Full Stack Development
Lab Maven 1

Basic Maven Concepts

1. Lab objectives

This initial lab is designed to help you understand some of the foundational concepts of Maven. In this lab you will set up and run the smallest possible Maven project which builds an empty jar.

2. Set Up

You will be using the command line for most the lab. Because you will be editing the POM file, it is suggested that you use an XML friendly editor like VSCode for editing.

Note the versions of Java and your default platform encoding.

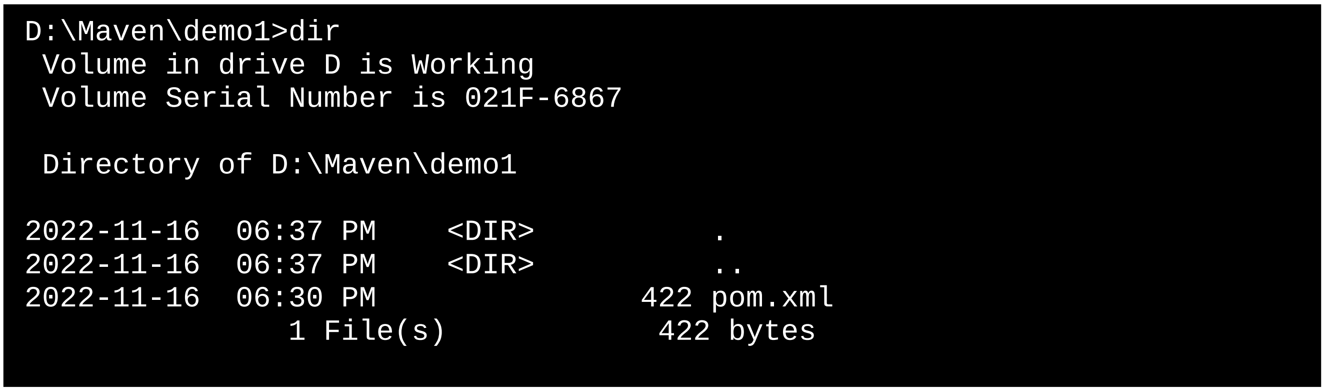
```
D:\Maven>mvn -v
Apache Maven 3.8.6 (84538c9988a25aec085021c365c560670ad80f63)
Maven home: D:\tools\maven
Java version: 18.0.1.1, vendor: Oracle Corporation, runtime:
C:\tools\java\Java18
Default locale: en_CA, platform encoding: UTF-8
OS name: "windows 10", version: "10.0", arch: "amd64", family: "windows"

D:\Maven>java -version
java version "18.0.1.1" 2022-04-22
Java(TM) SE Runtime Environment (build 18.0.1.1+2-6)
Java HotSpot(TM) 64-Bit Server VM (build 18.0.1.1+2-6, mixed mode, shar-
ing)

D:\Maven>javac -version
javac 18.0.1.1
```

1. Ensure that your **javac** and **java** versions are the same. It can often happen that there are several versions of Java installed and the **java** JVM is using a version older than the compiler tools **javac** are using.

