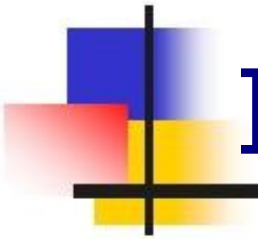

I Got My Mojo Workin'

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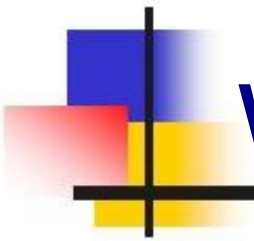
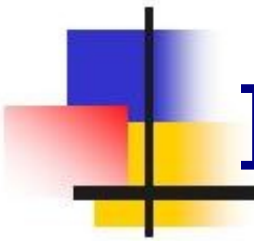
Agenda

- Quick overview on using Maven 2
- Key features and concepts
- A look at the structural components of Maven 2
- Developing Maven plug-ins, comprised of “mojos”.



What is Maven?

- **Framework** for development processes. Can be used for:
  - Build runtime artifacts, such as jars and wars
  - Build developer documentation, such as JavaDoc
  - Create reports for project management
  - Distribute applications to dev, prod, etc.
- ... and anything else for which you write a mojo.



Installing Maven?

- Maven is a project managed by the Apache Software Foundation:
  http://maven.apache.org
- Download and install a small core of Maven functionality
  - Maven will automatically load and install dependencies for each of the plug-ins you request

Running Maven

- This talk is more about writing mojos for Maven, but we should have a feel for how it works:

Maven Demo Time

Maven Objectives

- Make the build process easy
- Provide a uniform build system
- Provide quality project information
- Provide guidelines for best practices development
- Allow for transparent migration to new features.

Reference: http://maven.apache.org/what-is-maven.html

Meeting Those Objectives

- Maven is easy to get started, since it bootstraps most of its install.
- Maven build process is easy when it works. Difficult to diagnose when it doesn't.
  - Been reliable for me.
  - Some idiosyncrasies on some machines
  - Way better than Maven 1. Don't judge Maven 2 based on Maven 1 experience

Meeting Those Objectives

- High marks for project information. Plug-ins for:
  - JavaDoc generation
  - Unit test reports
  - Code style
- Pushes documentation closer to developer processes:
  - Better than external documentation
  - Documentation versioned with code

http://www.hilbertinc.com/whitepapers/ValueOfProcess.pdf

Meeting Those Objectives

- Provides standard directory structure layout:
  - Hard one for me to bite off
  - Defaults generate artifacts in the same directory structure as Eclipse projects
  - Default path structure can be changed, but more configuration work
- In short, Maven 2 is a big improvement over Maven 1 and does an adequate job of meeting its objectives

Key Features [c]

- Project set up via a "project object model" (POM).
  - Default "super POM" that is hard-coded and you override what differs
  - POMs have an inheritance hierarchy
    - Parent POM contains information common to all projects
    - Parent POM references all child projects
  - Demo time: AEntendre Frameworks POM structure. *Note distribution management.*

Key Features

- Dependency Management
  - The POM contains the dependencies and their scope (e.g. compile, runtime, test...)
  - Maven will handle the installation of direct and transitive dependencies
- Versioned jars are maintained in a repository
  - In Eclipse, recommend using a classpath variable (e.g. M2_REPO) to point to the repository root.

Key Features

- Artifact deployment
  - Can install runtimes to remote systems using SCP or other means.
- Project documentation:
  - Automatically generates a web site with the project information
  - Demo time: AEntendre Framework site

Concepts

- Goals
  - Accomplish a single, atomic task.
  - Similar in concept to an Ant goal
  - One goal per mojo
- Plug-ins
  - Packaged jar of mojos
- Lifecycle (more on next slide)
  - A collection of goals bound to a lifecycle
  - Model a high-level process

Concepts - Lifecycle

- Most Common Build Lifecycle Phases
  - **`install`** – Place the packaged artifact (e.g. a jar) in the local repository. This will compile, test, package, verify and install.
  - **`deploy`** – Place the packaged artifact in the remote repository
- These are run at the command line:

```
mvn install
```

http://maven.apache.org/guides/introduction/introduction-to-the-lifecycle.html

Underlying Structure

- Plexus (http://plexus.codehaus.org)
  - Inversion-of-control container
  - Uses field injection of requirements and configuration
  - Perhaps easy for the Maven 2 developers, but hard on the Mojo developers.
    - Not expressive!

