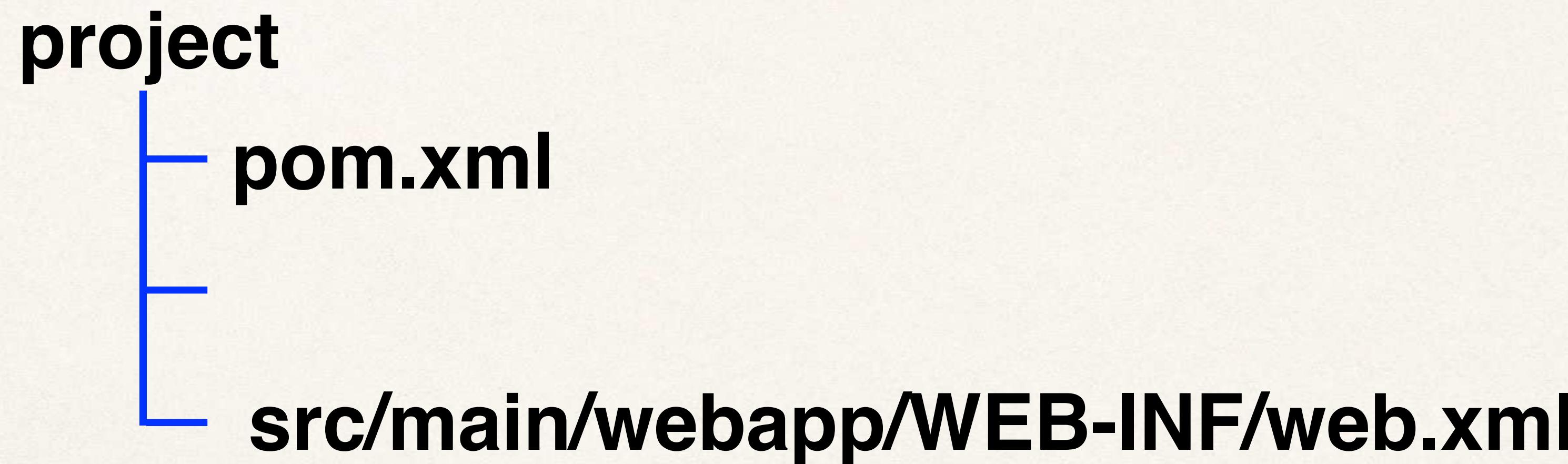
Quickstart Archetype

- maven-archetype-quickstart contains a sample Maven project



Webapp Archetype

- maven-archetype-webapp contains a sample Maven webapp project



Creating a Simple Maven Project



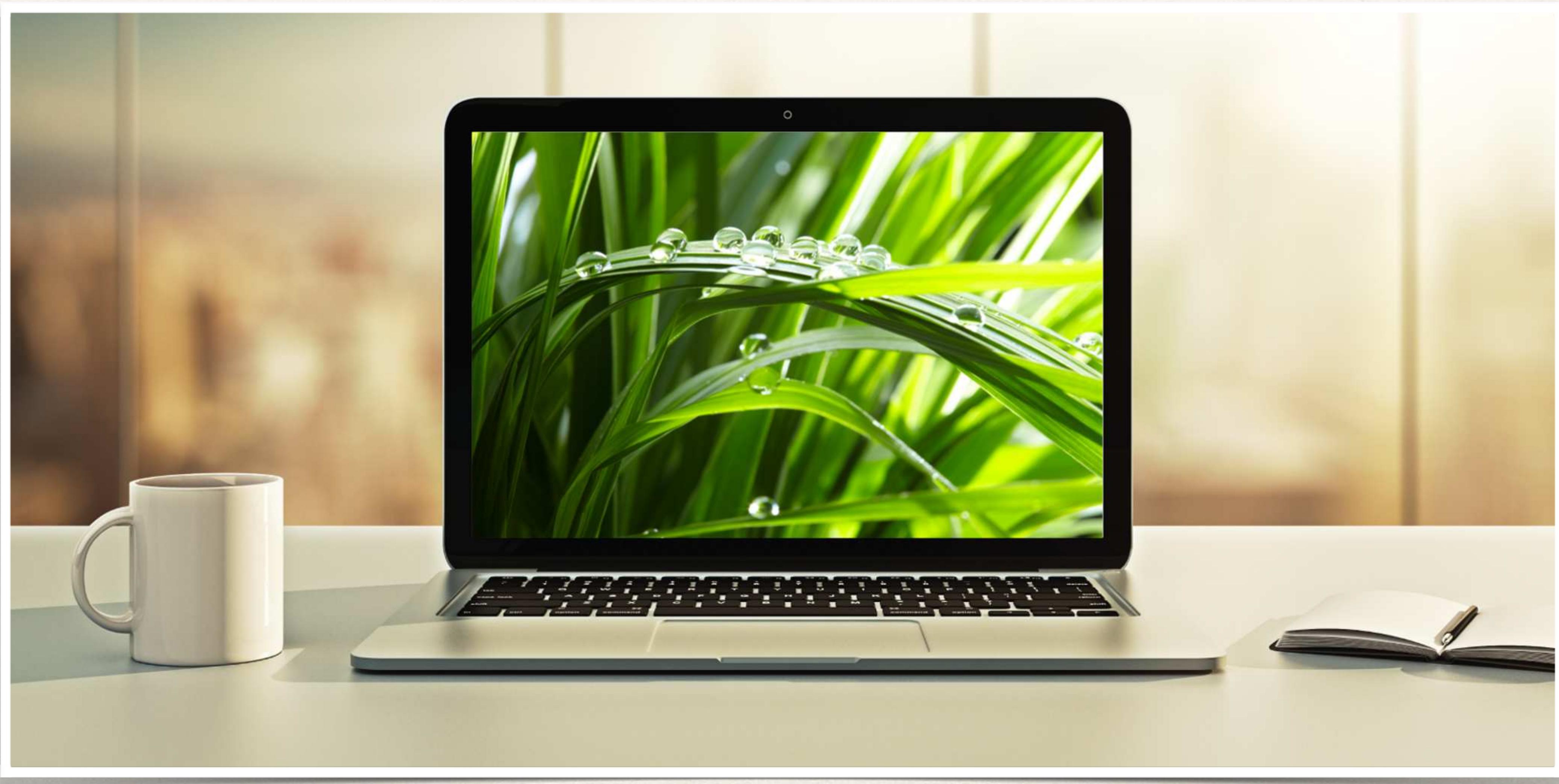
The Game Plan

- Learn about Eclipse's support for Maven
- Create a simple Maven Project with Eclipse
- Explore the generated files and directories
- Run our App
- U

Eclipse and Maven

- Most recent versions of Eclipse have built-in support for Maven
 - Use the **m2eclipse** plugin
- There is **no need** to download/install Maven separately
-

