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# Introduction to Maven

- First, it was used at **Apache’s Jakarta Alexandria Project** in 2001
- What Maven did was to **simplify the build processes**

# Introduction to Maven

- As a project management tool, Maven :
  - builds **multiple projects** easily,
  - **publishes documentation** for the projects,
  - accomplishes an **easy deployment**,
  - **shares JARs** across several other projects and
  - **helps in collaboration** with development teams.

# Introduction to Maven

- Maven can :
  - **manage the versions** of consecutive builds,
  - **compile** source code into binary,
  - **download dependencies**,
  - **add documentation**,
  - **run tests**,
  - **package** compiled code
  - **deploy** artifacts

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# Convention over Configuration

# Convention over Configuration

- Maven adopts Convention over Configuration
- Which means, **developers** should **not create building environment** and should **not deal with build processes** manually.

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# Features of Maven

# Features of Maven

- **Easy to start** with Maven
- Variety of **options**
- **Same structure** across different projects
- **Easy to integrate** into a developing team
- It has a **powerful dependency management tool**
- **Large repository** of libraries

# Introduction to Maven

- **Extra features** with plugins
- **Different outputs** like a jar, ear, war, or metadata
- Maven can **generate a website**
- Maven can **support the older versions**

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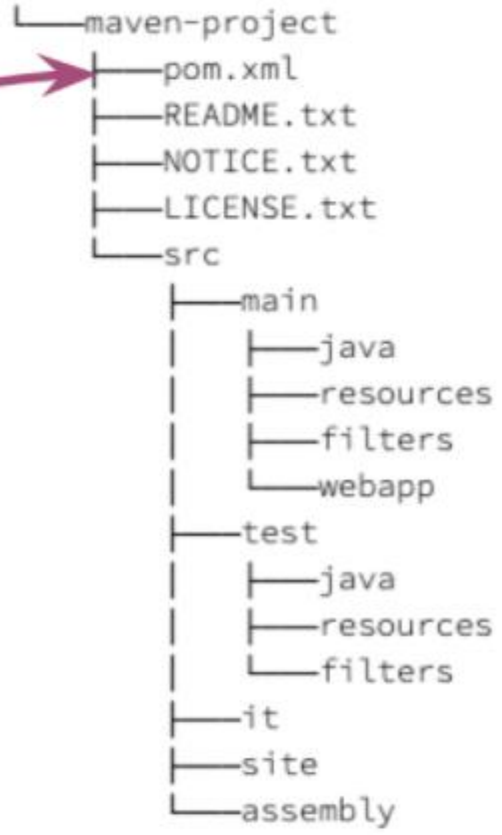
# Directory Structure

# Directory Structure

- Project structure **should conform** to →
- The most important is the **pom file**
  - defines project's **config details**



```
└──maven-project
   ├──pom.xml
   ├──README.txt
   ├──NOTICE.txt
   ├──LICENSE.txt
   └──src
      ├──main
      │   ├──java
      │   ├──resources
      │   ├──filters
      │   └──webapp
      ├──test
      │   ├──java
      │   ├──resources
      │   └──filters
      ├──it
      ├──site
      └──assembly
```

# POM File

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WAY TO REINVENT YOURSELF

# Table of Contents

- Introduction to POM File
- Super POM
- Project Inheritance
- Project Aggregation

