Maven Intermediate Concepts

Customizing the build process

Overview

- Maven plugins, and customizing the build lifecycle using plugins
- Customizing your build process with properties and filters
- Using build profiles

Properties and Profiles

Properties and Profiles

- Using properties and build profiles to customize your build
  - Properties let you parameterize and refactor your builds
  - Build profiles let you adapt your build process to different circumstances

Defining properties

- Properties can be defined in many places
  - Maven project properties
  - Maven settings properties
  - Java system properties
  - Environment properties
  - Arbitrary properties

Using POM variables

- Properties can refer to elements in the POM file itself
  - For example
    - *Maven coordinates*: ${project.groupId}, {$project.artifactId}, ${project.version},...
    - *Project name and description*: ${project.name}, ${project.description}
    - *Build directories*:
      - ${project.build.sourceDirectory} and ${project.build.testSourceDirectory},
      - ${project.build.outputDirectory} and ${project.build.testOutputDirectory}
  - ...

```
<dependencies>
  <dependency>
    <groupId>${project.groupId}</groupId>
    <artifactId>killerapp-core</artifactId>
    <version>${project.version}</version>
  </dependency>
</dependencies>
```

Properties in POMs

- You can use properties in your POM files to customize your build
  - Refactor and centralize frequently-used variables
  - Access environment variables in your build script
  - Refer to elements in the POM itself
- Properties use the familiar ${...} syntax:

```
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>${junit.version}</version>
  <scope>test</scope>
</dependency>
```

Property value

Using settings.xml variables

- Properties can be read from the settings.xml file, e.g.

settings.xml property	Description
settings.localRepository	Path to the local repository
settings.offline	Is Maven running in offline mode
settings.proxies	A list of the proxies defined in the settings.xml file
settings.servers	A list of the servers defined in the settings.xml file
settings.mirrors	A list of the mirrors defined in the settings.xml file
settings.profiles	A list of the profiles defined in the settings.xml file
...	

Using settings.xml variables

- Getting properties from the settings.xml file - some examples
  - Passing the local repository path to an Ant script

```
<plugin>
  <groupId>org.apache.maven.plugins</groupId>
  <artifactId>maven-antrun-plugin</artifactId>
  <executions>
    <execution>
      <id>process-widgets</id>
      <phase>validate</phase>
      <goals>
        <goal>run</goal>
      </goals>
      <configuration>
        <tasks>
          <ant target="process-widgets">
            <property name="localRepository"
                      value="${settings.localRepository}"/>
          </ant>
        </tasks>
      </configuration>
    </execution>
  </executions>
</plugin>
```

Pass the local repository path in the settings.xml file to an ant script

Using settings.xml variables

- Getting properties from the settings.xml file - some examples
  - Retrieving the username and password from a server definition

```
<plugin>
  <groupId>org.codehaus.groovy.maven</groupId>
  <artifactId>gmaven-plugin</artifactId>
  <version>1.0-rc-5</version>
  <executions>
    <execution>
      <id>process-db-scripts</id>
      <phase>pre-integration-test</phase>
      <goals>
        <goal>execute</goal>
      </goals>
      <configuration>
        <source>
        def server = settings.servers.find{ it.id.equals('staging-database') }
        """ant -Ddb.username=${server.username}
        -Ddb.password=${server.password}""".execute()
        </source>
      </configuration>
    </execution>
  </executions>
</plugin>
```

settings.xml

```
<settings>
  ...
  <servers>
    ...
    <server>
      <id>staging-database</id>
      <username>scott</username>
      <password>tiger</password>
    </server>
  </servers>
</settings>
```

Fetch the 'staging-database' server entry in settings.xml

Pass the username and password defined here to an Ant script

Java System properties

- You can also access Java System Properties, e.g.

System property	Description
java.version	Java Runtime Environment version
user.name	User's account name
user.home	User's home directory
user.dir	User's current working directory
os.name	Operating system name
java.io.tmpdir	Directory for temporary files
...	

System properties

- Command-line system properties are passed in using the -D option

```
$ mvn deploy -Dwar.version=1.2.4
```

```
<dependencies>
  <dependency>
    <groupId>com.training.killerapp</groupId>
    <artifactId>killerapp-war</artifactId>
    <version>${war.version}</version>
    <type>war</type>
  </dependency>
</dependencies>
```

User-defined properties

- User-defined properties can be set up in a POM or in settings.xml
  - Properties are defined in the <properties> section
  - Often used to centralize version numbers used in several places

```
<dependencies>
  ...
  <dependency>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>${junit.version}</version>
    <scope>test</scope>
  </dependency>
</dependencies>
...
<properties>
  <junit.version>3.8.1</junit.version>
</properties>
```