2. Record your Java version and the platform encoding since you will need it to configure your Maven projects

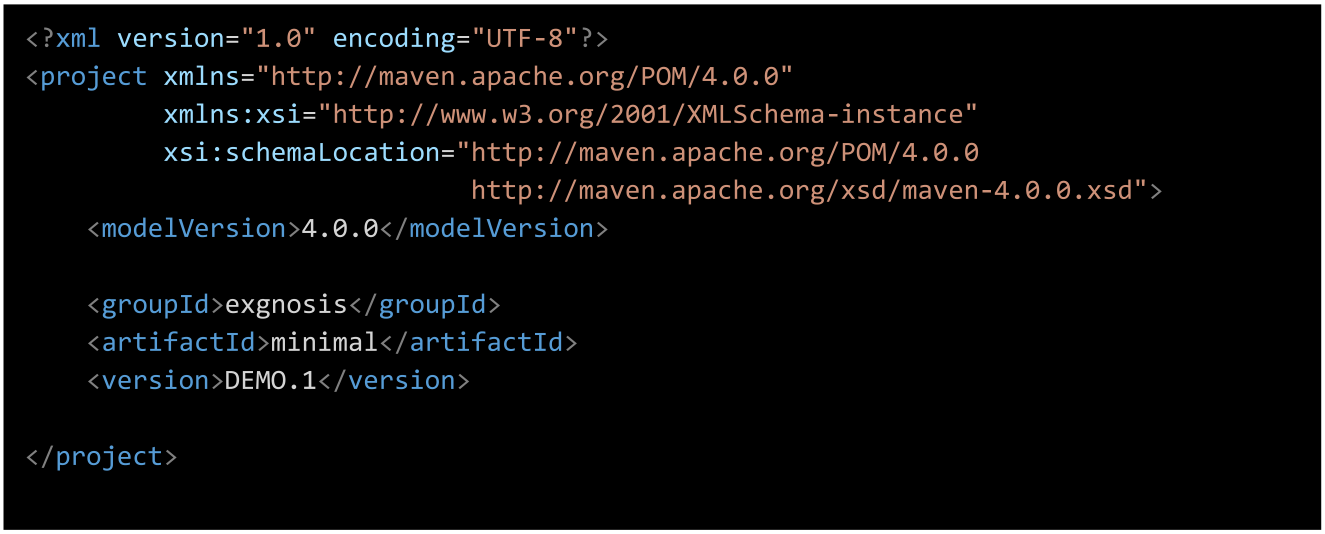
2. The minimal pom.xml

The pom.xml file you will be using is in the “Lab 1 Assets” folder in the repository. Create a working directory for this lab and paste the file “start.pom.xml” into the directory, then rename it to “pom.xml”. Your directory should look like this



```
D:\Maven\demo1>dir
 Volume in drive D is Working
 Volume Serial Number is 021F-6867

 Directory of D:\Maven\demo1

2022-11-16  06:37 PM    <DIR>          .
2022-11-16  06:37 PM    <DIR>          ..
2022-11-16  06:30 PM               422 pom.xml
               1 File(s)            422 bytes
```

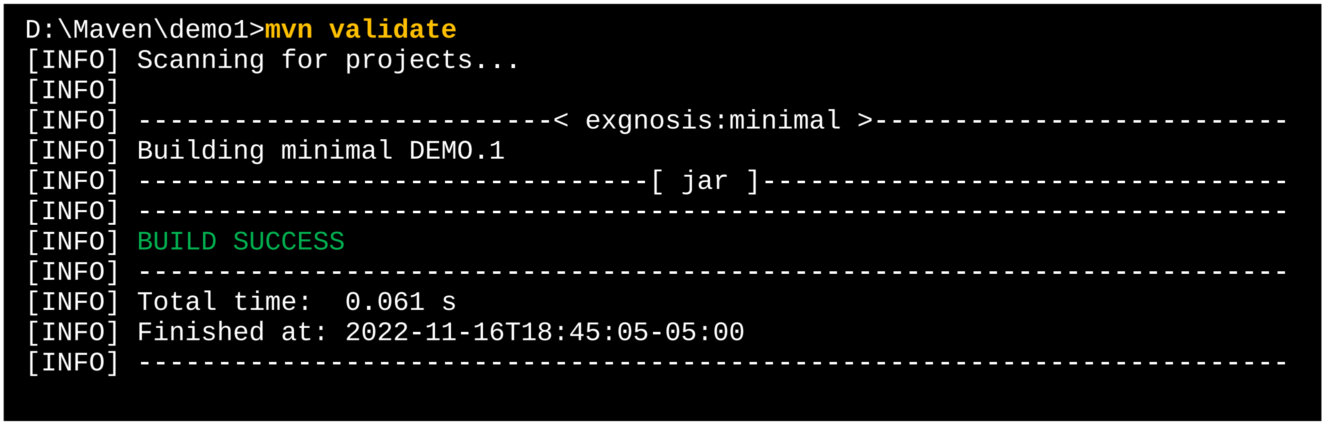
The pom.xml file you are using should look like this. However, you can change the groupID, artifactID and version to anything you want.



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

    <groupId>exgnosis</groupId>
    <artifactId>minimal</artifactId>
    <version>DEMO.1</version>

</project>
```

3. Run Maven validate

The Maven validate commands checks to see that the pom is a valid xml file. Run **mvn validate** to ensure your pom file is good to go.



