Agenda

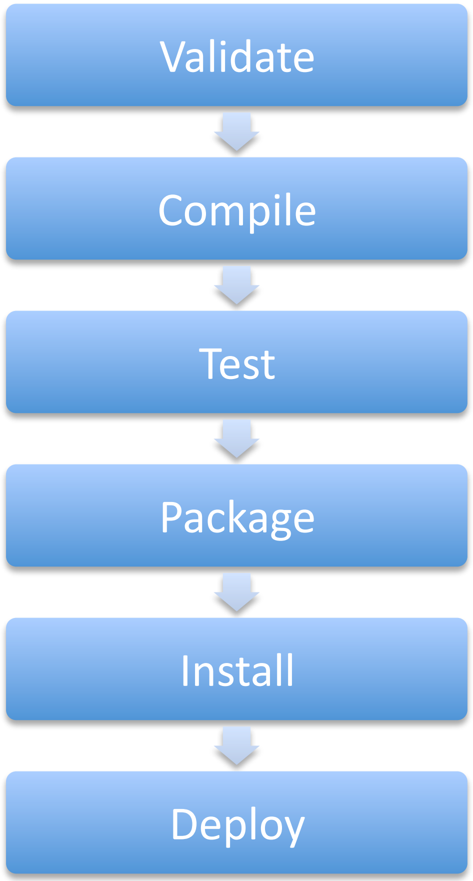
- What is Maven? How does it compare to Ant?
- Projects, dependencies, and artifacts
- Creating a maven build file
- Issuing builds
- Managing dependencies
- Multi-project builds
- IDEs, searching repositories
- Reporting

What is Maven?

- A build tool
- Convention (over?) configuration
  - Ant builds are procedural
  - Maven builds are structural
- Manages dependencies
  - You describe your dependencies, Maven downloads and includes in your build path
- Manages repositories
  - Your projects share a common set of artifacts/jar files
  - No need to check in JAR files to version control