Properties are defined here

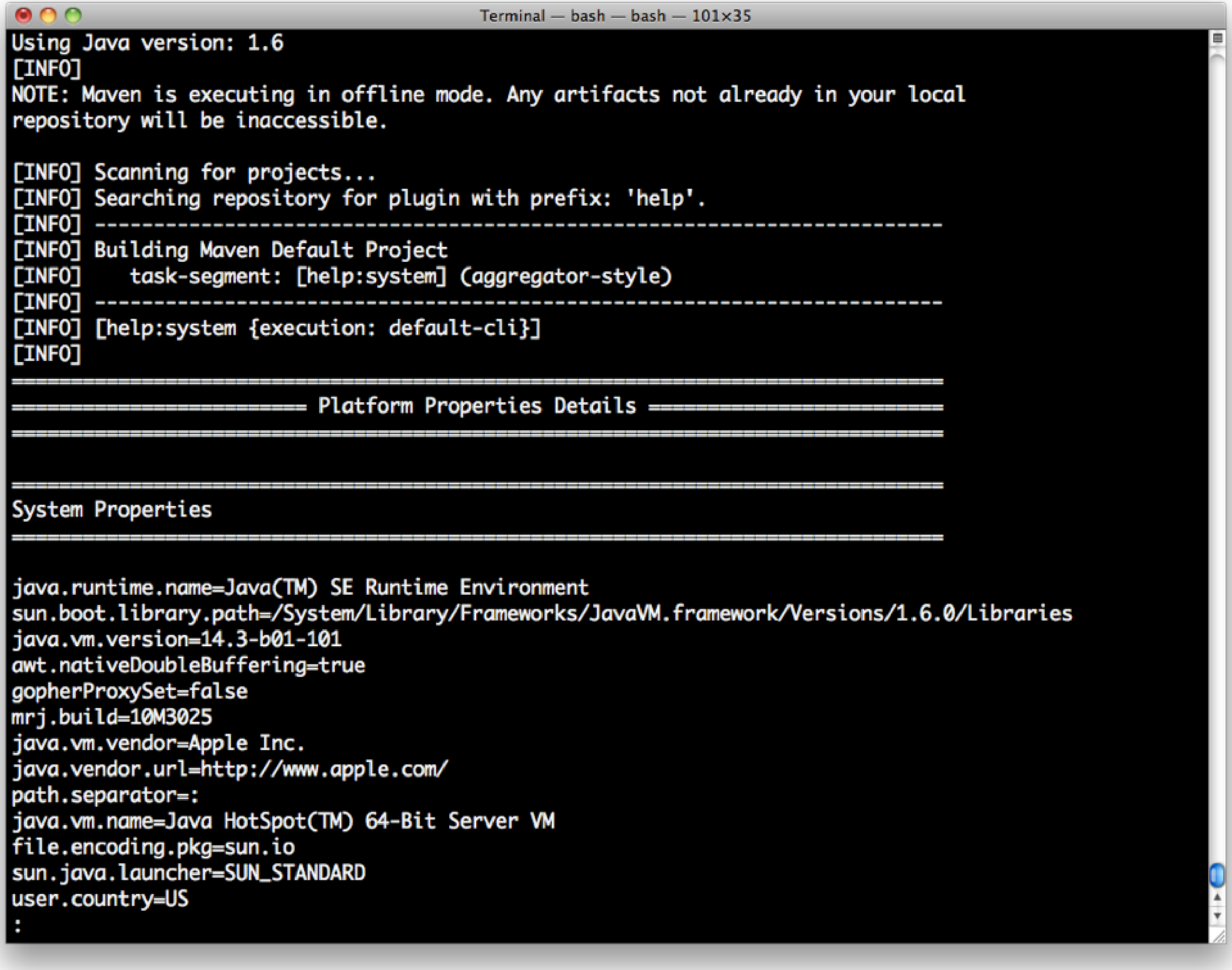
Using environment variables

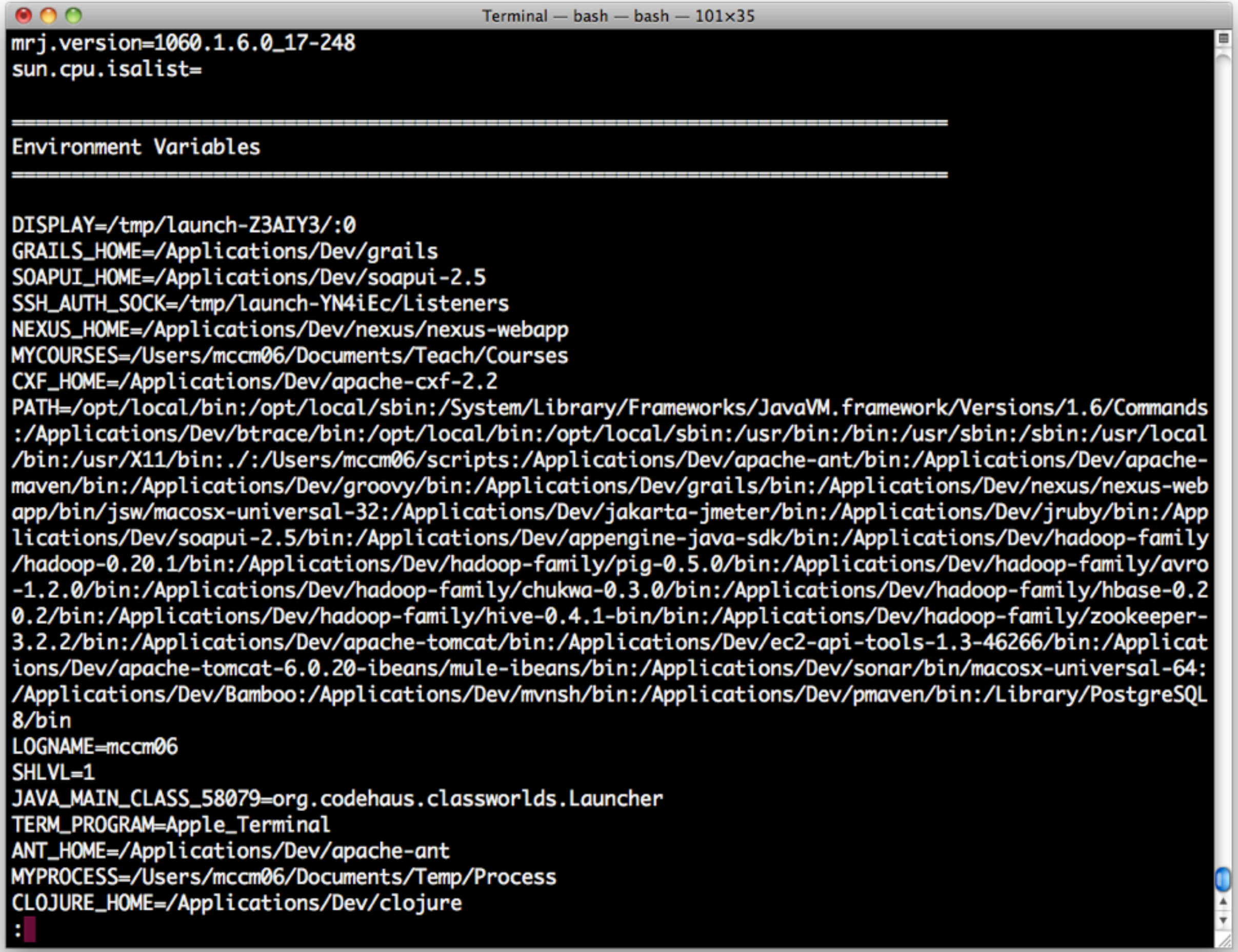
- Environment variables can be accessed using the "env" prefix
  - ${env.HOME}, ${env.JAVA_HOME},...
- Environment variables can be used to hide sensitive data:

```
$ export DB_USERNAME=root
$ export DB_PASSWORD=s3cr3t
$ mvn deploy
```

```
<configuration>
  ...
  <username>${env.DB_USERNAME}</username>
  <password>${env.DB_PASSWORD}</password>
</configuration>
```

```
mvn help:system
```


Terminal — bash — bash — 101×35
Using Java version: 1.6
[INFO]
NOTE: Maven is executing in offline mode. Any artifacts not already in your local
repository will be inaccessible.
[INFO] Scanning for projects...
[INFO] Searching repository for plugin with prefix: 'help'.
[INFO] --
[INFO] Building Maven Default Project
[INFO]   task-segment: [help:system] (aggregator-style)
[INFO] --
[INFO] [help:system {execution: default-cli}]
[INFO]
Platform Properties Details
System Properties
java.runtime.name=Java(TM) SE Runtime Environment
sun.boot.library.path=/System/Library/Frameworks/JavaVM.framework/Versions/1.6.0/Libraries
java.vm.version=14.3-b01-101
awt.nativeDoubleBuffering=true
gopherProxySet=false
mrj.build=10M3025
java.vm.vendor=Apple Inc.
java.vendor.url=http://www.apple.com/
path.separator=:
java.vm.name=Java HotSpot(TM) 64-Bit Server VM
file.encoding.pkg=sun.io
sun.java.launcher=SUN_STANDARD
user.country=US
:


Terminal — bash — bash — 101×35
mrj.version=1060.1.6.0_17-248
sun.cpu.isalist=
Environment Variables
DISPLAY=/tmp/launch-Z3AIY3/:0
GRAILS_HOME=/Applications/Dev/grails
SOAPUI_HOME=/Applications/Dev/soapui-2.5
SSH_AUTH_SOCK=/tmp/launch-YN4iEc/Listeners
NEXUS_HOME=/Applications/Dev/nexus/nexus-webapp
MYCOURSES=/Users/mccm06/Documents/Teach/Courses
CXF_HOME=/Applications/Dev/apache-cxf-2.2
PATH=/opt/local/bin:/opt/local/sbin:/System/Library/Frameworks/JavaVM.framework/Versions/1.6/Commands
:/Applications/Dev/btrace/bin:/opt/local/bin:/opt/local/sbin:/usr/bin:/bin:/usr/sbin:/sbin:/usr/local
/bin:/usr/X11/bin:./:/Users/mccm06/scripts:/Applications/Dev/apache-ant/bin:/Applications/Dev/apache-
maven/bin:/Applications/Dev/groovy/bin:/Applications/Dev/grails/bin:/Applications/Dev/nexus/nexus-web
app/bin/jsw/macosx-universal-32:/Applications/Dev/jakarta-jmeter/bin:/Applications/Dev/jruby/bin:/App
lications/Dev/soapui-2.5/bin:/Applications/Dev/appengine-java-sdk/bin:/Applications/Dev/hadoop-family
/hadoop-0.20.1/bin:/Applications/Dev/hadoop-family/pig-0.5.0/bin:/Applications/Dev/hadoop-family/avro
-1.2.0/bin:/Applications/Dev/hadoop-family/chukwa-0.3.0/bin:/Applications/Dev/hadoop-family/hbase-0.2
0.2/bin:/Applications/Dev/hadoop-family/hive-0.4.1-bin/bin:/Applications/Dev/hadoop-family/zookeeper-
3.2.2/bin:/Applications/Dev/apache-tomcat/bin:/Applications/Dev/ec2-api-tools-1.3-46266/bin:/Applicat
ions/Dev/apache-tomcat-6.0.20-ibeans/mule-ibeans/bin:/Applications/Dev/sonar/bin/macosx-universal-64:
/Applications/Dev/Bamboo:/Applications/Dev/mvnsh/bin:/Applications/Dev/pmaven/bin:/Library/PostgreSQL
8/bin
LOGNAME=mccm06
SHLVL=1
JAVA_MAIN_CLASS_58079=org.codehaus.classworlds.Launcher
TERM_PROGRAM=Apple_Terminal
ANT_HOME=/Applications/Dev/apache-ant
MYPROCESS=/Users/mccm06/Documents/Temp/Process
CLOJURE_HOME=/Applications/Dev/clojure
:

filters

Using filters on Resources

- What are resources?
  - Resources are non-Java files to be bundled with the application
    - Properties files
    - Configuration files
    - Message bundles
    - Templates
    - ...
  - Resources are placed in `src/main/resources`
  - When packaged, they are placed on the application classpath

Using filters on Resources

- What are test resources?
  - Resources required for unit and integration tests
  - Placed in `src/test/resources`
  - Not deployed with the application
  - Can be used to override application resources during testing

Using filters on Resources

- Filtering resources
  - You can embed properties in your resources
  - Property values come from the usual places
    - pom.xml, settings.xml, environment variables,...
  - Or from a filter properties file
  - They will be resolved during the *process-resources* phase

Property variable

```
log4j.rootLogger=${log4j.level}, stdout

# NULL appender
log4j.appender.null=org.apache.log4j.varia.NullAppender
...
```

Set the property value

```
<properties>
  <log4j.level>DEBUG</log4j.level>
</properties>
```

Resolved property variable

```
log4j.rootLogger=DEBUG, stdout

# NULL appender
log4j.appender.null=org.apache.log4j.varia.NullAppender
...
```