# 1 Introduction to POM File

# Introduction to POM File

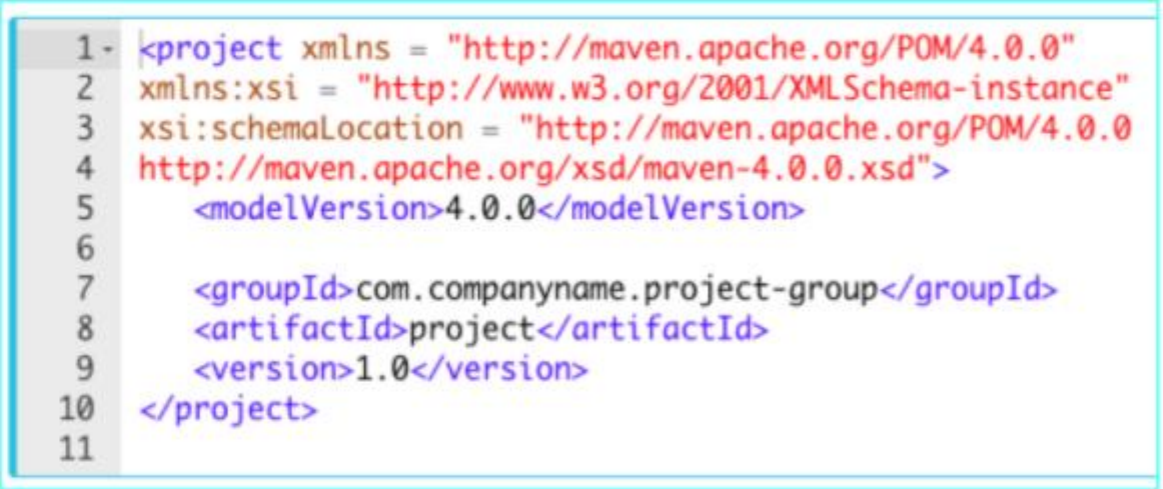
- It is an XML file
- **P**roject **O**bject **M**odel is the **starting point** for a Maven project
- It contains **configurations** about the project
- When a task or goal is executed, **Maven searches for** the **POM file**

# Introduction to POM File

- POM defines
  - Project **dependencies**
  - Plugins and **goals** to be executed
  - **Build profiles**
  - Other information like the **project version**, **description**, **developers**, **mailing lists**, and more

# Introduction to POM File

- There **must** be a POM file in every Maven project
- **All POM**s **need** at least
  - Project tag
  - modelVersion tag
  - **g**roupId tag
  - **a**rtifactId tag
  - **v**ersion (Last three called as **gav** in short)



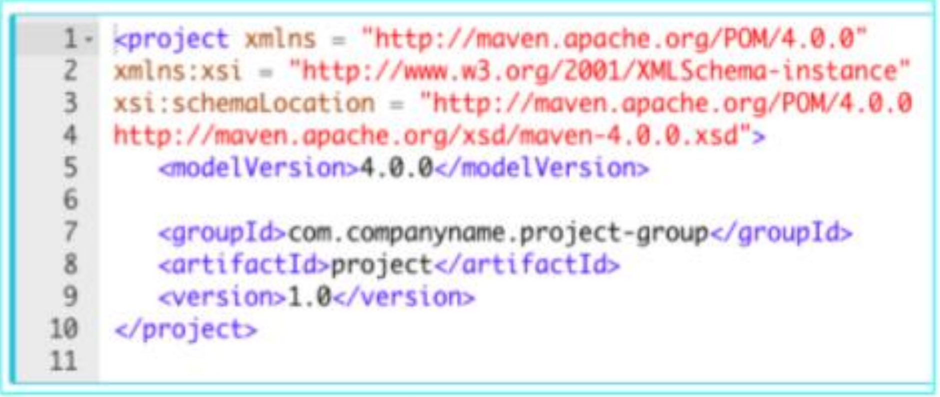
```
<project xmlns = "http://maven.apache.org/POM/4.0.0"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation = "http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
   <modelVersion>4.0.0</modelVersion>

   <groupId>com.companyname.project-group</groupId>
   <artifactId>project</artifactId>
   <version>1.0</version>
</project>

```

# Introduction to POM File

- **Project tag** is the **root** of the file
- It should reference a basic schema settings such as **apache schema** and **w3.org** specification



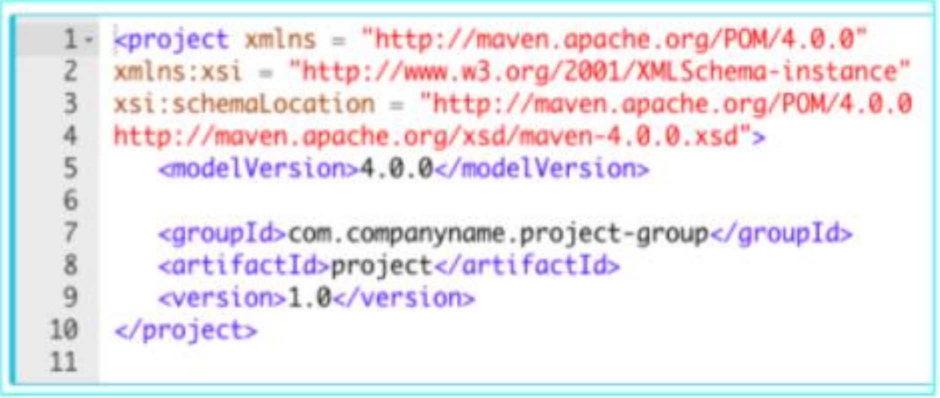
```xml
<project xmlns = "http://maven.apache.org/POM/4.0.0"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation = "http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
   <modelVersion>4.0.0</modelVersion>

   <groupId>com.companyname.project-group</groupId>
   <artifactId>project</artifactId>
   <version>1.0</version>
</project>
```