Maven is extensible

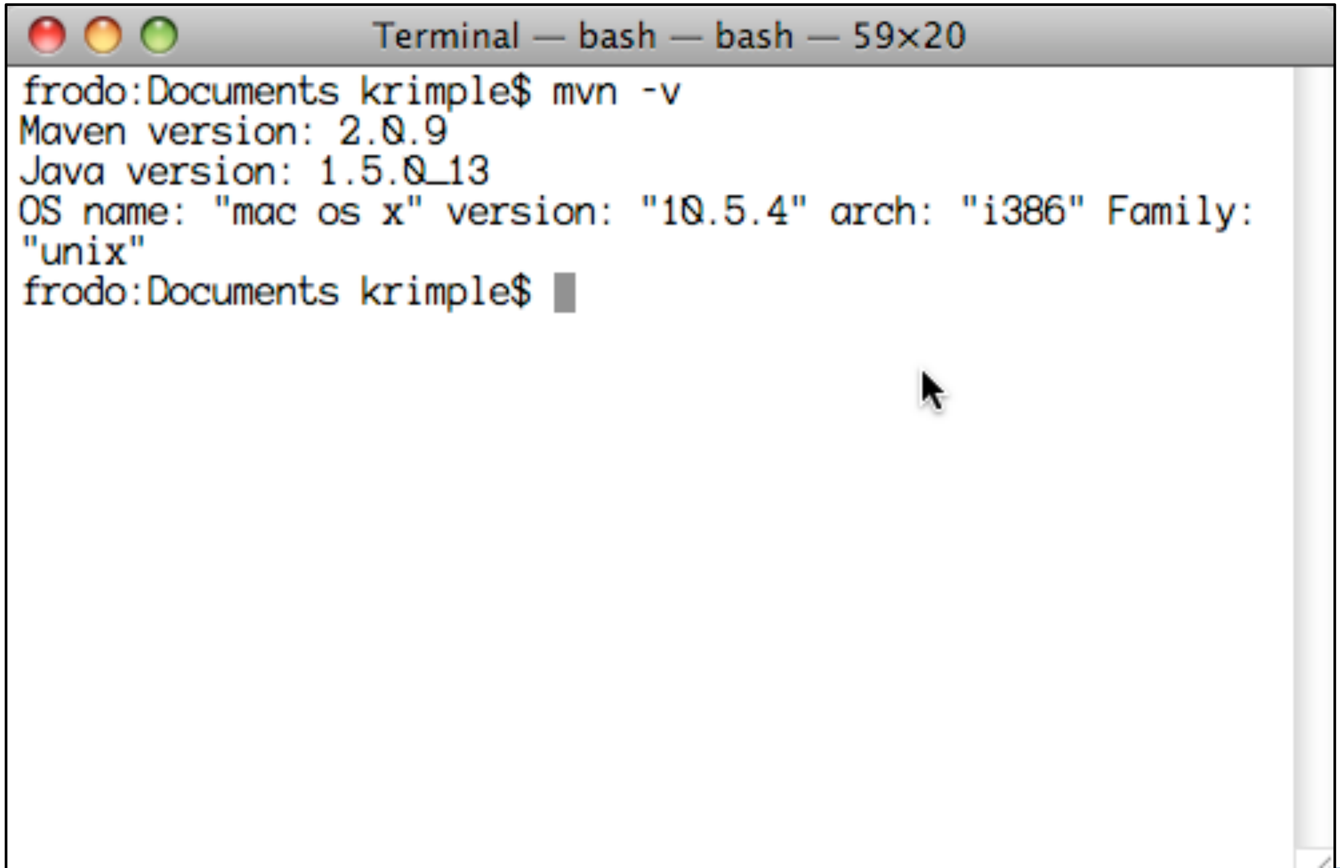
- Maven builds follow a lifecycle, using phases
  - Each lifecycle phase includes the ones above
    - (Package starts with compile, then test, then package)
    - Plugins can customize or hook-in to the phases
  - Key Maven lifecycles
    - **Default** – your normal lifecycle
    - **Clean** – issued during the mvn cleanup command
    - **Site** – issued during the mvn site command



Getting Started

- Installation Steps
  - Download maven from maven.apache.org
  - Unzip into a directory of choice (mine is /opt/java/maven-2.0.9)
  - Add a MAVEN_HOME environment variable
  - Add $MAVEN_HOME/bin to your path
- Start up a new shell and test…

Testing Maven



Terminal — bash — bash — 59×20

```
frodo:Documents krimple$ mvn -v
Maven version: 2.0.9
Java version: 1.5.0_13
OS name: "mac os x" version: "10.5.4" arch: "i386" Family:
"unix"
frodo:Documents krimple$ 
```