Using filters on Resources

- Enabling filtering
  - Filtering disabled by default
  - You need to activate it in your POM file

```
<project>
    ...
    <build>
        <resources>
            <resource>
                <directory>src/main/resources</directory>
                <filtering>true</filtering>
            </resource>
        </resources>
        <testResources>
            <testResource>
                <directory>src/test/resources</directory>
                <filtering>true</filtering>
            </testResource>
        </testResources>
    ...
```

Enable filtering on the main resource directory

Enable filtering on the test resource directory

An alternate approach

- Enabling filtering
  - Create a new folder specifically for filtering

```
<project>
    ...
    <build>
        <resources>
            <resource>
                <directory>src/main/resources</directory>
                <filtering>false</filtering>
            </resource>
            <resource>
                <directory>src/main/filtered-resources</directory>
                <filtering>true</filtering>
            </resource>
        </resources>
    ...
```

Leave Filtering disabled on the main resource

Enable filtering on the filtered - resource directory

labs

- Lab 10 - Working with properties and filters

Including & Excluding Resources

Including/excluding Resources

- What files do you want to include?
  - Include and exclude certain files in the resources

```
<resources>
   <resource>
      <directory>src/main/resources</directory>
      <includes>
        <include>**/*.xml</include>
      </includes>
   </resource>
</resources>
```

Only XML files will be deployed

Including/excluding Resources

- Selective filtering
  - Attention: here, only the included files will be deployed

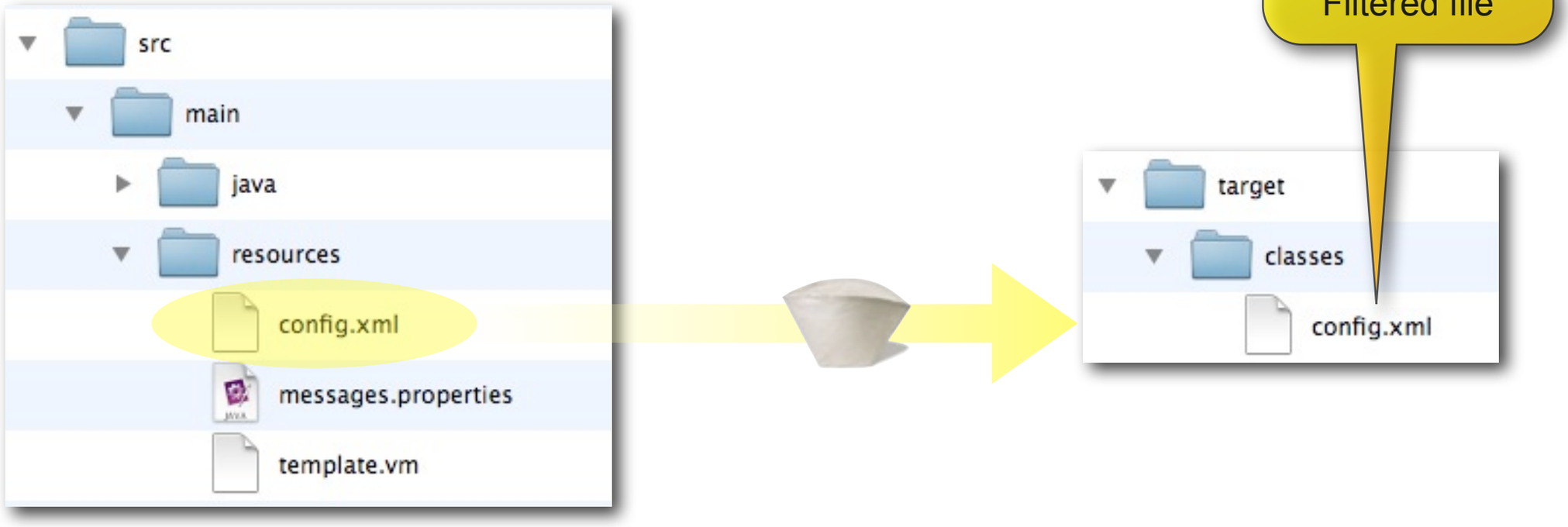
```
<project>
    ...
    <build>
        <resources>
            <resource>
                <directory>src/main/resources</directory>
                <includes>
                  <include>**/*.xml</include>
                </includes>
                <filtering>true</filtering>
            </resource>
      </resources>
    ...
```

Only XML files will be deployed

Including/excluding Resources

- Selective filtering
  - Attention: here, only the included files will be deployed

```
<resources>
   <resource>
      <directory>src/main/resources</directory>
      <includes>
        <include>**/*.xml</include>
      </includes>
      <filtering>true</filtering>
   </resource>
</resources>
```



Including/excluding Resources

- What files do you want to filter?
  - Selectively filtering certain files

```
<project>
    ...
    <build>
        <resources>
            <resource>
                <directory>src/main/resources</directory>
                <includes>
                  <include>**/*.xml</include>
                </includes>
                <filtering>true</filtering>
            </resource>
            <resource>
                <directory>src/main/resources</directory>
                <excludes>
                  <exclude>**/*.xml</exclude>
                </excludes>
                <filtering>false</filtering>
            </resource>
      </resources>
    ...
```

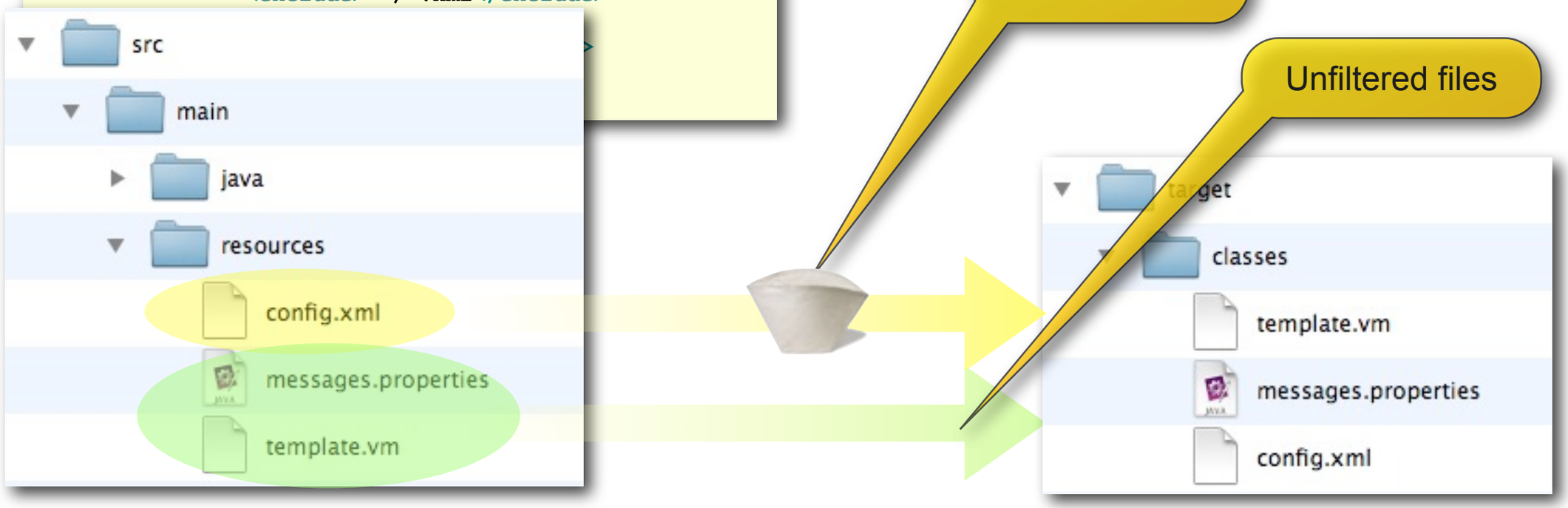
Only XML files will be filtered

Turn filtering off for all the non-XML files

Including/excluding Resources

- What files do you want to filter?
  - Selectively filtering certain files

```
<resources>
   <resource>
      <directory>src/main/resources</directory>
      <includes>
        <include>**/*.xml</include>
      </includes>
      <filtering>true</filtering>
   </resource>
   <resource>
      <directory>src/main/resources</directory>
      <excludes>
        <exclude>**/*.xml</exclude>
```



Profiles

Working with build profiles

- What are build profiles?
  - Customize the build process for different environments or circumstances
    - Override default behavior defined in your POM
    - Define specific property values
    - Define specific behavior (by configuring plugins)
- Where do you put them?
  - In your POM...
  - ...or in a `settings.xml` file

Working with build profiles

- What can you override
  - Almost everything!
    - Build configuration
      - FinalName
      - Resources and Test Resources
      - Plugins
    - Reporting
    - Modules
    - Dependencies and DependencyManagement sections
    - Repositories and Plugin Repositories
    - Properties

Working with build profiles

- Some simple profiles

```
<profiles>
    <!-- Development environment -->
    <profile>
        <id>development</id>
        <properties>
            <!-- The development platform -->
            <log4j.level>DEBUG</log4j.level>
        </properties>
    </profile>
</profiles>
```

Every profile needs a unique identifier

This property will only be defined for this profile

```
<profile>
    <id>production</id>
    <properties>
        <log4j.level>WARNING</log4j.level>
    </properties>
    <build>
      <pluginManagement>
        <plugins>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-compiler-plugin</artifactId>
                <configuration>
                    <debug>false</debug>
                    <optimize>true</optimize>
                </configuration>
            </plugin>
        </plugins>
      <pluginManagement>
    </build>
</profile>
```

This profile uses a different property value

Customize the compiler plugin

Working with build profiles

- Activating a profile
  - Profiles need to be activated to take effect
  - You can activate a profile in several ways:
    - By defining a default profile
    - From the command line using the -P option and the profile id
    - By specifying conditions (environment variables, JDK versions, OS...) in which this profile should be activated
    - From the settings
  - Several profiles can be activated at once.