```
D:\Maven\demo1>mvn validate
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------------< exgnosis:minimal >--------------------------
[INFO] Building minimal DEMO.1
[INFO] --------------------------------[ jar ]---------------------------------
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  0.061 s
[INFO] Finished at: 2022-11-16T18:45:05-05:00
[INFO] ------------------------------------------------------------------------
```

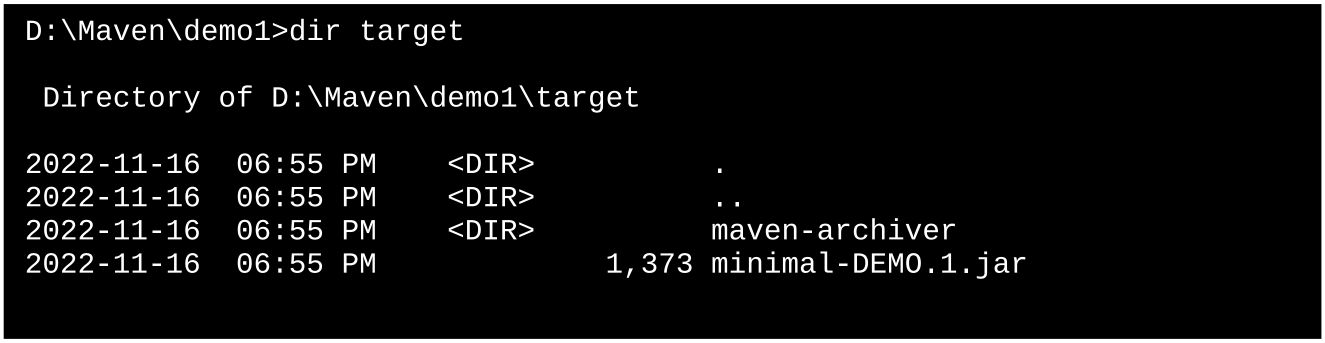
Invalid your pom file by removing the last **</project>** tag, then rerun **mvn validate** to see how Maven responds to an invalid pom file.

Replace the tag and rerun **mvn validate** to ensure your pom file is valid once again.

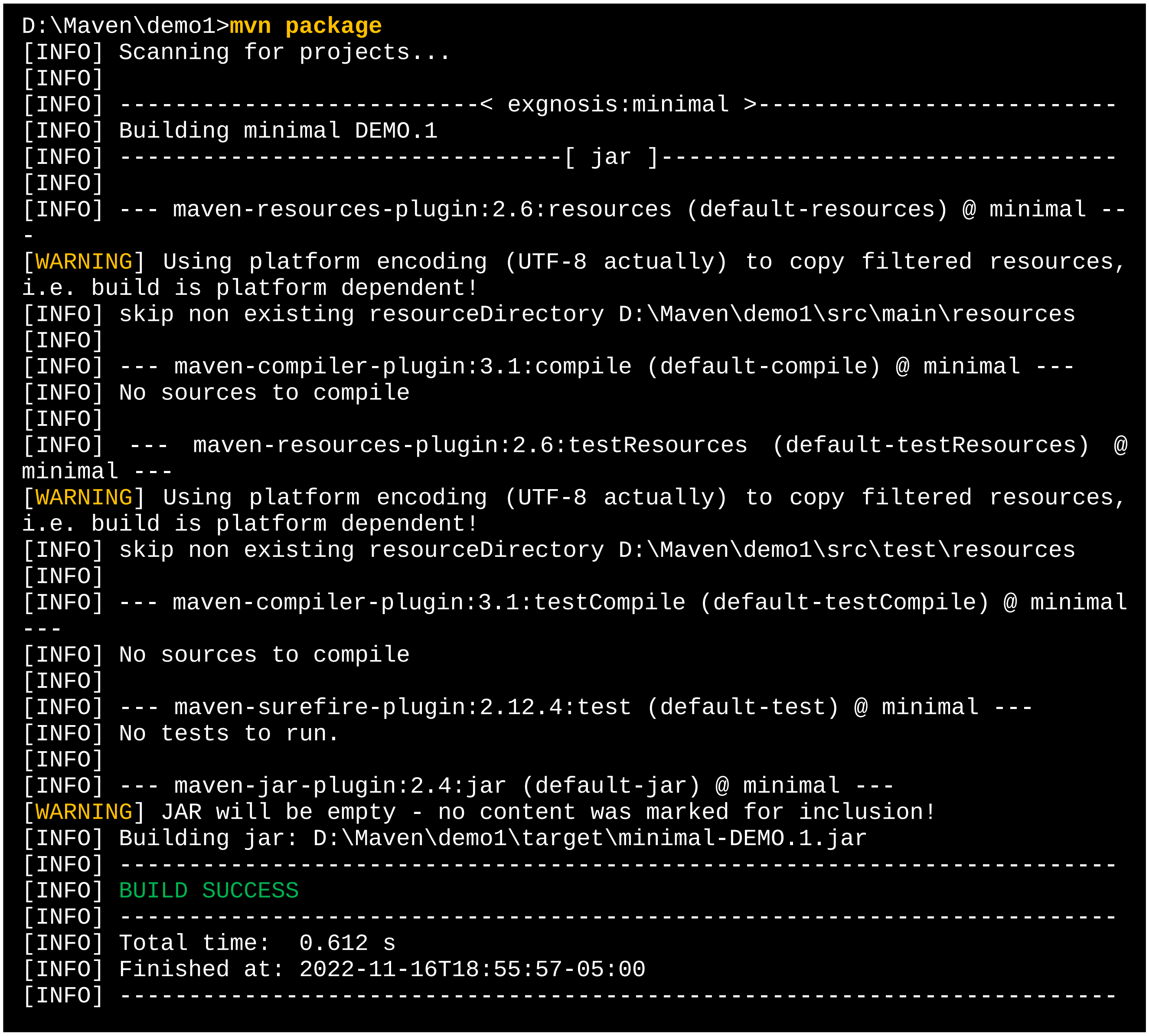
4. Creating a jar file

By default, Maven produces a jar file when **mvn package** is run. The jar file is not a stand-alone jar file (stand alone jar files are also called fat jars file or uber-jar files). Uber-jar files have all the dependencies, sometimes even application servers, bundled together in the jar file. The Maven default is not to include the dependencies in the jar file. In the next lab, you will see how to create an uber-jar file.

Since the output is rather long, it is displayed on the next page. However, note that the result of the packaging produced a **target** directory that contains the jar file. Confirm this for yourself