Underlying Structure

- Modello (http://modello.codehaus.org)
  - Describes an object model in XML. In this case, the POM.
  - Generates Java objects from the XML
    - Generated code contains untyped collections
    - As a result, very difficult to follow
- Surefire (http://maven.apache.org/surefire)
  - Testing framework for JUnit

Underlying Structure

- Doxia (http://maven.apache.org/doxia)
  - Documentation engine
    - APT – Almost plain text
    - DocBook
    - FML – FAQ Markup Language
    - LaTeX
    - RTF
    - XDoc
    - XHTML

Questions

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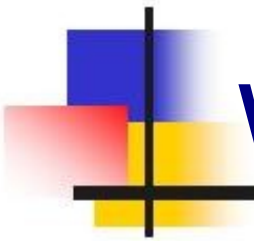
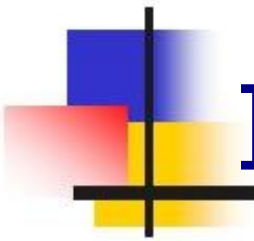


What is a Mojo?

- A mojo is:
  - a play on POJO - Maven plain Old Java Object
  - an executable goal in maven
- A plug-in is a distribution of one or more related mojos.

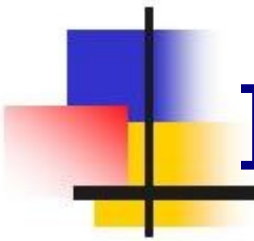


Introduction to Mojos

- Can be written in Java or other scripting languages.
  - This will cover Java mojos only.
- The interface is defined in:

  org.apache.maven.plugin.Mojo
- Abstract base class in:

  org.apache.maven.plugin.AbstractMojo



Introduction to Mojos

- Base class includes an implementation of a logging facility.
  - Use instead of System.out.println
  - Allows integration with GUI applications
- Concrete implementations must supply an execute() method.

plugin.xml

- The jar containing the plug-in classes must contain a descriptor file:
  - META-INF/maven/plugin.xml
  - Contains metadata about each mojo:
    - goal name
    - dependencies
    - parameters in the pom.xml that can be overridden
- Can (and should be) generated from JavaDoc annotations

settings.xml [n]

- Maven needs to know the location (group) for your plugins:

```
<pluginGroups>
    <pluginGroup>org.aentendre.maven</pluginGroup>
</pluginGroups>
```

Annotations

- Mojo metadata specified via JavaDoc annotations (not Java annotations). Most common follow:
  - @goal *goalname* – used on the command line
  - @phase *phasename* – used if you want your mojo to be part of the standard build

Annotations - Parameter

- Makes objects available to mojo via Plexus injection:
  - @required – Parameter must be available for the mojo to work
  - @readonly – Can't be configured by user (i.e. access to internal objects)
  - @parameter expression="${*expr*}" - bind to available objects.
    Expression values are still largely undocumented.
    ... the explore mojo will help.

http://maven.apache.org/guides/introduction/introduction-to-the-lifecycle.html

Explore Mojo

- Developed by me to reverse engineer how mojos work.
- Will be included on the Conference CD
- Used other open-source mojos for guidance.

Let's go exploring...

Questions

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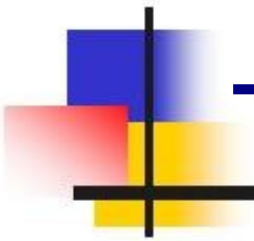
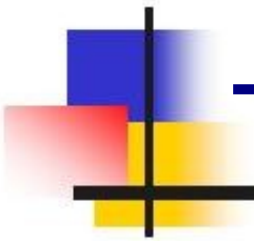


Thanks

- Thank you for attending.
- Please fill out the evaluations. They are helpful to Wayne and Peggy as well as me.
- Feel free to ask questions during the week.
- Time permitting, we can look at some peripheral issues...



Time Permitting...

- Eclipse and Maven 2
  - There is a plug-in for Maven 2 that I haven't used.
    - Eases setup of classpath in Eclipse
- By default, Maven builds in the same directory structure as Eclipse.
  - I changed the build directory locations
- Eclipse doesn't allow nesting of projects in the filesystem