Working with build profiles

- Setting up a default profile
  - A default profile will be activated if no other profiles (in the same pom) are activated
  - Use a default profile to define sensible default values for any properties used elsewhere

```
<profile>
    <id>development</id>
    <activation>
        <activeByDefault>true</activeByDefault>
    </activation>
    <properties>
        <!-- The development platform -->
        <log4j.debug>DEBUG</log4j.debug>
    </properties>
</profile>
```

Use the ‘development’ profile if no others are activated

Working with build profiles

- Defining default profiles in the `settings.xml` file
  - You can also define active profiles using the `<activeProfiles>` entry:

```
<settings>
    <activeProfiles>
        <activeProfile>development</activeProfile>
        <activeProfile>windows</activeProfile>
    </activeProfiles>
</settings>
```

Use the ‘development’ and ‘windows’ profiles

Working with build profiles

- Activating a profile from the command line
  - Just use the -P option

```
$ mvn deploy -P production
```

Use the ‘production’ profile

```
$ mvn deploy -P production,unix
```

You can activate several profiles at once

- Deactivating a default profile
  - Use ‘!’

```
$ mvn deploy -P !development
```

Deactivate the ‘development’ profile

Working with build profiles

- Activating a profile using properties or environment variables
  - Activate a profile if a property or environment variable is set to a certain value
  - Properties can be provided on the command line using -D
  - Environment variables can be accessed using the "env." prefix

```
<profile>
    <id>development</id>
    <activation>
        <property>
            <name>env.PLATFORM</name>
            <value>dev</value>
        </property>
    </activation>
    ...
</profile>
```

Activated if an environment variable called PLATFORM is set to "dev"

```
$ export PLATFORM=dev
$ mvn deploy
```

```
<profile>
    <id>development</id>
    <activation>
        <property>
            <name>platform</name>
            <value>dev</value>
        </property>
    </activation>
    ...
</profile>
```

Activated if a property called 'platform' is set to "dev"

```
$ mvn deploy -Dplatform=dev
```

Working with build profiles

- Activating a profile using environment conditions
  - Define profiles that will be activated for certain operating systems or Java versions

```
<profile>
    <id>windows-test</id>
    <activation>
        <os>
            <name>Windows XP</name>
            <family>Windows</family>
            <arch>x86</arch>
            <version>5.1.2600</version>
        </os>
    </activation>
    ...
</profile>
```

Only activate on Windows environments

Working with build profiles

- Activating a profile using JDK

```
<profile>
     <id>jdk-14-test</id>
     <activation>
          <jdk>1.4</jdk>
     </activation>
     ...
 </profile>
```

```
<profile>
     <id>jdk-14-test</id>
     <activation>
          <jdk>[1.3,1.6)</jdk>
     </activation>
     ...
 </profile>
```

This range includes 1.3, 1.4, 1.5 but not 1.6

Brackets in version ranges are end inclusive

Parenthesis in version ranges are end exclusive

Working with build profiles

- Activating a profile using a file's existence

```
<profile>
     <id>jdk-14-test</id>
     <activation>
       <file>
         <missing>target/generated-sources/something</missing>
      </file>
     </activation>
     ...
</profile>
```

Profile Inheritance

- Profiles themselves are not inherited
  - The results of a profile are inherited -- properties set, dependencies added, etc
- The only net impact of this is that profiles defined in a parent may not be activated by a profile set in the child.

labs

- Lab 11 - Working with build profiles

Repositories

Maven Repositories

- Maven downloads artifacts from a remote repository
  - Keeps the size of the Maven core small and modular
- The default remote repository is known as "Central"
  - http://repo1.maven.org/maven2/
  - Defined by the superpom
- Maven Repositories are defined by Structure
  - A collection of artifacts organized to be easily understood by Maven
  - Directory hierarchy defined by Maven coordinates
  - <groupId>/<artifactId>/<version>/<artifactId>-<version>.<packaging>

Maven Repositories

- Artifacts are downloaded from remote repos to the local repo
  - The local repo serves as a cache of artifacts
- Local repo is located in your home dir
  - **Linux/Unix/Mac** - ~/.m2/repository/
  - **Windows XP** - C:\Documents and Settings\<USERNAME>\.m2\repository
  - **Windows Vista** - C:\Users\<USERNAME>\.m2\repository
- Artifacts built locally can be installed into the local repo
  - mvn install
- Artifacts can also be copied to a remote repository
  - mvn deploy

Maven Repositories

- Some examples:
  - JUnit - junit:junit:4.4
    - http://repo1.maven.org/maven2/junit/junit/4.4/junit-4.4.jar
  - Castor - org.codehaus.castor:castor:1.2
    - http://repo1.maven.org/maven2/org/codehaus/castor/castor/1.2/castor-1.2.jar
  - Maven - org.apache.maven:maven-core:2.2.1
    - http://repo1.maven.org/maven2/org/apache/maven/maven-core/2.2.1/maven-core-2.2.1.jar

Maven Repositories

- Installation into the local repo allows other projects to access the artifacts
- Example output during a Maven run:

```
$ mvn install
...
[INFO] [install:install]
[INFO] Installing /Users/someuser/Desktop/eclipse-3.4/
workspace/simple/target/simple-0.0.1-SNAPSHOT.jar to /Users/
someuser/.m2/repository/com/sonatype/maven/simple/0.0.1-
SNAPSHOT/simple-0.0.1-SNAPSHOT.jar
...
```

Maven Repositories

- All non-SNAPSHOT artifacts are cached (found or not found)
- Force an update from remote repos via the -U flag
  - For example, ran a build while off the 'net on an airplane
  - Useful for when a "failure to find an artifact" is cached
  - Once back on the internet, run your goal with -U to retrieve the plugin or dependency

```
$ mvn package -U
...
```

```
<pluginRepositories>
  <pluginRepository>
      <id>apache-plugin-snapshots</id>
      <name>Apache Maven Plugins Snapshot Repository</name>
      <url>http://people.apache.org/maven-snapshot-repository</url>
      <snapshots>
          <enabled>true</enabled>
          <updatePolicy>always</updatePolicy>
          <checksumPolicy>fail</checksumPolicy>
      </snapshots>
      <releases>
          <enabled>false</enabled>
      </releases>
  </pluginRepository>
</pluginRepositories>
```

or...

```
<repositories>
  <repository>
    ...
  </repository>
</repositories>
```

updatePolicy can be "always", "daily" (default), "interval:XXX" (in minutes) or "never".

checksumPolicy for failure of artifact checksum verification can be "fail" or "warn".

Maven Intermediate Concepts

Consistent Development Environments

Maven

Ant Tasks

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versionMapper

Project Documentation
Project Information
About
Continuous Integration
Dependencies
Issue Tracking
Mailing Lists
Plugin Management
Project License
Project Plugins
Project Summary
Project Team
Source Repository

Maven Ant Tasks

The Mavent Ant Tasks allow several of Maven's artifact handling features to be used from within an Ant build. These include:

- *Dependency management* - including transitive dependencies, scope recognition and SNAPSHOT handling
- *Artifact deployment* - deployment to a Maven repository (file integrated, other with extensions)
- *POM processing* - for reading and writing a Maven 2 `pom.xml` file

The Ant tasks can be downloaded from the download page.

System Requirements

JDK	JDK version 1.5 or above is required (This is due to dependencies on internal Maven libraries.)
Ant	Ant version 1.6.x or 1.7.x is required

Usage

General instructions for installing and using the Maven Ant Tasks can be found on the installation page and the usage page respectively. Some more specific use cases are described in the examples given below. Last but not least, users occasionally contribute additional examples, tips or errata to the project's wiki page.

Examples

Several common usage examples are provided for the following tasks:

- Dependencies task
- Install and Deploy tasks
- Pom task
- WritePom task
- Mvn task

What are Maven Ant Tasks?