Create a WebApp Maven Project



The Game Plan

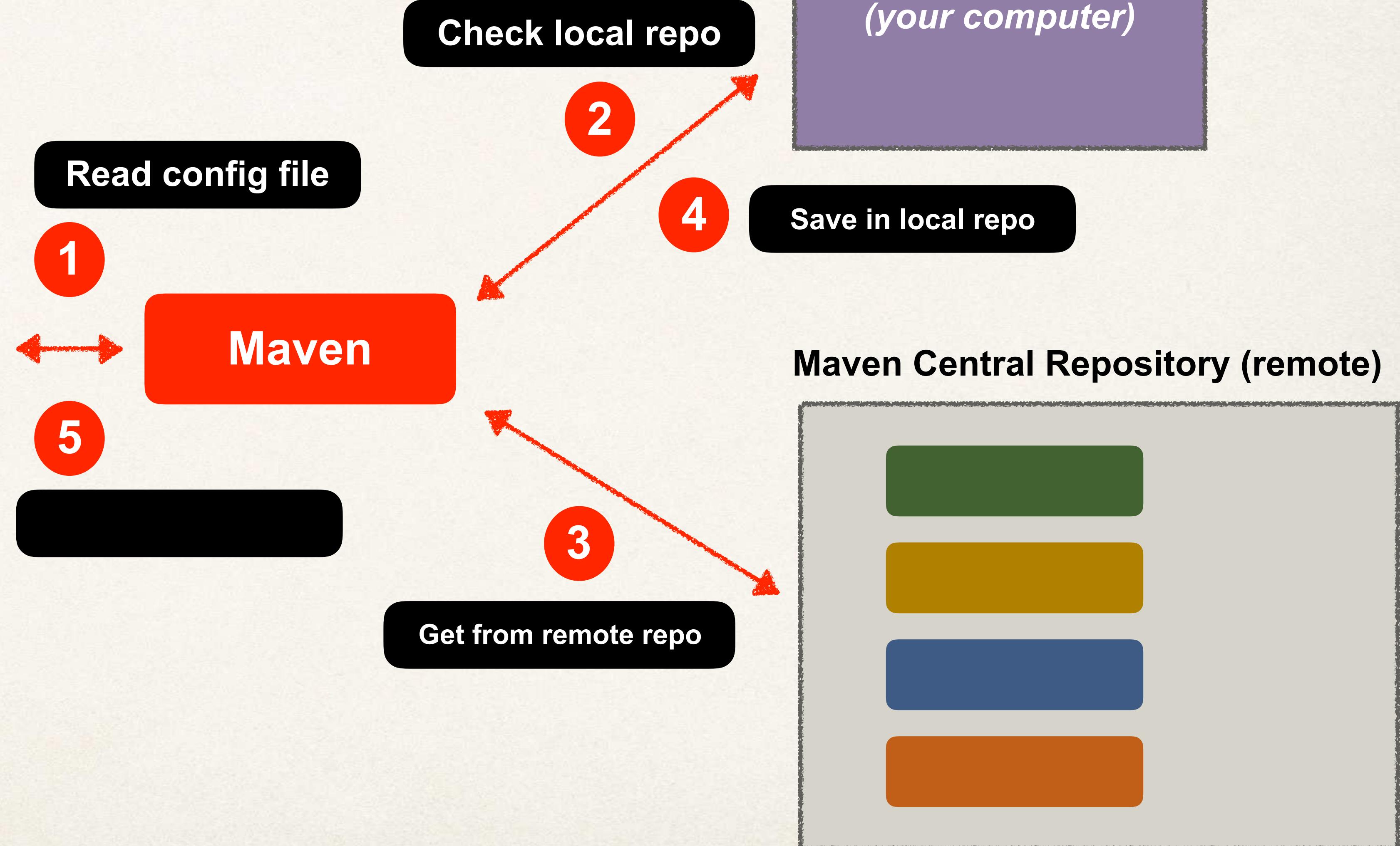
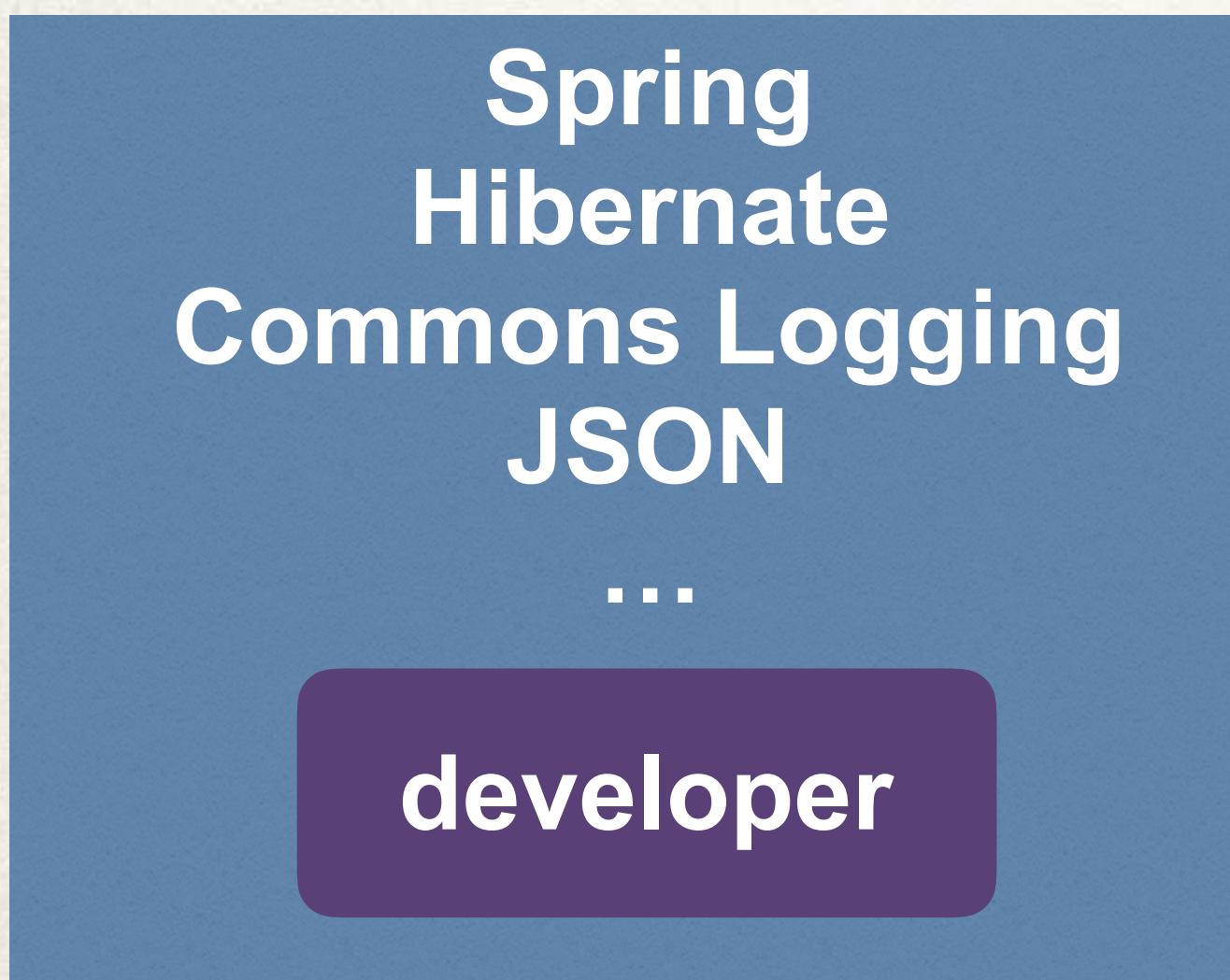
- Create a WebApp Maven Project with Eclipse
- Explore the generated files and directories
- Add dependencies to our POM file
- Run our WebApp

Maven Repositories



Maven - How It Works

Project Config file (pom.xml)



Repository Types

- Local Repository
- Central Repository

Local Repository

- Located on developer's computer
 - MS Windows: **c:\Users\<users-home-dir>\.m2\repository**
 - Mac and Linux: **~/.m2/repository**
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Central Repository

