How to deal with a real project?

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Table of contents

The actors

Who is involved ?

The steps

Who should do what ? When ?

Agile

What is agile software development ?

Table of contents

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Eclipse is for development

- An **IDE** is an integrated **development** environment
- Your client does not have Eclipse
- Your client does not know Eclipse
- Your client does not want Eclipse
- Your client does not know how to use Eclipse

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Compile and run

Quick reminder about compilation

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Meet JAR

- JAR stands for Java ARchive
- It's sort of a zip containing class files.
- A JAR file car be **runnable**, in which case it contains the name of the class containing the main method.

Meet JAR

Let's try that.

```
/path/to/java -jar jeanmichel.jar
/path/to/java Main -jar jeanmichel.jar
```

Table of contents

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Motivation

- **Dependencies** a.k.a. **libraries** are a way to reuse code from projects to projects.
- The main goal is use code already made by others not to reinvent the wheel.
- Focus only on what makes your project specific.

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with JAR

Compilation time :

```
/path/to/javac -cp lib.jar Main.java
```

Runtime :

```
/path/to/java -jar lib.jar Main Main.class
```

with Eclipse

Let's try that.

Some problems

- How to handle dependencies of dependencies (=**transitive dependencies**) ?
- Which version should I use ? How to keep up to date ?
- What if two dependencies have the same dependency in different versions ?

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Meet Maven

- Wikipedia : **Maven** is a build automation tool used primarily for Java projects. Maven addresses two aspects of building software : how software is built, and its dependencies.
- Maven is an independent software but works well with Eclipse.
- Notice Ensai-specific configuration before starting.

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Meet Maven

- Maven uses a single xml file to describe how your project should be built and what are its dependencies : **pom.xml**
- It has to be this exact name and present at the root of the project.
- Maven only works if you structure well your project using a specific tree.

So, two very important steps :

- have a well formed pom.xml
- have a accurate tree

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Tree

```
my-app
|-- pom.xml
‘-- src
    |-- main
    |   ‘-- java
    |       ‘-- com
    |           ‘-- mycompany
    |               ‘-- app
    |                   ‘-- App.java
    ‘-- test
        ‘-- java
            ‘-- com
                ‘-- mycompany
                    ‘-- app
                        ‘-- AppTest.java
```

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pom.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>fr.ensai.mygroup</groupId>
  <artifactId>myapp</artifactId>
  <version>1.0</version>

</project>
```

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Add a dependency

Check **mvnrepository.com** to see what is available.

```
<dependencies>
    <dependency>
        <groupId>groupId</groupId>
        <artifactId>artifactId</artifactId>
        <version>version</version>
    </dependency>
</dependencies>
```

Example

```
<dependencies>
    <dependency>
        <groupId>org.apache.commons</groupId>
        <artifactId>commons-math3</artifactId>
        <version>3.6.1</version>
    </dependency>
</dependencies>
```

```
SimpleRegression regression = new SimpleRegression();
regression.addData(1, 2);
regression.addData(2, 3);
regression.addData(3, 4);
System.out.println(regression.getIntercept());
```

http://commons.apache.org/proper/commons-math/javadocs/api-3.6.1/org/apache/commons/math3/stat/regression/SimpleRegression.html

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Table of contents

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Typology

30% to 40% of development time is occupied by tests.

Two very important things : **tools** and **processes**.

What kind of tests can you think of ?

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Focus on unit tests in Java

- Unit tests in Java are just like in Python.
- The general principle is **given** a situation (somes variables), **when** I call this specific function, **then** I'm supposed to get this result.

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Focus on unit tests in Java

```
my-app
|-- pom.xml
‘-- src
    |-- main
    |   ‘-- java
    |       ‘-- com
    |           ‘-- mycompany
    |               ‘-- app
    |                   ‘-- App.java
    ‘-- test
        ‘-- java
            ‘-- com
                ‘-- mycompany
                    ‘-- app
                        ‘-- AppTest.java
```

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Focus on unit tests in Java

```
<dependency>
    <groupId>org.junit.jupiter</groupId>
    <artifactId>junit-jupiter-api</artifactId>
    <version>5.5.2</version>
    <scope>test</scope>
</dependency>
```

Focus on unit tests in Java : example

```java
public class Maths {
    public int addition(int a, int b) {
        return a+b;
    }
}
```

```java
public class MathsTest {
    @Test
    public void testAddition() {
        //GIVEN
        int a = 1;
        int b = 2;
        //WHEN
        int c = new Maths().addition(a,b);
        //THEN
        Assert.assertEquals(3,c);
    }
}
```

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