```
D:\Maven\demo1>dir target

 Directory of D:\Maven\demo1\target

2022-11-16  06:55 PM    <DIR>          .
2022-11-16  06:55 PM    <DIR>          ..
2022-11-16  06:55 PM    <DIR>          maven-archiver
2022-11-16  06:55 PM             1,373 minimal-DEMO.1.jar
```

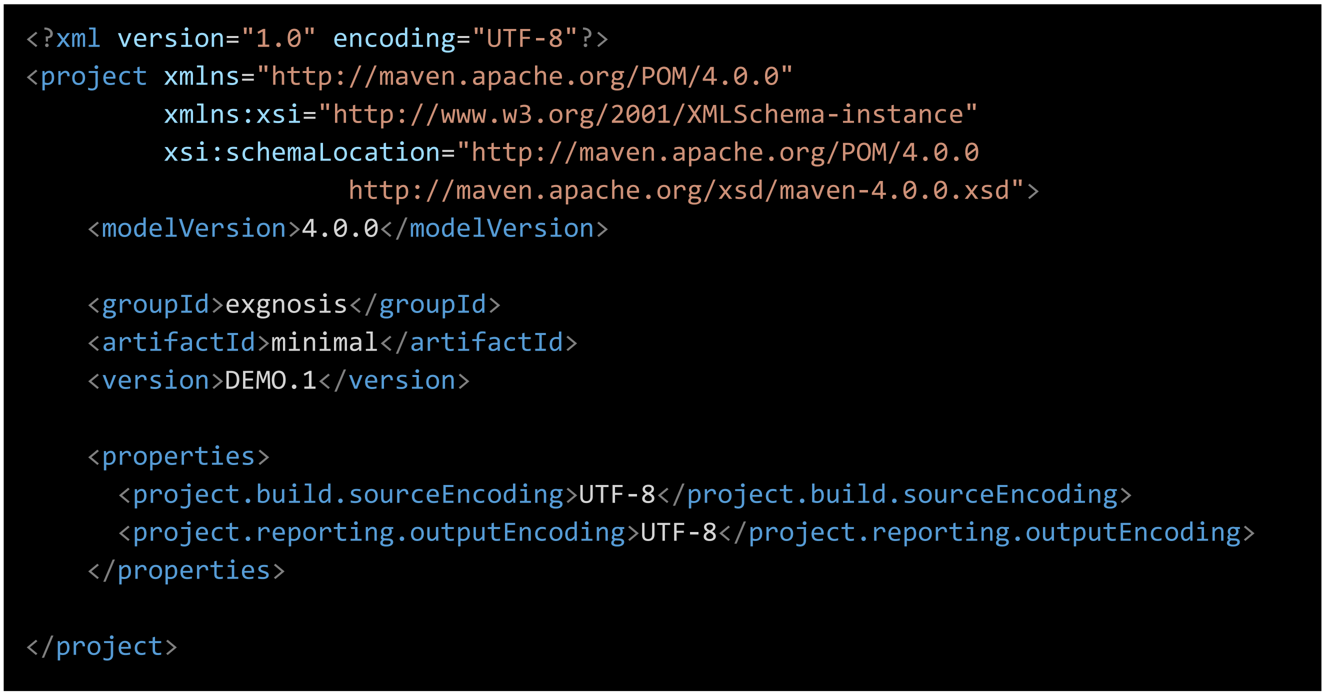