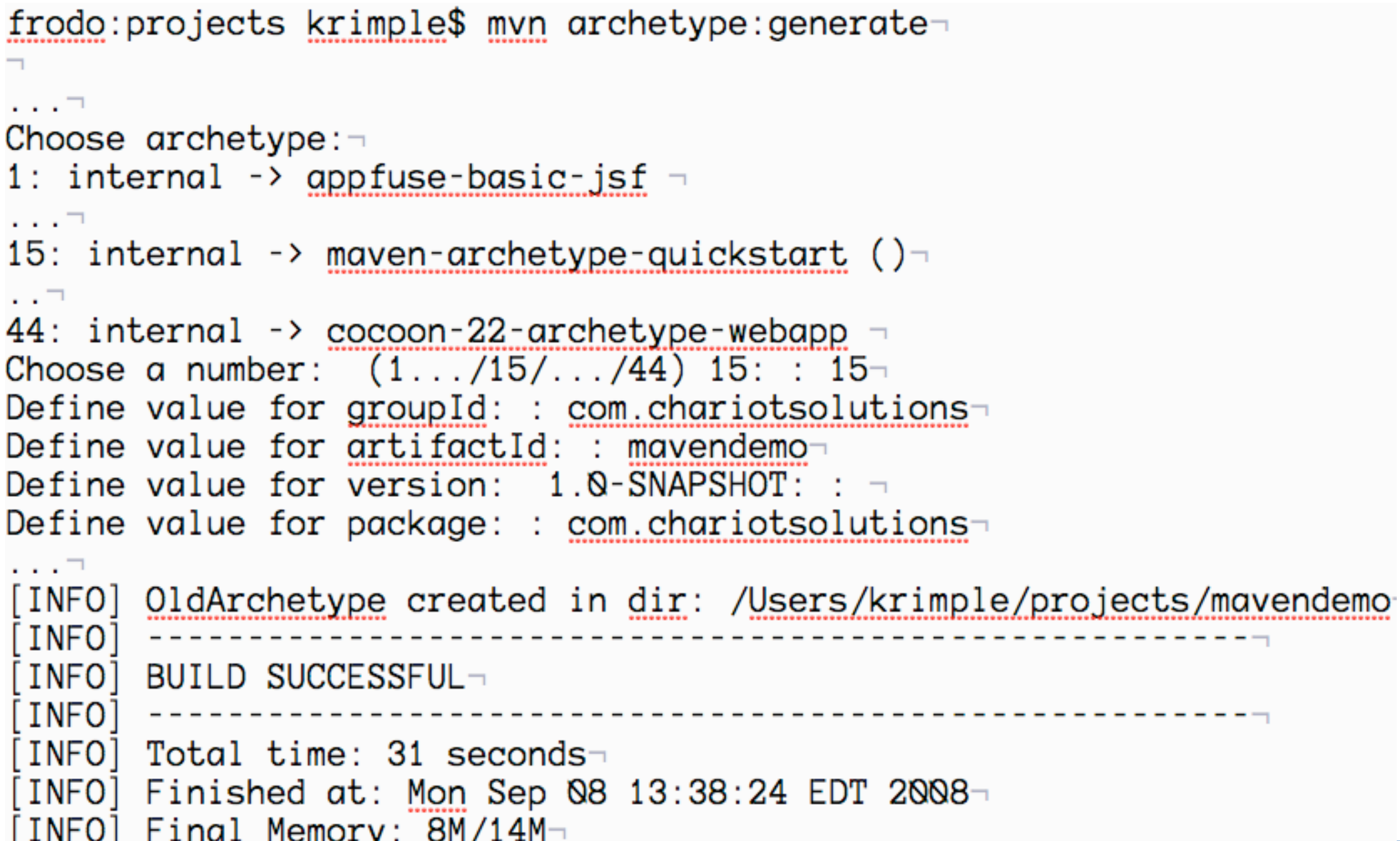
Creating a Maven Project…

- Create a root project directory
- Create a pom.xml file (Project Object Model)
  - Three methods
    - Slug it out (not recommended)
    - Find a prototypical example and steal it (recommended)
    - Use a Maven archetype (sometimes recommended)

What is a POM file?