- Ant plugin (tasks) that interoperate with Maven repositories
- Dependency management
  - Transitive dependencies, scope recognition and SNAPSHOT handling
- Artifact deployment
  - Deployment to a Maven repository (file integrated, other with extensions)
- POM processing
  - Reading and writing a Maven 2 pom.xml file

Maven Ant Task References

- Project Homepage
  - http://maven.apache.org/ant-tasks/index.html
- Managing dependencies
  - http://maven.apache.org/ant-tasks/examples/dependencies.html
  - Adds dependencies to pathId
- Install an Ant artifact to a Maven Repository
  - http://maven.apache.org/ant-tasks/examples/install-deploy.html
- POM Management
  - http://maven.apache.org/ant-tasks/examples/pom.html

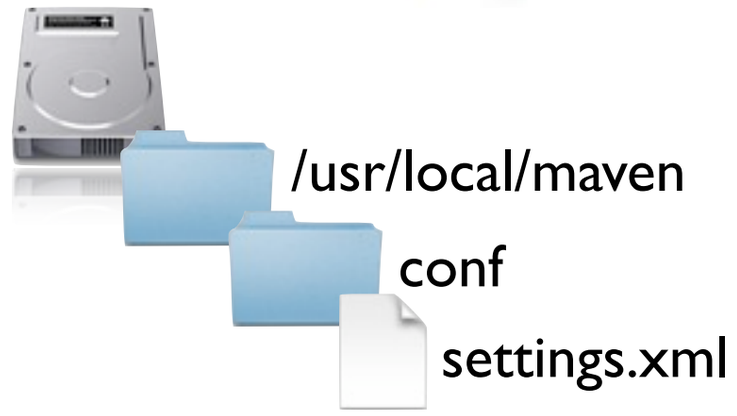
Consistency Approaches

Consistent Development Environments

- Make it easy to get Maven working.
- Make it easy to do the right thing with the build.
- Set a default goal.
- Create safety nets for "late night" mistakes.
  - JDK
  - Plugins
  - Maven version

Consistent Maven Version

Consistent environments



- Create a "standard" Maven install
  - Use the global settings.xml file to define enterprise repositories and mirrors or a Nexus instance.
  - Store a copy of the standard install in your SCM
  - Provide instructions on the project/company wiki

Consistent environments

- Require team-wide consistent version of Maven
- Significant improvements in behavior
  - Less plugin, text encoding consistency in **<= 2.0.8**
  - Core plugin definitions in **>= 2.0.9**
  - Multithreaded downloads in **>= 2.1.0**
  - Command and default plugin execution IDs **>= 2.2.0**
    - http://maven.apache.org/guides/mini/guide-default-execution-ids.html
  - Requires JDK 1.5 **>= 2.2.0**
  - Pluggable providers per wagon protocol **>= 2.2.1**
- Full Release Notes

Minimum Maven Version

pom.xml

```
1  <?xml version="1.0"?>
2  <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">
3    <modelVersion>4.0.0</modelVersion>
4    <groupId>com.ambientideas</groupId>
5    <artifactId>sample-svn-scm</artifactId>
6    <packaging>jar</packaging>
7    <version>1.9-SNAPSHOT</version>
8    <name>Sample Project - Subversion SCM</name>
9    <url>http://github.com/matthewmccullough/maven-training/tree/master</url>
10
11   <prerequisites>
12     <maven>2.0.9</maven>
13   </prerequisites>
14
15   <scm>
16
   <connection>scm:svn:http://ambientideas.unfuddle.com/svn/ambientideas_sample11
   -svnscm</connection>
17
   <url>http://ambientideas.unfuddle.com/svn/ambientideas_sample11-svnscm</url>
18   </scm>
```

Line: 1 Column: 1 Maven POM Soft Tabs: 2

Rule Enforcement

Standard rules

Enforcer Rules – Standard Rules

http://maven.apache.org/enforcer/enforcer-rules/index.html

Google

Enforcer Rules – Standard Rules

Apache Maven Project

http:// maven.apache.org

maven

Apache > Maven > Enforcer > Enforcer Rules

Last Published: 2009-02-25 | Version: 1.0-beta-1

Overview

Introduction
Rule API
Maven Enforcer Plugin

Custom Rules

Writing a custom rule

Project Documentation

Project Information
Project Reports

Maven Projects

Ant Tasks
Doxia
JXR
Maven 1.x
Maven 2
Mercury
Plugins
SCM
Shared Components
Surefire

Standard Rules

The following standard rules ship along with the enforcer plugin:

- alwaysPass - Always passes... used to test plugin configuration.
- alwaysFail - Always fail... used to test plugin configuration.
- bannedDependencies - enforces that excluded dependencies aren't included.
- evaluateBeanshell - evaluates a beanshell script.
- requireReleaseDeps - enforces that no snapshots are included as dependencies.
- requireReleaseVersion - enforces that the artifact is not a snapshot.
- requireMavenVersion - enforces the Maven version.
- requireJavaVersion - enforces the JDK version.
- requireOS - enforces the OS / CPU Archictecture.
- requirePluginVersions - enforces that all plugins have a specified version.
- requireProperty - enforces the existence and values of properties.
- requireFilesDontExist - enforces that the list of files do not exist.
- requireFilesExist - enforces that the list of files do exist.
- requireFilesSize - enforces that the list of files exist and are within a certain size range.

You may also create and inject your own custom rules by following the maven-enforcer-rule-api instructions.

Rule enforcement

- Ensure that your project uses a specific Maven version
- Similar to the core Maven version enforcement, but profile-selectable

```
<plugin>
  <groupId>org.apache.maven.plugins</groupId>
  <artifactId>maven-enforcer-plugin</artifactId>
  <version>1.0-beta-1</version>
  <executions>
    <execution>
      <id>enforce-versions</id>
      <goals>
        <goal>enforce</goal>
      </goals>
      <configuration>
        <rules>
          <requireMavenVersion>
            <version>2.0.10</version>
          </requireMavenVersion>
        </rules>
      </configuration>
    </execution>
  </executions>
</plugin>
```

Requires Maven 2.0.10 or higher

Consistent JDK

Consistent version of Java

- Ensure that all developers are using the same JDK
- Motivations
  - Bytecode produced is not identical between JDKs, even with the same target platform specified
  - XML parsers that ship with the JDK are different
  - Have you tried to use JAXB with Java 6?
  - Have you compiled something with Java 5 and distributed it to someone running 1.4?
  - Core Maven and its plugins are affected by the current JDK

Rule enforcement

- Ensure that your project uses a specific Maven version and JDK

```
<plugin>
   <groupId>org.apache.maven.plugins</groupId>
   <artifactId>maven-enforcer-plugin</artifactId>
   <version>1.0-beta-1</version>
   <executions>
     <execution>
       <id>enforce-versions</id>
       <goals>
         <goal>enforce</goal>
       </goals>
       <configuration>
         <rules>
           <requireJavaVersion>
             <version>[1.5.0,1.6.0)</version>
           </requireJavaVersion>
         </rules>
       </configuration>
     </execution>
   </executions>
</plugin>
```

