Maven 3 ~~quick~~ overview

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Agenda

- Define Maven
  - Why?
  - Maven vs. Ant or Gradle
- Basic Concepts
- Dependency Management
- Repositories
- Deployment
- Releases
- Q&A

Define Maven

- Apache Maven is a software project management and comprehension tool
- Based on the concept of a **p**roject **o**bject **m**odel (POM), Maven can manage a project's build, reporting and documentation from a central piece of information

Why Use Maven?

Convention over Configuration

- Pre-defined directory structures
  - Source
  - Tests
  - Documentation
- Based on goals
  - compile, test, package, install, deploy, site…
- Just learn the conventions!
- Archetype plugin for easy project creation
  - mvn archetype:generate

Maven vs. ant or Gradle

- Vs. ant
  - Standardizes project structure
  - Provides dependency management
  - Built-in reporting and documentation
  - Easier to setup platform independent projects
- Vs. Gradle
  - More verbose project file (positive and negative)
  - Little to no programming knowledge needed
  - Large community support
    - Pre-built plugins, solutions and documentation
  - Better IDE support
    - Except Eclipse, which does not support either well

Basic Concepts

- POM
  - Master & Effective
- Lifecycles
  - Maven’s lifecycles
- Goals
- Plugins
  - Plugin Management
- Dependencies
- Profiles

POM

- File defining project/module settings
  - XML file*
- “Super POM” provided by Maven
  - Super POM used as base for all Maven projects
- Built-in hierarchy
  - Settings, properties, plugins, dependencies, profiles…
  - Use mvn help:effective-pom to generate the “used” POM
- Parent POM
  - POM files can be nested allowing each project to encapsulate the artifact’s intent
  - Defines base versions for common dependencies, reporting, profiles and plugins
- One POM per module

POM – Important Attributes

- <artifactId/>
  - Artifact's name, must be unique within groupID scope
- <groupId/>
  - Typically package name for project
- <version/>
  - Current version of the artifact
- <name/>
  - Name of the app, IDEs typically use this
- <packaging/>
  - Type of artifact packaging
  - POM, jar, WAR, EAR, EJB, bundle
- <distributionManagement/>
  - Controls where artifact is deployed to
- <parent/>
  - Hierarchy of the project
- <version/>
  - Current version of the artifact
- <scm/>
  - Source code management section
- <dependencyManagement/>
  - Defaults for dependencies
- <dependencies/>
  - Dependency definitions

POM – Important Attributes

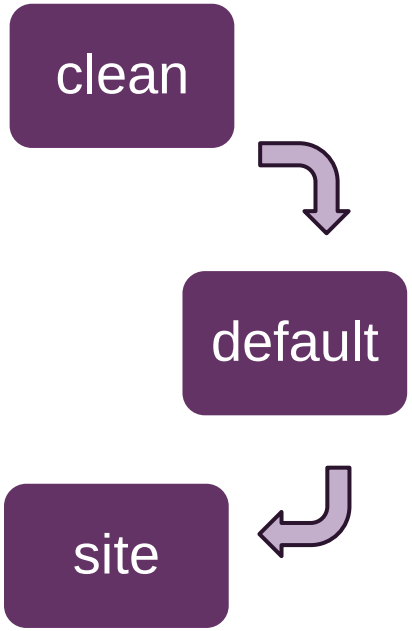
```
<project …>
   <groupId>com.example</groupId>
   <artifactId>some-webapp</artifactId>
   <packaging>war</packaging>
   <version>0.01-SNAPSHOT</version>
   <name>${project.artifactId}</name>
   <distributionManagement>
      <snapshotRepository>
         <id>releases</id>
         <name>Mobile Snapshot Nexus</name>
         <url>http://nexus.kohls.com/content/repositories/Snapshots</url>
      </snapshotRepository>
      <repository>
         <id>releases</id>
         <name>Mobile Release Nexus</name>
         <url>http://nexus.kohls.com/content/repositories/releases</url>
      </repository>
      <site>
         <id>site-docs</id>
         <url>scp://${site.host}/opt/lampp/htdocs/site/${project.artifactId}</url>
      </site>
   </distributionManagement>
</project>
```

Versioning

- Versions should be considered permanent
- SNAPSHOT builds should NEVER be deployed or released
  - 15 step process to determine which version build to use!
- Maven Reactor – Maven's process to determine which dependencies and versions are included
- Initial sequence based versioning
  - 0 – for alpha
  - 1 – after first release
- major (dot) minor
  - 1.1, 1.11, 1.111, 1.112
- Attempt to keep major versions should be same on each module
  - 10.2.17 – 10 = major number, 2 = internal major, 17 = release