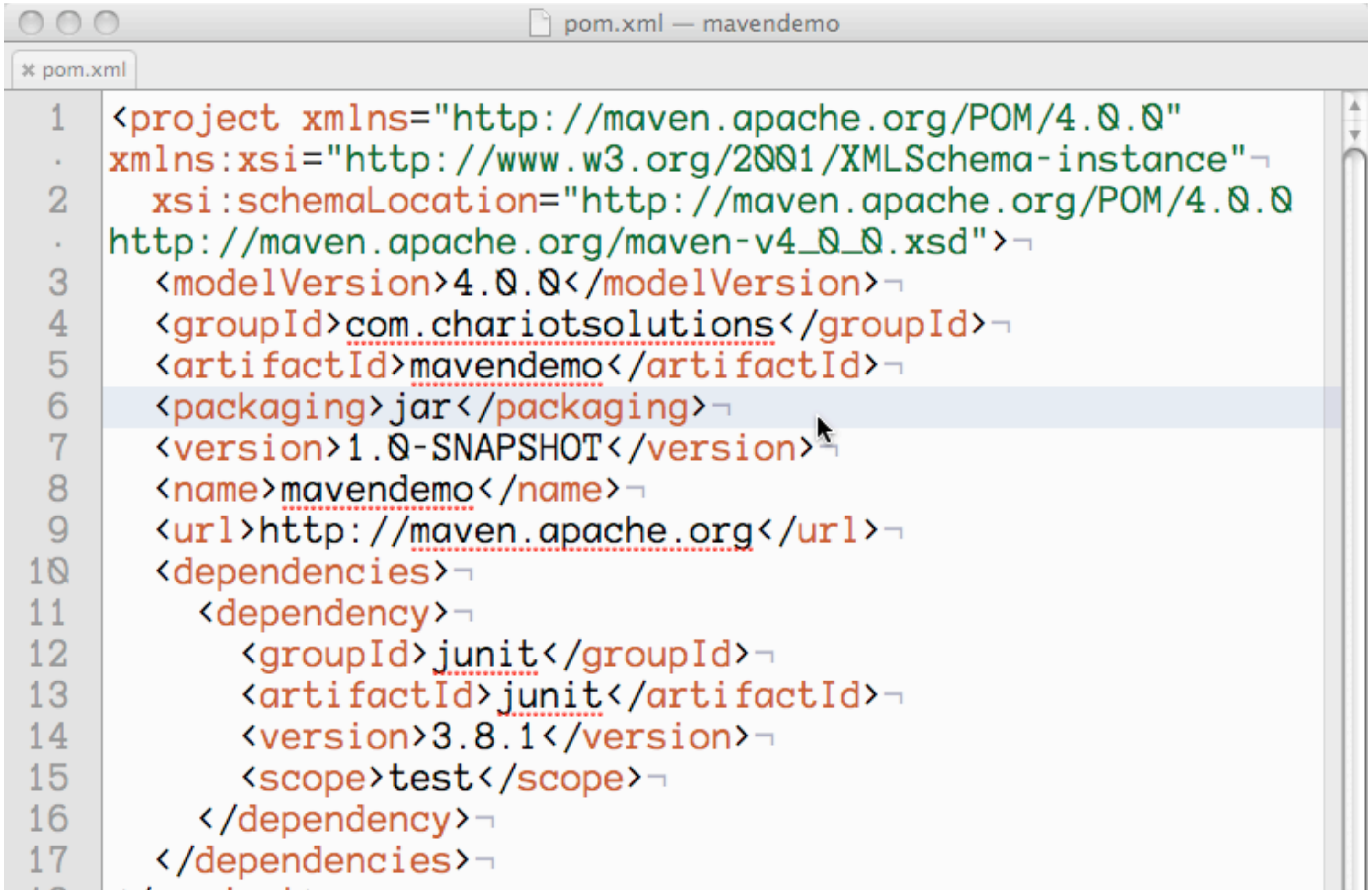
- Contains configuration information about your project
- Key items
  - Project Identification
  - Dependencies
  - Plug-Ins
  - Other Settings

Getting Started: Use the Archetype Plugin



```
frodo:projects krimple$ mvn archetype:generate¬
¬
...¬
Choose archetype:¬
1: internal -> appfuse-basic-jsf ¬
...¬
15: internal -> maven-archetype-quickstart ()¬
..¬
44: internal -> cocoon-22-archetype-webapp ¬
Choose a number:  (1.../15/.../44) 15: : 15¬
Define value for groupId: : com.chariotsolutions¬
Define value for artifactId: : mavendemo¬
Define value for version:  1.0-SNAPSHOT: : ¬
Define value for package: : com.chariotsolutions¬
...¬
[INFO] OldArchetype created in dir: /Users/krimple/projects/mavendemo
[INFO] ------------------------------------------------------------------¬
[INFO] BUILD SUCCESSFUL¬
[INFO] ------------------------------------------------------------------¬
[INFO] Total time: 31 seconds¬
[INFO] Finished at: Mon Sep 08 13:38:24 EDT 2008¬
[INFO] Final Memory: 8M/14M¬
```