Java 1.5.0 or greater, but less than Java 1.6.0

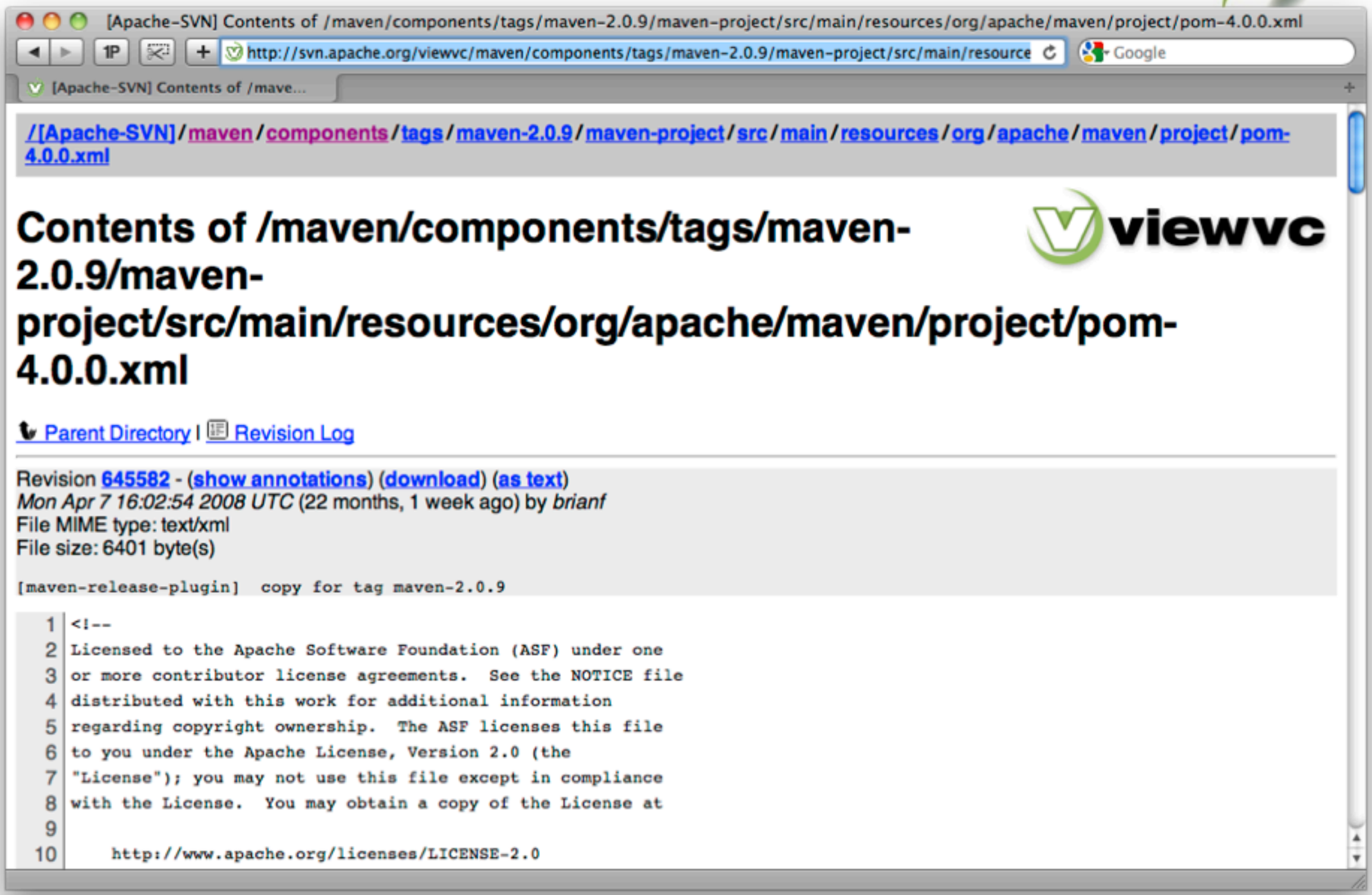
Consistent Plugin Versions

Specify plugin versions

- In Maven 2.0.x, you can use a plugin with no version number
- In Maven 3.0 missing version specifications outputs a warning to the console
- Undeclared versions are never a good idea
  - Changes can break your build
  - Builds can become inconsistent among developers
  - Builds may not be repeatable over time
- Lock down all your plugin versions

Reminder: From Maven 2.0.9 onward, default plugins such as *compiler* and *resource* are set to specific versions in the super POM.

Super POM


[Apache-SVN] Contents of /maven/components/tags/maven-2.0.9/maven-project/src/main/resources/org/apache/maven/project/pom-4.0.0.xml
http://svn.apache.org/viewvc/maven/components/tags/maven-2.0.9/maven-project/src/main/resource
Google
[Apache-SVN] Contents of /mave...
/[Apache-SVN]/maven/components/tags/maven-2.0.9/maven-project/src/main/resources/org/apache/maven/project/pom-4.0.0.xml
Contents of /maven/components/tags/maven-2.0.9/maven-project/src/main/resources/org/apache/maven/project/pom-4.0.0.xml
viewvc
Parent Directory | Revision Log
Revision 645582 - (show annotations) (download) (as text)
Mon Apr 7 16:02:54 2008 UTC (22 months, 1 week ago) by brianf
File MIME type: text/xml
File size: 6401 byte(s)
[maven-release-plugin] copy for tag maven-2.0.9
1 <!--
2 Licensed to the Apache Software Foundation (ASF) under one
3 or more contributor license agreements. See the NOTICE file
4 distributed with this work for additional information
5 regarding copyright ownership. The ASF licenses this file
6 to you under the Apache License, Version 2.0 (the
7 "License"); you may not use this file except in compliance
8 with the License. You may obtain a copy of the License at
9
10 http://www.apache.org/licenses/LICENSE-2.0

Super POM - Plugin Versions

[Apache-SVN] Contents of /maven/components/tags/maven-2.0.9/maven-project/src/main/resources/org/apache/maven/project/pom-4.0.0.xml

http://svn.apache.org/viewvc/maven/components/tags/maven-2.0.9/maven-project/src/main/resource

Google

[Apache-SVN] Contents of /mave...

```
69    </testResources>
70    <pluginManagement>
71      <plugins>
72        <plugin>
73          <artifactId>maven-antrun-plugin</artifactId>
74          <version>1.1</version>
75        </plugin>
76        <plugin>
77          <artifactId>maven-assembly-plugin</artifactId>
78          <version>2.2-beta-2</version>
79        </plugin>
80        <plugin>
81          <artifactId>maven-clean-plugin</artifactId>
82          <version>2.2</version>
83        </plugin>
84        <plugin>
85          <artifactId>maven-compiler-plugin</artifactId>
86          <version>2.0.2</version>
87        </plugin>
88        <plugin>
89          <artifactId>maven-dependency-plugin</artifactId>
90          <version>2.0</version>
91        </plugin>
92        <plugin>
93          <artifactId>maven-deploy-plugin</artifactId>
94          <version>2.3</version>
95        </plugin>
96        <plugin>
97          <artifactId>maven-ear-plugin</artifactId>
98          <version>2.3.1</version>
```

Specify plugin versions

- For predictable builds, avoid SNAPSHOT plugins
- Release plugin will check no SNAPSHOT dependencies are used
- What about plugins?
  - Enforcer plugin can verify no SNAPSHOT versions are used
  - http://maven.apache.org/enforcer/enforcer-rules/requirePluginVersions.html

Enforce plugin versions

- Ensure that plugin version numbers are declared
- Forbid SNAPSHOT, LATEST and RELEASE versions

```
<plugin>
   <groupId>org.apache.maven.plugins</groupId>
   <artifactId>maven-enforcer-plugin</artifactId>
   <version>1.0-beta-1</version>
   <executions>
     <execution>
       <id>enforce-versions</id>
       <goals>
         <goal>enforce</goal>
       </goals>
       <configuration>
         <rules>
           <requirePluginVersions/>
         </rules>
       </configuration>
     </execution>
   </executions>
</plugin>
```

All plugins must have stable version numbers

Enforce plugin versions

Questions

- What could you enforce?
- Are your builds platform dependent?
- Do you have a top level "corporate" pom?
  - Great place for team-wide rules
- Ever been frustrated by moving SNAPSHOTs?