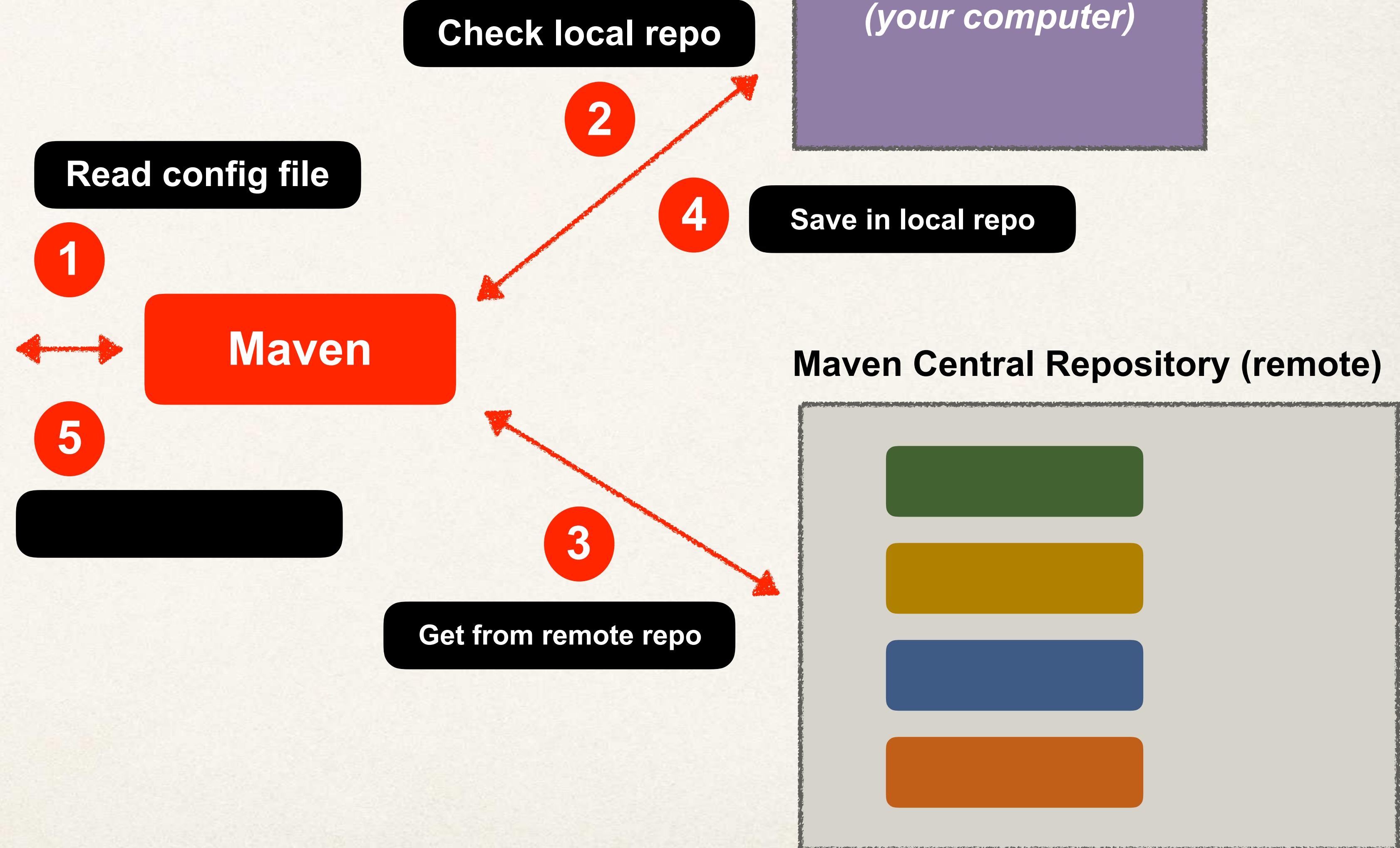
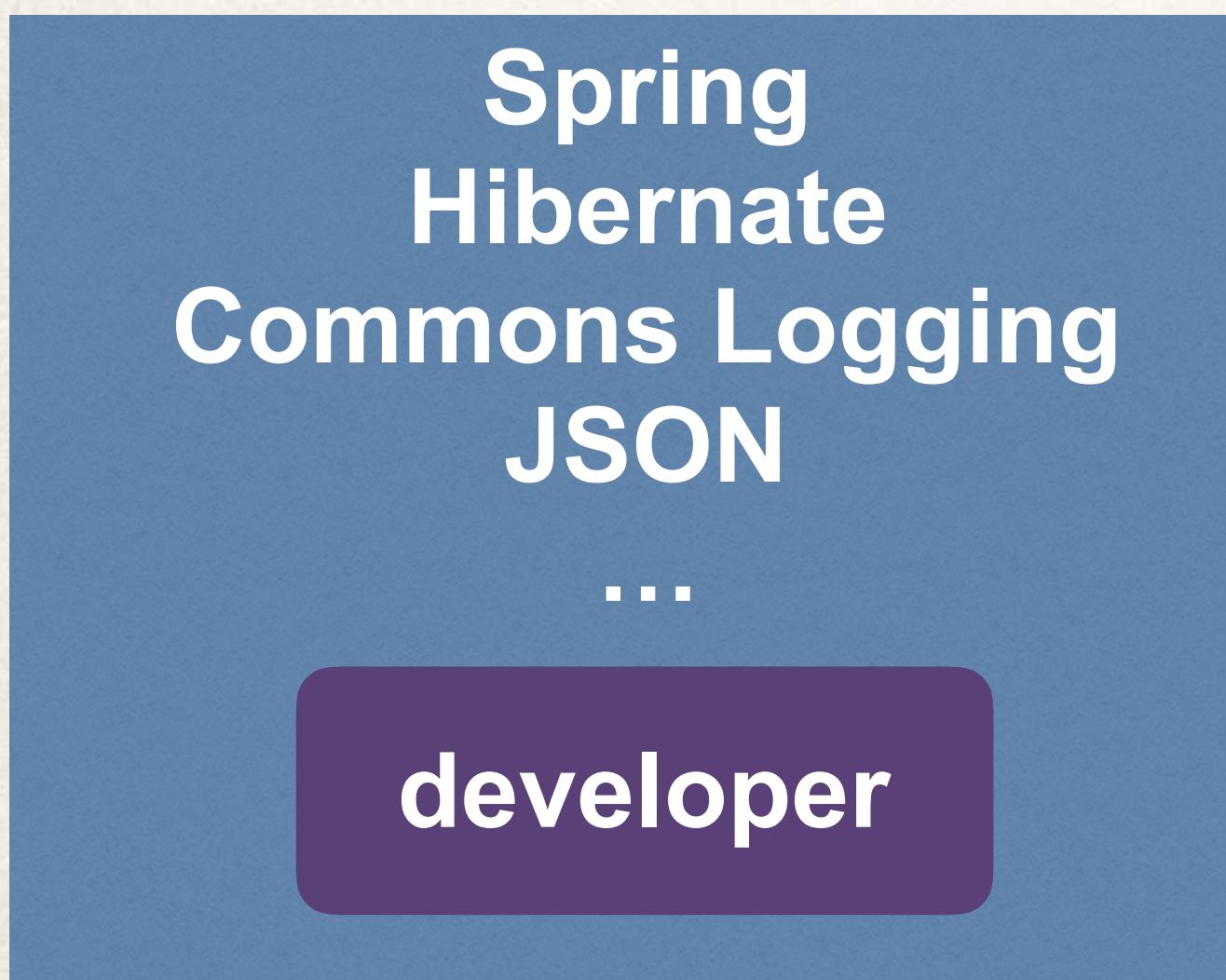
- By default, Maven will search Maven's Central Repository (remote)
 - <https://repo.maven.apache.org/maven2/>
- Requires an Internet connection
-