```
D:\Maven\demo1>mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------------< exgnosis:minimal >--------------------------
[INFO] Building minimal DEMO.1
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ minimal --
-
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources,
i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory D:\Maven\demo1\src\main\resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ minimal ---
[INFO] No sources to compile
[INFO]
[INFO]  ---  maven-resources-plugin:2.6:testResources  (default-testResources)  @
minimal ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources,
i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory D:\Maven\demo1\src\test\resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ minimal
---
[INFO] No sources to compile
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ minimal ---
[INFO] No tests to run.
[INFO]
[INFO] --- maven-jar-plugin:2.4:jar (default-jar) @ minimal ---
[WARNING] JAR will be empty - no content was marked for inclusion!
[INFO] Building jar: D:\Maven\demo1\target\minimal-DEMO.1.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  0.612 s
[INFO] Finished at: 2022-11-16T18:55:57-05:00
[INFO] ------------------------------------------------------------------------
```

There are two warnings. The second is just Maven telling us that there is nothing in the jar file since it didn't find any code to compile. The first is telling us that the character encoding has not been specified and so the default encoding of your machine is used. This can create cross-platform problems if the other machines use a different default encoding, like ASCII.

To fix this, you need to add a property element that tells Maven what encoding to use regardless of the default platform encoding. The pom with this addition is in the lab assets folder in the repo with the name **final.pom.xml**.

The most effective way to proceed is to just cut and paste the new lines from final.pom.xml into the pom you are using, the run **mvn validate** to ensure you did it right.



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

    <groupId>exgnosis</groupId>
    <artifactId>minimal</artifactId>
    <version>DEMO.1</version>

    <properties>
      <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
      <project.reporting.outputEncoding>UTF-8</project.reporting.outputEncoding>
    </properties>

</project>
```

Run the **mvn package** command again and the platform encoding warnings should no longer be happening.

5. Cleaning the build

Before starting this section, confirm that you have a jar file in the **target** directory. The Maven clean command removes the target directory to clean out all the results of a previous build, including any of the intermediate files that may have been generated. Run the clean command as shown below, and then verify that the target directory no longer exists.

```
D:\Maven\demo1>mvn clean
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------------< exgnosis:minimal >--------------------------
[INFO] Building minimal DEMO.1
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ minimal ---
[INFO] Deleting D:\Maven\demo1\target
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  0.142 s
[INFO] Finished at: 2022-11-16T19:19:40-05:00
[INFO] ------------------------------------------------------------------------
```

Do not delete your project, you will be using it in the next lab.

End of Lab