- **Model version** describes the **version of Maven**
- **Group Id** is the id of the project's group (Simply it shows the **company** or the **organization** or the **owner of the project**)

# Introduction to POM File

- **Group Id** should be long enough to give **uniqueness** to the project
- **Artifact id** is the id for specifying the project under the group



```xml
<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
http://maven.apache.org/xsd/maven-4.0.0.xsd">
   <modelVersion>4.0.0</modelVersion>

   <groupId>com.companyname.project-group</groupId>
   <artifactId>project</artifactId>
   <version>1.0</version>
</project>

```

- It shows the **name of the project** like pet-clinic-server
- **Version** defines the version number of the project

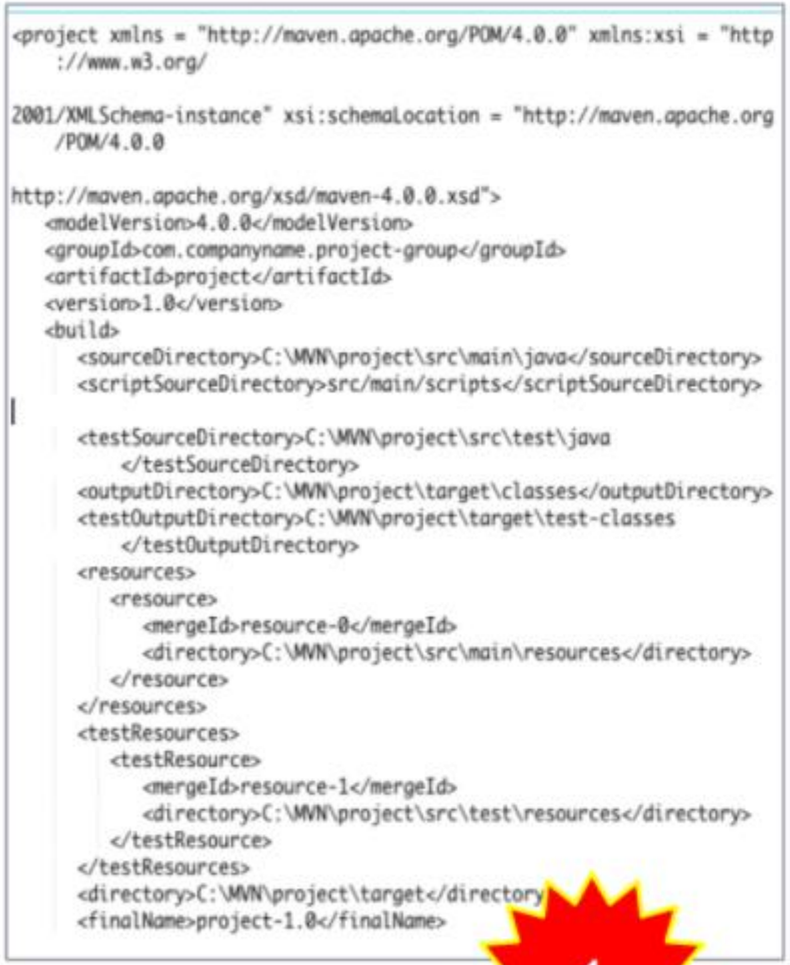
# 2 Super POM

# Super POM

- Super POM is Maven's **default POM**
- **All POMs extend** the Super POM **unless explicitly set**
- Super POM and project POM creates the **Effective POM**
- Which is the **overall configuration** file
- Effective POM can be examined by running "**mvn help:effective-pom**"