Maven Intermediate Concepts

Part 6

Deeper Dependency Management

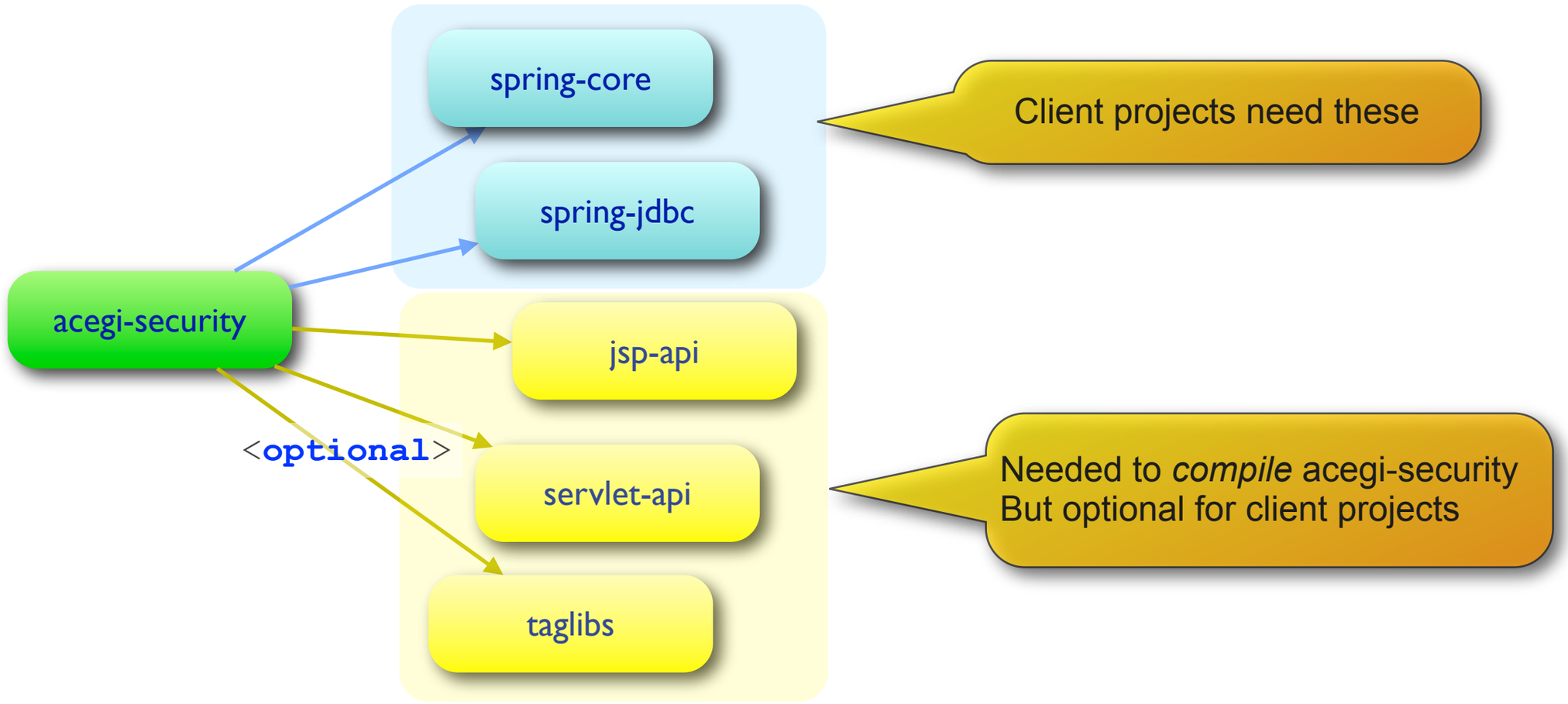
Optional Dependencies

Optional Dependencies

- Dependencies can be marked as optional
  - Provide choices to library users (e.g. supported databases, plugins,...)
  - Libraries that are only required for certain (optional) features
  - You need all of them to compile the project
  - But client projects only need to declare the ones they use
- Why use optional dependencies?
  - Avoid unnecessary API bloat
  - Clearly define what dependencies are required to use a project

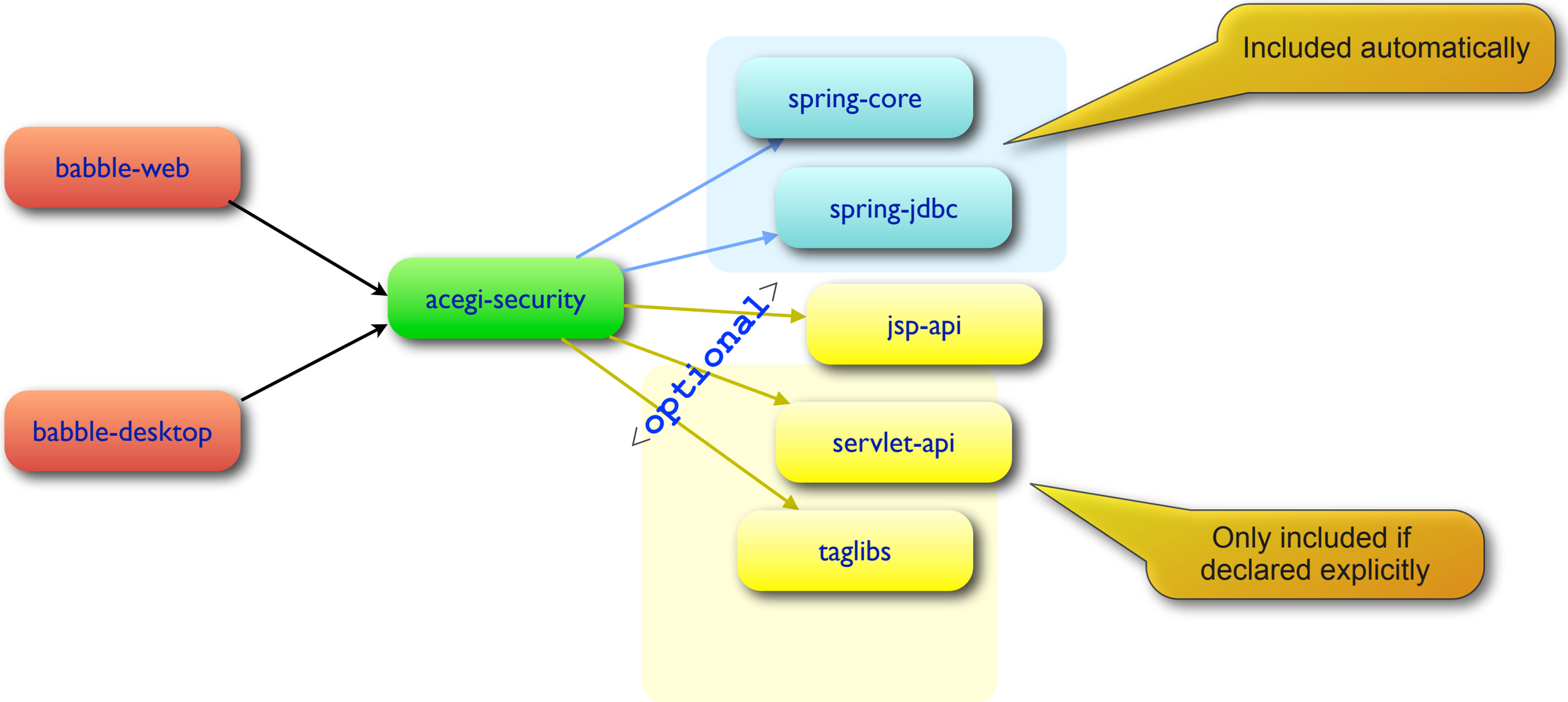
Optional Dependencies

- Dependencies can be marked as optional
  - Provide choices to library users (e.g. supported databases, plugins,...)
  - You need all of them to compile the project
  - Client projects only need to declare the ones they use



Optional Dependencies

- Dependencies can be marked as optional
  - By default, client projects only get the *required* libraries
  - Must declare any desired <optional> dependencies explicitly



Optional Dependencies

acegi-security

All are needed to compile this project

But these ones are optional for client projects

We use this library in our project

We only declare the optional libraries that this project uses

```
...
    <dependencies>
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-core</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-jdbc</artifactId>
        </dependency>
        ...
        <dependency>
            <groupId>javax.servlet</groupId>
            <artifactId>jsp-api</artifactId>
            <version>2.0</version>
            <optional>true</optional>
        </dependency>
        <dependency>
            <groupId>taglibs</groupId>
            <artifactId>standard</artifactId>
            <version>1.0.6</version>
            <optional>true</optional>
        </dependency>
        ...
    <dependencies>
    ...
</project>
```

```
<project>
  <modelVersion>4.0.0</modelVersion>
  <groupId>org.sonatype.mavenbook</groupId>
  <artifactId>babble-web</artifactId>
  <version>1.0.0</version>
  <dependencies>
    <dependency>
        <groupId>org.acegisecurity</groupId>
        <artifactId>acegi-security</artifactId>
        <version>1.0.7</version>
    </dependency>
    <dependency>
        <groupId>javax.servlet</groupId>
        <artifactId>jsp-api</artifactId>
        <version>2.0</version>
    </dependency>
     ...
  </dependencies>
</project>
```

Version Ranges

Version Ranges

- Infrequently used, but powerful
- Designed for widely used APIs
  - log4j to indicate compatible library ranges
  - JUnit

Version Ranges

- Number parsed if using standard pattern
  - A.B.C-buildnum or A.B.C-qualifier
  - 1.0.9 < 1.0.12
- Compared as strings if non-standard pattern
  - 1.0.0.9 > 1.0.0.12
- Range specification pages
  - http://docs.codehaus.org/display/MAVEN/Versioning
  - http://jira.codehaus.org/browse/MNG-3010
  - http://www.sonatype.com/books/mvnref-book/reference/pom-relationships-sect-version-ranges.html

Version Ranges

- You can specify a version range instead of an specific version
  - Exclusive quantifiers - (,)
  - Inclusive quantifiers - [,]
  - Examples
    - Include JUnit 3.8 or greater, but less than 4.0

```
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>[3.8,4.0)</version>
  <scope>test</scope>
</dependency>
```

    - No higher than JUnit 3.8.1

```
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>[,3.8.1]</version>
  <scope>test</scope>
</dependency>
```

Version Ranges

- Using snapshots in version ranges
  - Ranges don't include SNAPSHOT versions unless explicitly defined
  - Examples
    - Use a SNAPSHOT version until the 1.0.1 release is available

```
<dependency>
  <groupId>com.acme.killerapp</groupId>
  <artifactId>core</artifactId>
  <version>[1.0.1-SNAPSHOT,1.0.1]</version>
  <scope>test</scope>
</dependency>
```

Version Ranges

- JUnit 4.0 or greater

```
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>[4.0,)</version>
  <scope>test</scope>
</dependency>
```

- Only JUnit 3.8.1

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

The build will fail if this version is not available

- Allow any, but prefer JUnit 3.8.1

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

If a conflict is detected, a different version might be used

Maven Intermediate Concepts

Part 7

Site Generation

Objectives

- Learn about Maven site and documentation mechanism
- Learn how to generate a site from an archetype
- Learn Best Practices such as:
  - the default site directory layout
  - the site lifecycle
  - internationalize documentation
- Learn what is the purpose of - and how to configure - the site descriptor
- Learn how to write documents in different markup languages
  - how to extend the available markup languages beyond the default
- using and creating an alternate look-and-feel to the site