Maven Repositories - Additional



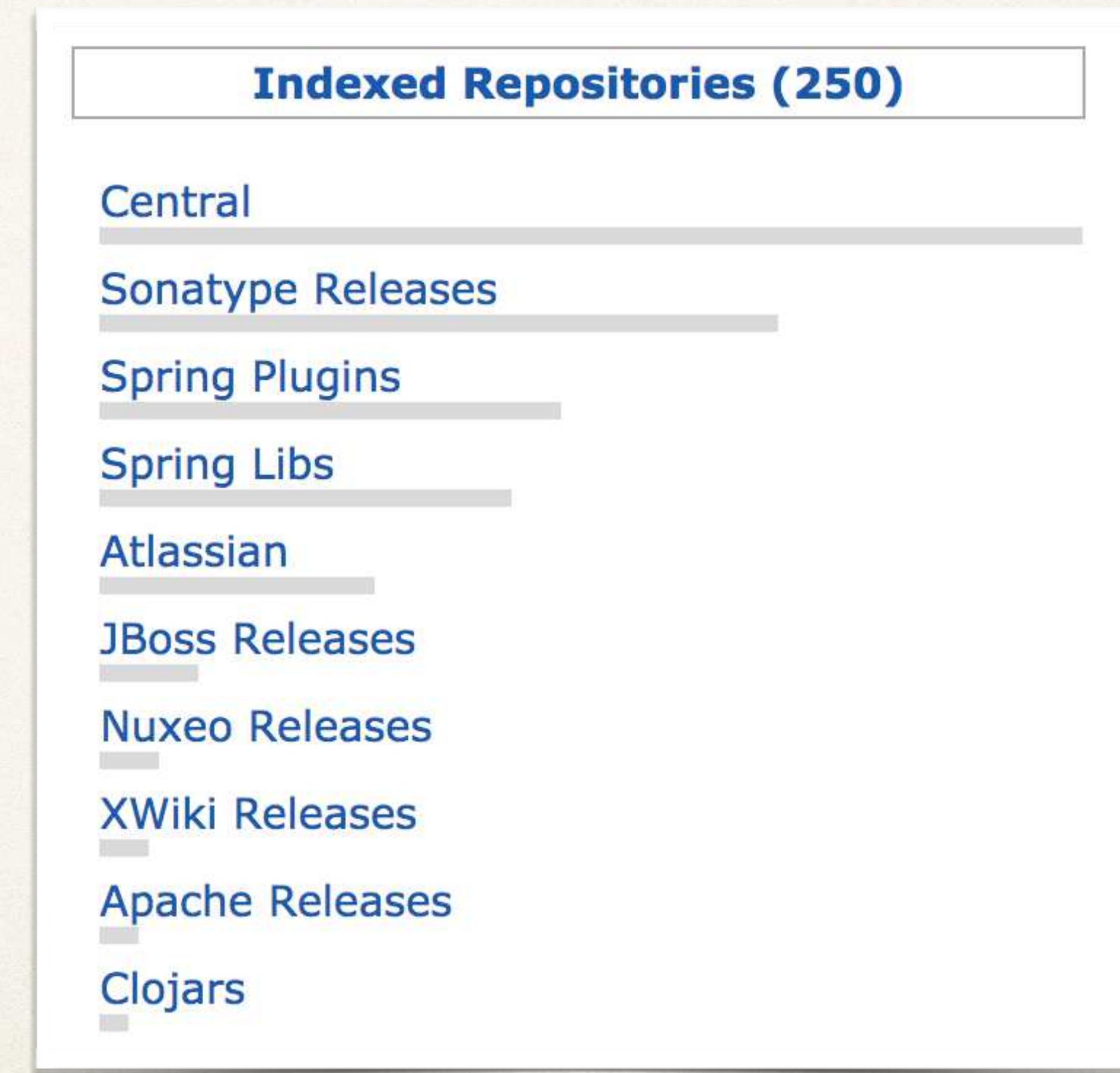
Maven - How It Works

Project Config file (pom.xml)