# Super POM

## - Effective POM -



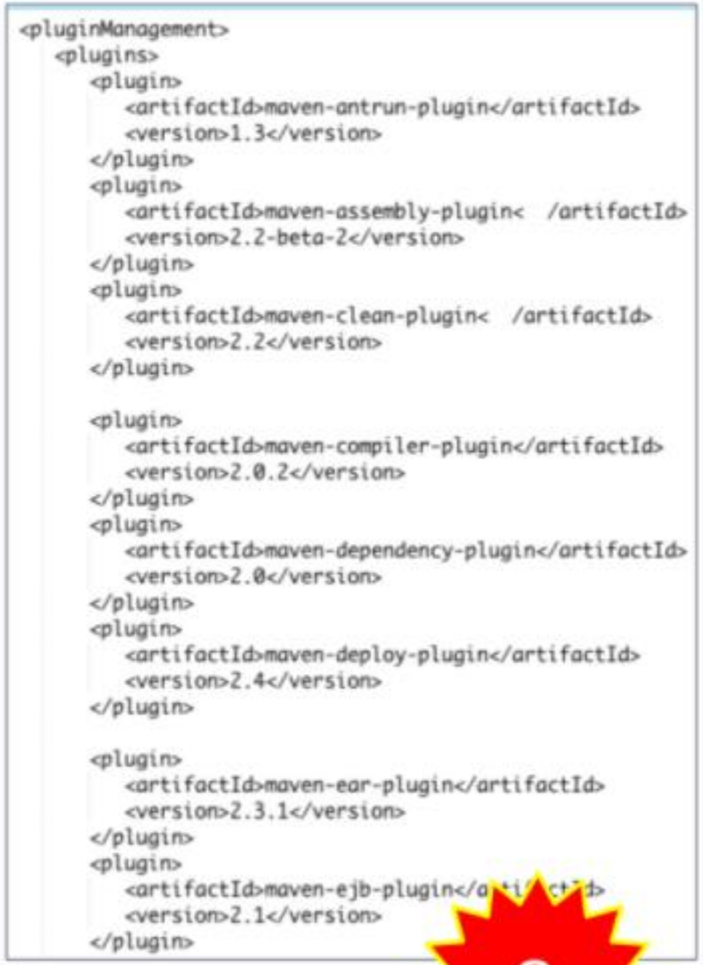
```
<project xmlns = "http://maven.apache.org/POM/4.0.0" xmlns:xsi = "http
    ://www.w3.org/

2001/XMLSchema-instance" xsi:schemaLocation = "http://maven.apache.org
    /POM/4.0.0

http://maven.apache.org/xsd/maven-4.0.0.xsd">
   <modelVersion>4.0.0</modelVersion>
   <groupId>com.companyname.project-group</groupId>
   <artifactId>project</artifactId>
   <version>1.0</version>
   <build>
      <sourceDirectory>C:\MVN\project\src\main\java</sourceDirectory>
      <scriptSourceDirectory>src/main/scripts</scriptSourceDirectory>

      <testSourceDirectory>C:\MVN\project\src\test\java
         </testSourceDirectory>
      <outputDirectory>C:\MVN\project\target\classes</outputDirectory>
      <testOutputDirectory>C:\MVN\project\target\test-classes
         </testOutputDirectory>
      <resources>
         <resource>
            <mergeId>resource-0</mergeId>
            <directory>C:\MVN\project\src\main\resources</directory>
         </resource>
      </resources>
      <testResources>
         <testResource>
            <mergeId>resource-1</mergeId>
            <directory>C:\MVN\project\src\test\resources</directory>
         </testResource>
      </testResources>
      <directory>C:\MVN\project\target</directory>
      <finalName>project-1.0</finalName>
```