Lifecycles

- Phases maven moves to build artifact
- Runs in sequential, pre-defined order
  - Ex: *mvn clean site* – runs clean and site
    - Note: site typically has surefire-plugin turned on, so phases in default are run
  - Ex: *mvn clean test site* - runs *clean*, everything in default up thru *test* and then *site*
- 3 Core Phases
  - clean
  - default
  - site
- Clean – resets project back to known state
- Site – Builds documentation ("site docs"), reporting, JavaDocs, coverage, test results…



Default Phase

- 23 sub-phases
- Typically run unless only “clean” or “site” lifecycle run
  - “site” might include default-bound goals inside of “default” phase such as test, generate-sources and compile
- Common default sub-phases
  - generate-sources
  - compile
  - test
  - package
  - install
  - deploy
- Some phases have *goals* bound automatically
  - compile – compiler:compile

Commands

- Goals – Represent specific task contributing to build phase in their lifecycle
  - Goals are bound to phases
  - Example goals: checkstyle:checkstyle
- Plugins – Modules adding new goals to maven
  - Sample plugins
    - PMD
    - Checkstyle
    - JavaDocs
    - Resources (maven-resources)
    - Surefire and Failsafe

Dependency Management

- Group
- Artifact
- Version
- Scope
- Type
- Exclusions
- Optional
- Quick note: Set dependency versions and exclusions in <dependencyManagement/>

```
<dependency>
    <groupId>com.example</groupId>
    <artifactId>random-webapp</artifactId>
    <packaging>war</packaging>
    <version>0.01</version>
    <scope>test</scope>
</dependency>
```

Dependency Management – Scope

- Scope
  - **compile** – Available in all classpaths, dependent projects inherit {default scope}
  - **provided** – Indicates that JDK or container will provide at run-time
  - **runtime** – Not required to compile, but needed to run
  - **system** – Same as provided, does not look up in repository
  - **test** – Available only during test phase
  - **import** – When type is *POM*, import dependencies matching in <dependencyManagement/> sections
- Type
  - jar, pom, war, ear, ejb, bundle, maven-plugin
  - Default packaging "jar"
- Exclusions
- Optional

Dependency Management – cont.

- Type – Specify type of artifact (common)
  - JAR – Default type
  - WAR – WAR, used for WAR Overlays and Uber WARs
  - POM – Master POM or dependency POMs
- Exclusions – Ability to exclude dependencies from incoming dependencies {transitive dependencies}
  - Used to manage transitive dependencies
- Optional – Method to mark transitive dependencies as excluded by default. Declared in incoming dependency, not in project
- **Note**: Must repeat <*scope*> and <*type*> in dependency and dependencyManagement sections

Artifact Naming Conventions

- Why have naming conventions?
  - Promotes re-use
  - Organizes artifacts
- Libraries (jar type)
  - descriptive-name-**lib**
  - ex: common-database-lib
- Webapps (ear and war)
  - descriptive-name-**webapp**
  - ex: company-ecommerce-webapp
- Common dependencies
  - Groups of similar dependencies can be grouped into a “dependency project"
  - descriptive-name-**dep**
  - ex: common-web-dep

Repositories

- Local – Local dependency cache
  - ~/.m2/repository
- Remote – Servers that hold binaries
  - Internet (“central”)
  - Internal – Nexus, Artifactory…
- Plugin and Dependency repositories defined in POM or settings.xml
  - NOTE: Best to define in settings.xml
  - Treat <id> as a “name” for the repository; should match <id> in all settings.xml files in each environment

Deployment

- Single command to deploy
  - Pushes artifact to artifact server
- (Almost) single command to Release
  - Release process consists of two goals
  - release:prepare
    - Strip “-SNAPSHOT” from <version/>
    - Run through site phase
    - SCM “tag” project (optional)
  - release:perform
    - Pushes artifact to artifact server
    - Increments <version/> number
    - Appends “-SNAPSHOT” to <version/>
    - Checks in (SCM) updated POM upon success

Deployment: Snapshot

- Snapshot builds are incremental, non-versioned releases
- Typically used for intra-team use
- Use “deploy” to push snapshots to repository
  - Repository location must be setup to accept snapshots
    - Allow for redeploy
    - Allow for snapshots over releases
  - Make sure <server> setting is correct in settings.xml
- Typical use case:
  - Setup a nightly SNAPSHOT build for external teams to use
    - Minimizes changes that might cause compilation failures

Q&A

- Lots covered…questions?