Additional Repositories

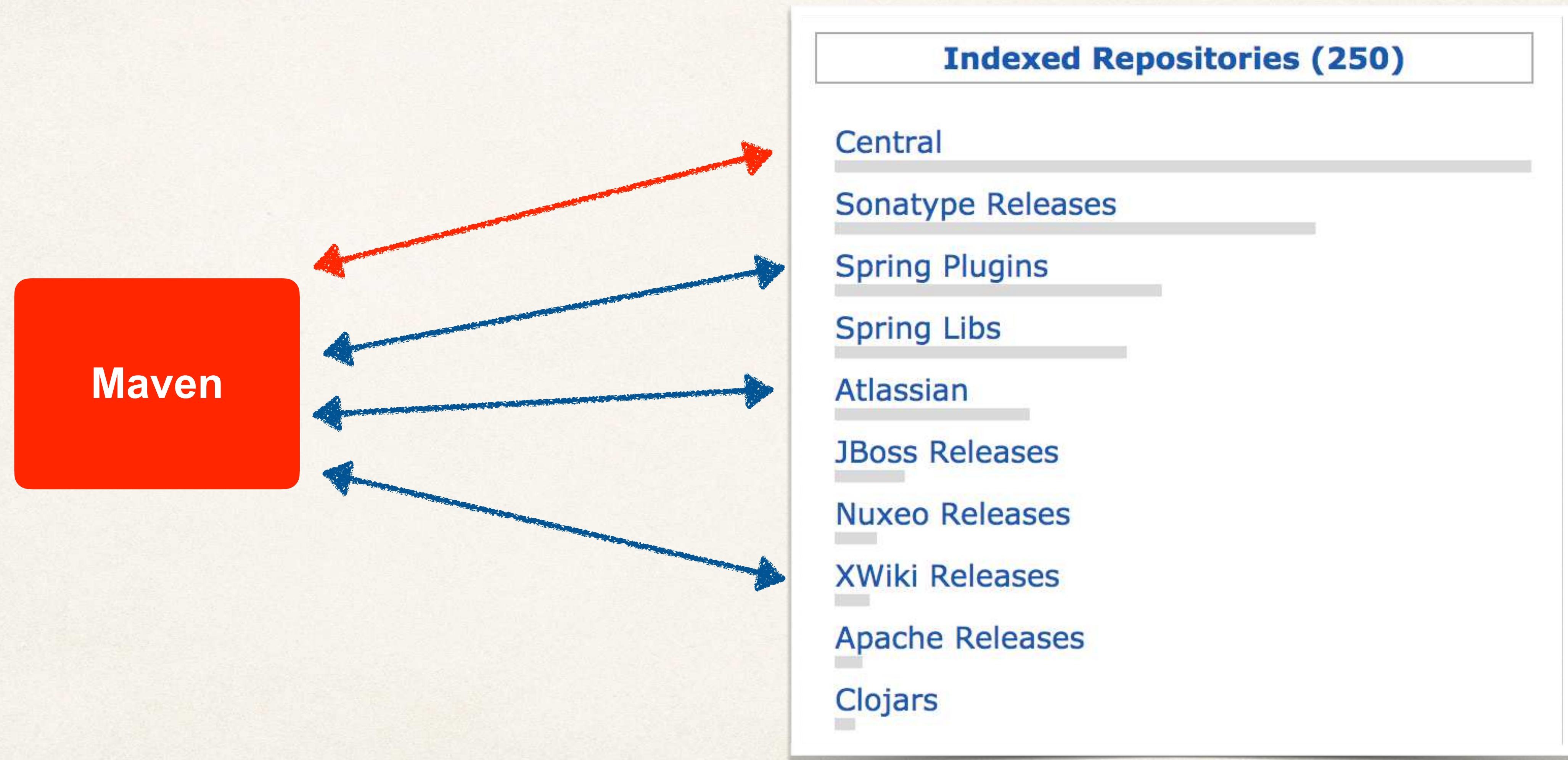
- Remember how mvnrepository.com can index additional repositories?