1

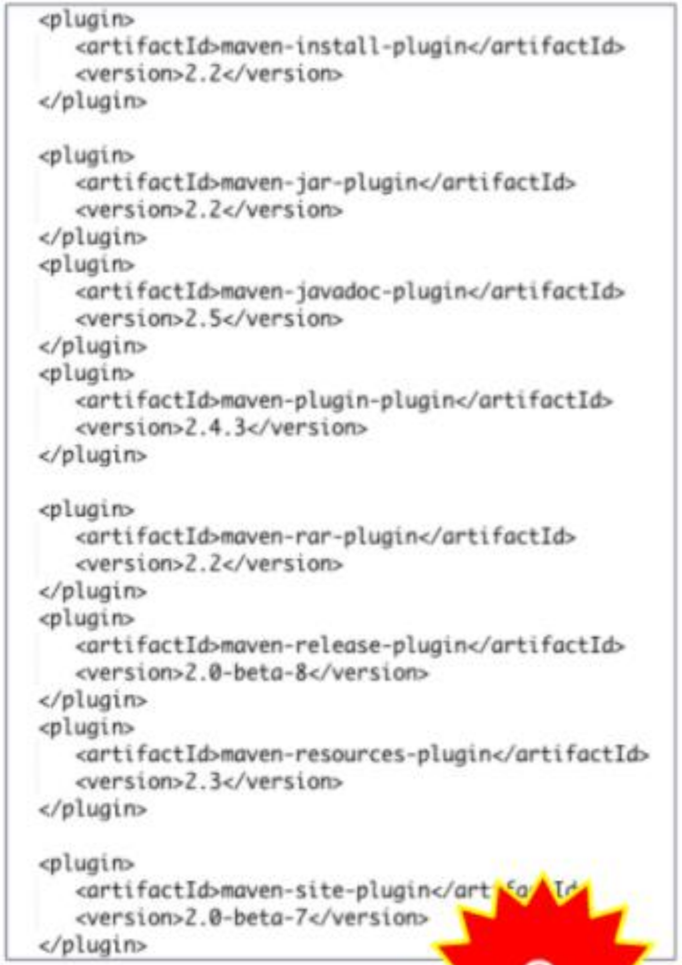


```
<pluginManagement>
   <plugins>
      <plugin>
         <artifactId>maven-antrun-plugin</artifactId>
         <version>1.3</version>
      </plugin>
      <plugin>
         <artifactId>maven-assembly-plugin<  /artifactId>
         <version>2.2-beta-2</version>
      </plugin>
      <plugin>
         <artifactId>maven-clean-plugin<  /artifactId>
         <version>2.2</version>
      </plugin>

      <plugin>
         <artifactId>maven-compiler-plugin</artifactId>
         <version>2.0.2</version>
      </plugin>
      <plugin>
         <artifactId>maven-dependency-plugin</artifactId>
         <version>2.0</version>
      </plugin>
      <plugin>
         <artifactId>maven-deploy-plugin</artifactId>
         <version>2.4</version>
      </plugin>

      <plugin>
         <artifactId>maven-ear-plugin</artifactId>
         <version>2.3.1</version>
      </plugin>
      <plugin>
         <artifactId>maven-ejb-plugin</artifactId>
         <version>2.1</version>
      </plugin>
```

2



```
<plugin>
   <artifactId>maven-install-plugin</artifactId>
   <version>2.2</version>
</plugin>

<plugin>
   <artifactId>maven-jar-plugin</artifactId>
   <version>2.2</version>
</plugin>
<plugin>
   <artifactId>maven-javadoc-plugin</artifactId>
   <version>2.5</version>
</plugin>
<plugin>
   <artifactId>maven-plugin-plugin</artifactId>
   <version>2.4.3</version>
</plugin>

<plugin>
   <artifactId>maven-rar-plugin</artifactId>
   <version>2.2</version>
</plugin>
<plugin>
   <artifactId>maven-release-plugin</artifactId>
   <version>2.0-beta-8</version>
</plugin>
<plugin>
   <artifactId>maven-resources-plugin</artifactId>
   <version>2.3</version>
</plugin>

<plugin>
   <artifactId>maven-site-plugin</artifactId>
   <version>2.0-beta-7</version>
</plugin>
```

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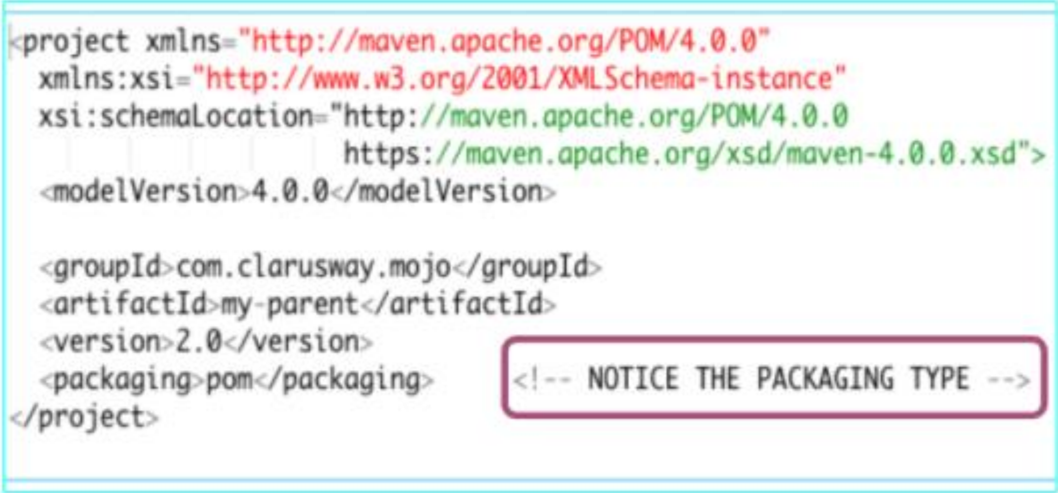
# Project Inheritance