The Resulting pom.xml file:

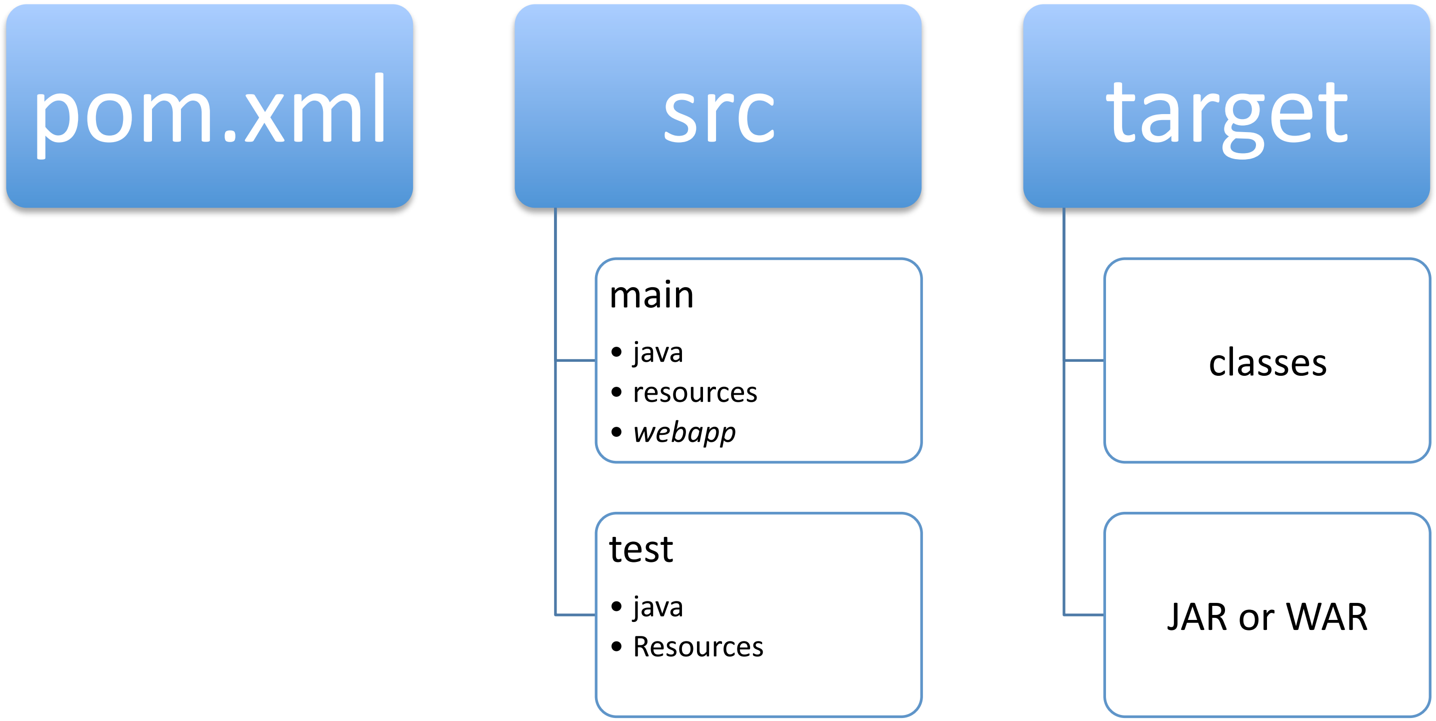


```
<project xmlns="http://maven.apache.org/POM/4.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/maven-v4_0_0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <groupId>com.chariotsolutions</groupId>
  <artifactId>mavendemo</artifactId>
  <packaging>jar</packaging>
  <version>1.0-SNAPSHOT</version>
  <name>mavendemo</name>
  <url>http://maven.apache.org</url>
  <dependencies>
    <dependency>
      <groupId>junit</groupId>
      <artifactId>junit</artifactId>
      <version>3.8.1</version>
      <scope>test</scope>
    </dependency>
  </dependencies>
```

What just happened?