Why are there Additional Repositories?

- Some development teams may self-host their Maven projects / JARs
 - Alpha/Beta releases
 - More control over deployments etc
 - *Other reasons ...*

Accessing Additional Repositories



Task: Configure Additional Repositories

Step-By-Step

- Step 1: Add **atlassian-mail** dependency to our project
 - This is only available in the Atlassian repository
 - S **pom.xml** file

Step 1: Adding atlassian-mail Dependency

File: pom.xml

```
<dependencies>

    <dependency>
        <groupId>com.atlassian.mail</groupId>
        <artifactId>atlassian-mail</artifactId>
        <version>4.0.4</version>
    </dependency>
```

Step 2: Adding Repositories

File: pom.xml

```
<repositories>

<repository>
<id>atlassian</id>
<name>Atlassian Repository</name>
<url>https://maven.atlassian.com/content/repositories/atlassian-public/</url>
</repository>

<repository>
...

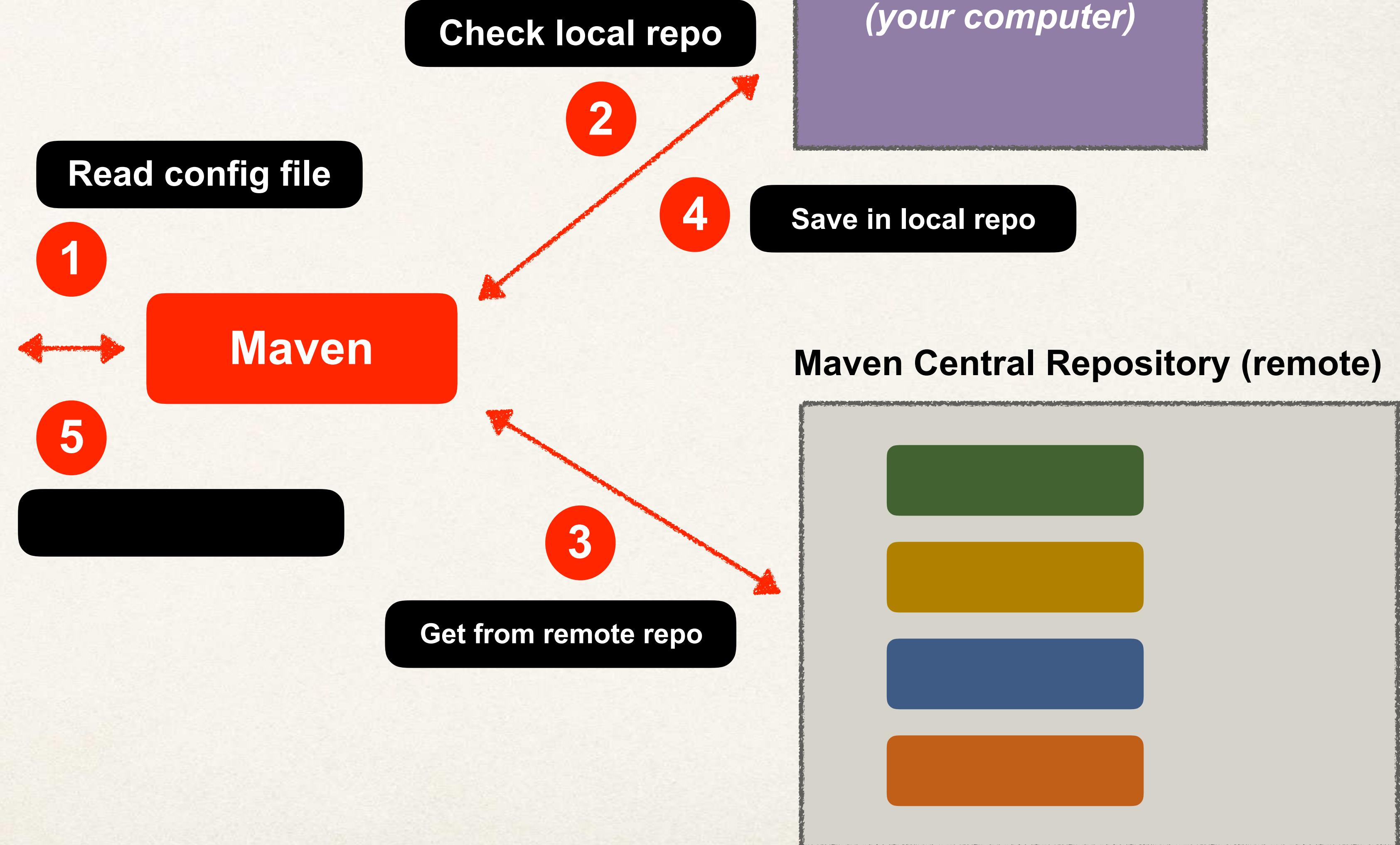
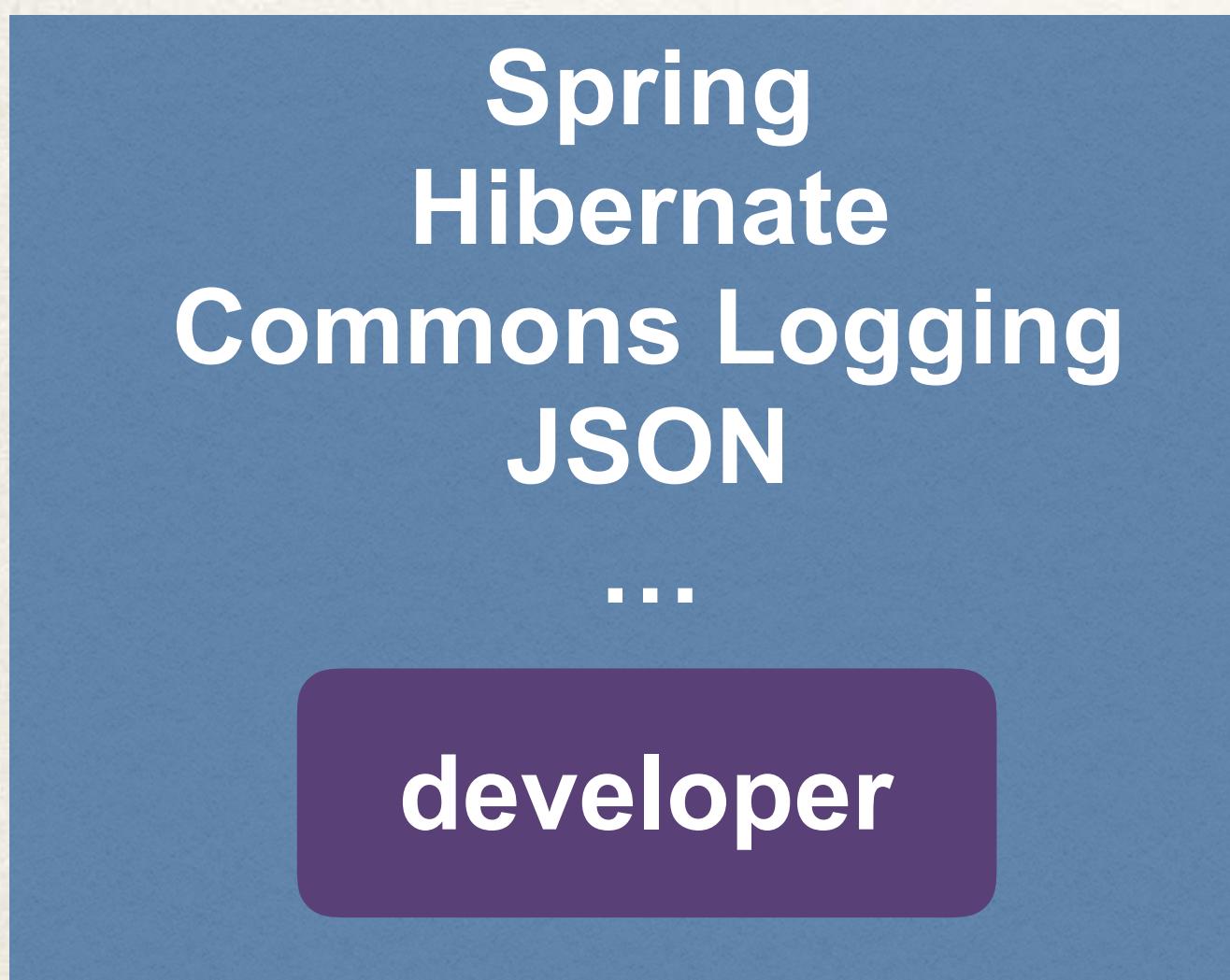
```

Maven Repositories - Private



Maven - How It Works

Project Config file (pom.xml)



Private Repositories - Use Case

- Your company has created super-top-secret code modules
- Would like to share with other development teams at your company
- But let's keep it private
-

Private Maven Repository

- You can set up your own private Maven Repository
 - Secure it with credentials: id / password
- Create your super-top-secret projects and publish on private repository
- Your development teams can access your private repository

Maven Repository Manager Products

Product	Company	Website
Archiva	Apache	archiva.apache.org
Artifactory	JFrog	www.jfrog.com
Nexus		www.sonatype.com

Cloud Solutions

- If you don't need to self-host internally at your company
- Cloud hosted solutions are available
- Check for:
 - www.packagecloud.io,
 -