- As in the object-oriented programming, POM files **can also be inherited** by other POM files
- Child POM can either **inherit** or **override**
- Parent POM is a **general template**
- **Not every item** in the parent is inherited
- Some elements should be declared specifically
- Like **artifactId**, **name**, and **prerequisites**

# Project Inheritance

- **Super POM** is **an example** of project inheritance
- You can also introduce **your own parent**
- Parent POM's **packaging** tag should have the value "**pom**"

### Parent

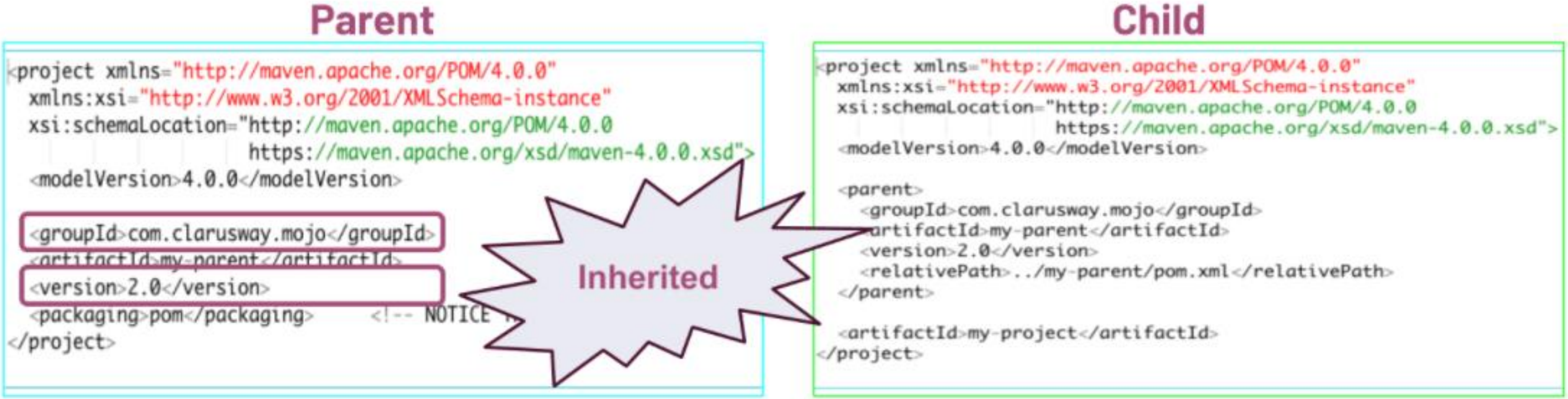


```
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
                      https://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <groupId>com.clarusway.mojo</groupId>
  <artifactId>my-parent</artifactId>
  <version>2.0</version>
  <packaging>pom</packaging>          <!-- NOTICE THE PACKAGING TYPE -->
</project>
```

# Project Inheritance

- Child is related to parent **by specifying the parent element**
- If you want to inherit an element you should remove it



Parent

```xml
<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.clarusway.mojo</groupId>
  <artifactId>my-parent</artifactId>
  <version>2.0</version>
  <packaging>pom</packaging>      <!-- NOTICE
</project>
```

Child

```xml
<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>

  <parent>
    <groupId>com.clarusway.mojo</groupId>
    <artifactId>my-parent</artifactId>
    <version>2.0</version>
    <relativePath>../my-parent/pom.xml</relativePath>
  </parent>

  <artifactId>my-project</artifactId>
</project>
```