- We let Maven build a project skeleton
  - Maven used its’ conventions to place files in the right places
  - Issuing “mvn package” will place a jar file in target/, after compiling and running unit tests
- Let’s look at the directory structure…

Directory Structure, Typical Maven Project



Using Maven

- The maven command (mvn)
  - mvn clean – removes files in target
  - mvn compile – compiles a project
  - mvn test – Runs all tests in the src/test directory
  - mvn package – builds the final target artifact (JAR, WAR)
  - mvn install – Installs the target artifact in your local repository
  - mvn deploy – Deploys the artifact (if configured)

Helpful Maven Reports

- **mvn site** -- Generates a web site report in target/site/index.html
- **mvn pmd:pmd** – runs a PMD report, output in target/site/pmd.html
- **mvn cobutura:cobertura** – runs a cobertura code coverage report, output in target/site/cobertura/index.html
- **mvn jdepend:generate** – runs a report on coupling between packages, output in target/site/jdepend-report.html
- **mvn checkstyle:checkstyle** – runs a checkstyle report
- **mvn javancss:javancss-report** – Runs a JavaNCSS report to show method complexity
- Note: all of these and more can be configured in the <site> section of the maven build… YMMV.

Managing Dependencies

- Key fact: Maven projects have ONE Artifact (JAR, WAR)
  - Can build projects that depend on other projects
  - Can build parent projects that build child projects
  - Can depend on other open source libraries and frameworks
- Manage all of this via the <dependencies> tags

Sample Dependencies: Junit

- Adds dependency to jUnit
  - Downloads 3.8.1 of Junit and stores in your maven repository
  - Only uses in path for testing

```
<dependencies>
    <dependency>
      <groupId>junit</groupId>
      <artifactId>junit</artifactId>
      <version>3.8.1</version>
      <scope>test</scope>
    </dependency>
  </dependencies>
```

Let’s Add TestNG and rev Junit…

```
<dependency>
     <groupId>junit</groupId>
     <artifactId>junit</artifactId>
     <version>4.5</version>
     <scope>test</scope>
   </dependency>
   <dependency>
     <groupId>org.testng</groupId>
     <artifactId>testng</artifactId>
     <version>5.8</version>
     <classifier>jdk15</classifier>
     <scope>test</scope>
   </dependency>
```

- Now we’ve revved to 4.5 of Junit
- We’ve also added support for TestNG
  - Well, a little more XML than this, see a demo…

Dependency Tips…

- Look for public dependencies on www.mvnrepository.com
- Split out re-usable functionality into JAR projects
  - Create top-level projects with a “pom” target which coordinate the build of subordinate projects
  - Manage your own shared projects using a company repository (Archiva, others)

Open up your Toolset

- With Maven, you can create projects for major IDEs this way:
- mvn eclipse:eclipse – Builds a .classpath and .project file for eclipse
- mvn idea:idea – Builds an idea 6.0 project. Idea 7 can directly read POM files and build an idea project automatically
- Netbeans can import maven projects directly if configured with the Maven support plugin

What we didn’t cover…

- Transitive dependencies
  - If one dependency needs version A of a project, but another needs version B… You have to exclude the download of the wrong version
- We didn’t cover multiple projects
- We didn’t talk much about plugins
- We didn’t show you anything about version control
- Sites?
- But this will get you started

Resources

- Maven web site: http://maven.apache.org
- Download “Better Builds with Maven” for a more detailed overview