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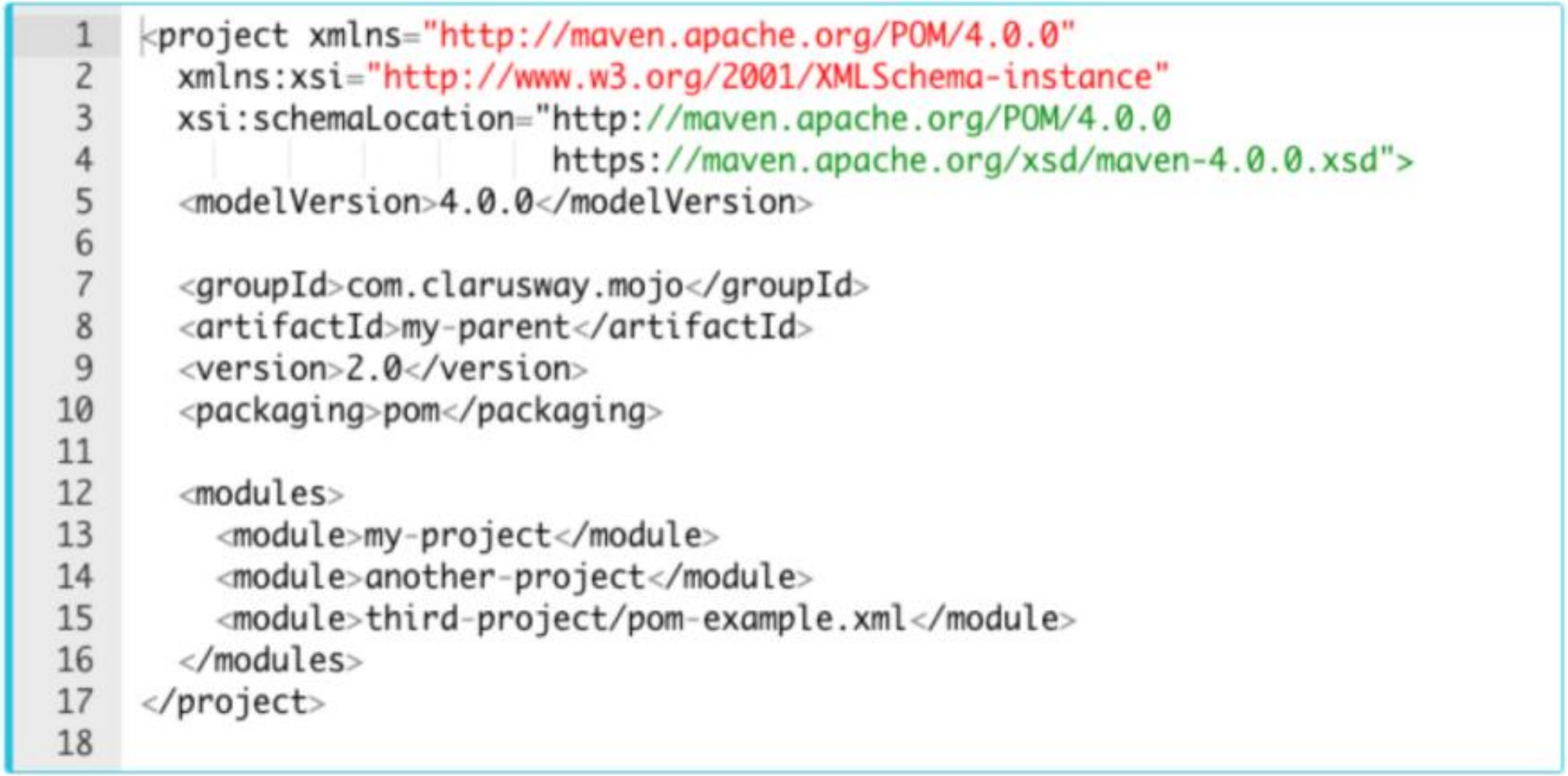
# Project Aggregation

# Project Aggregation

- A project **with modules** (children) is called a **multi-module**, or aggregator project
- Modules are projects that a parent **POM file specifies**
- These modules are **built** together **as a group**
- Aggregator POM should have
  - **packaging tag** with "pom"
  - **modules tag** with relative paths to the directories or the POM files of modules

# Project Aggregation

- **As in the example :**



```xml
<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.clarusway.mojo</groupId>
  <artifactId>my-parent</artifactId>
  <version>2.0</version>
  <packaging>pom</packaging>

  <modules>
    <module>my-project</module>
    <module>another-project</module>
    <module>third-project/pom-example.xml</module>
  </modules>
</project>
```