Maven Sites

Site Generation and Reporting

- Maven can generate documentation and reports
- Best demonstrated through a quick example

Demonstration

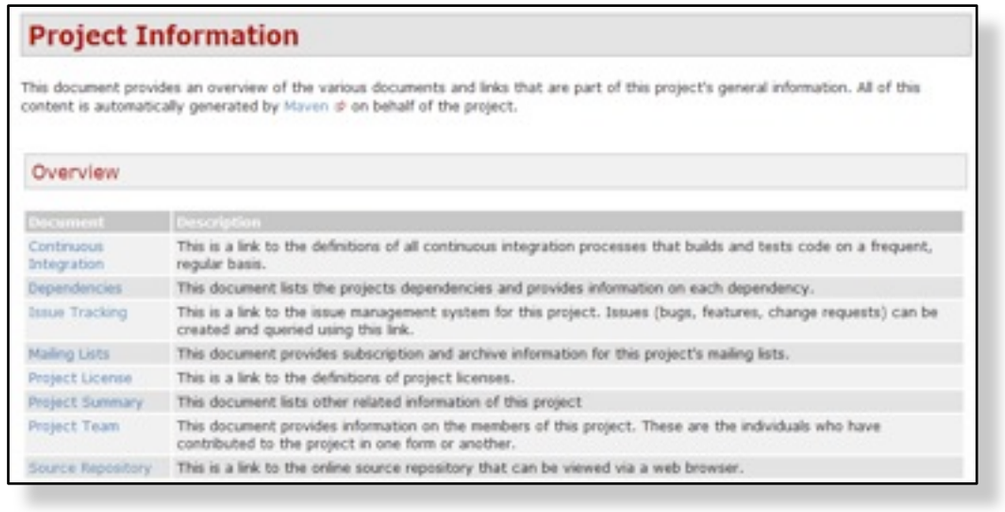
- Generate and view some reports
  - Right-click on the project
  - Go to Run As->Maven build...
  - Enter 'site' into the Goals field and click Run
  - Press F5 to refresh the project
  - Expand the target/site directory
  - Right-click the index.html file
  - Go to Open With->Web Browser
  - Inspect the site info

The Maven Site

- The Maven Site: a communication tool
  - General information
    - SCM, team details, issue management, CI...
  - Reports
    - Dependency graphs
    - Test results
    - Javadoc
    - Code and quality and code coverage metrics
    - ...

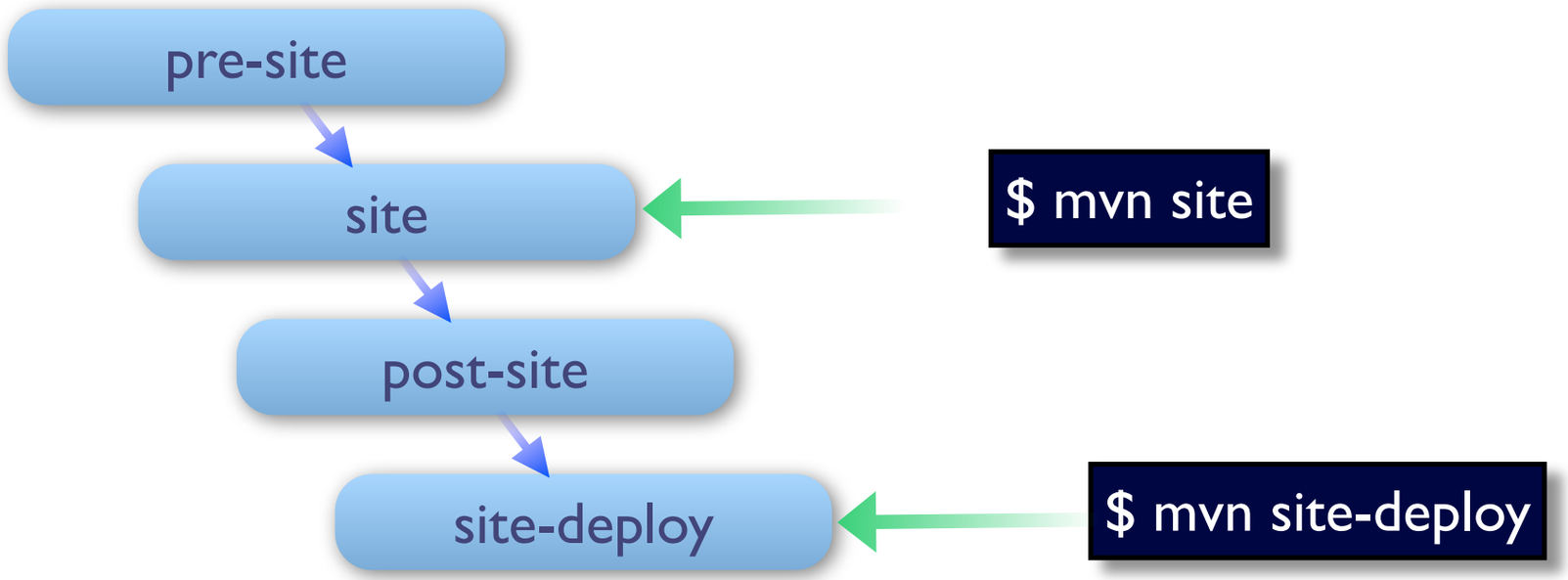
The Maven Site

- Generating the Maven site
  - Generate the site using the **mvn site** command
  - Basic configuration generates human-readable project information
    - Project description
    - Source code repository
    - Issue tracking
    - Continuous Integration
    - Dependencies
    - Team members



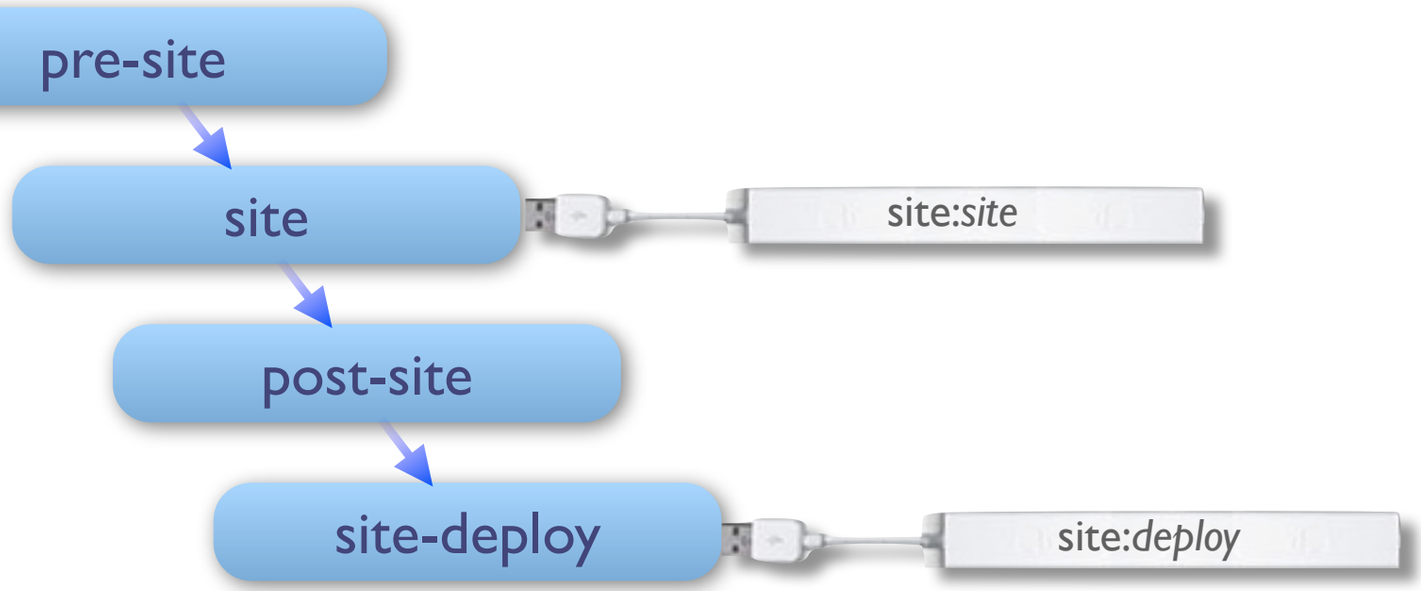
The Site lifecycle

- Site generation happens outside the normal development lifecycle
- The Maven site lifecycle:



The Site lifecycle

- The Maven site plugin
  - Renders documents
  - Generates reports



Default site layout

- You can add your own content to your Maven site
  - General project information
  - Architecture documents
  - Configuration notes
  - Other project documentation
- Your content can be in several formats
  - APT - *a simple, Wiki-like format*
  - XDoc - *older format used in Maven 1*
  - FML - *used for FAQ*
  - Pick whatever suits you!

Creating a site

Creating your site project

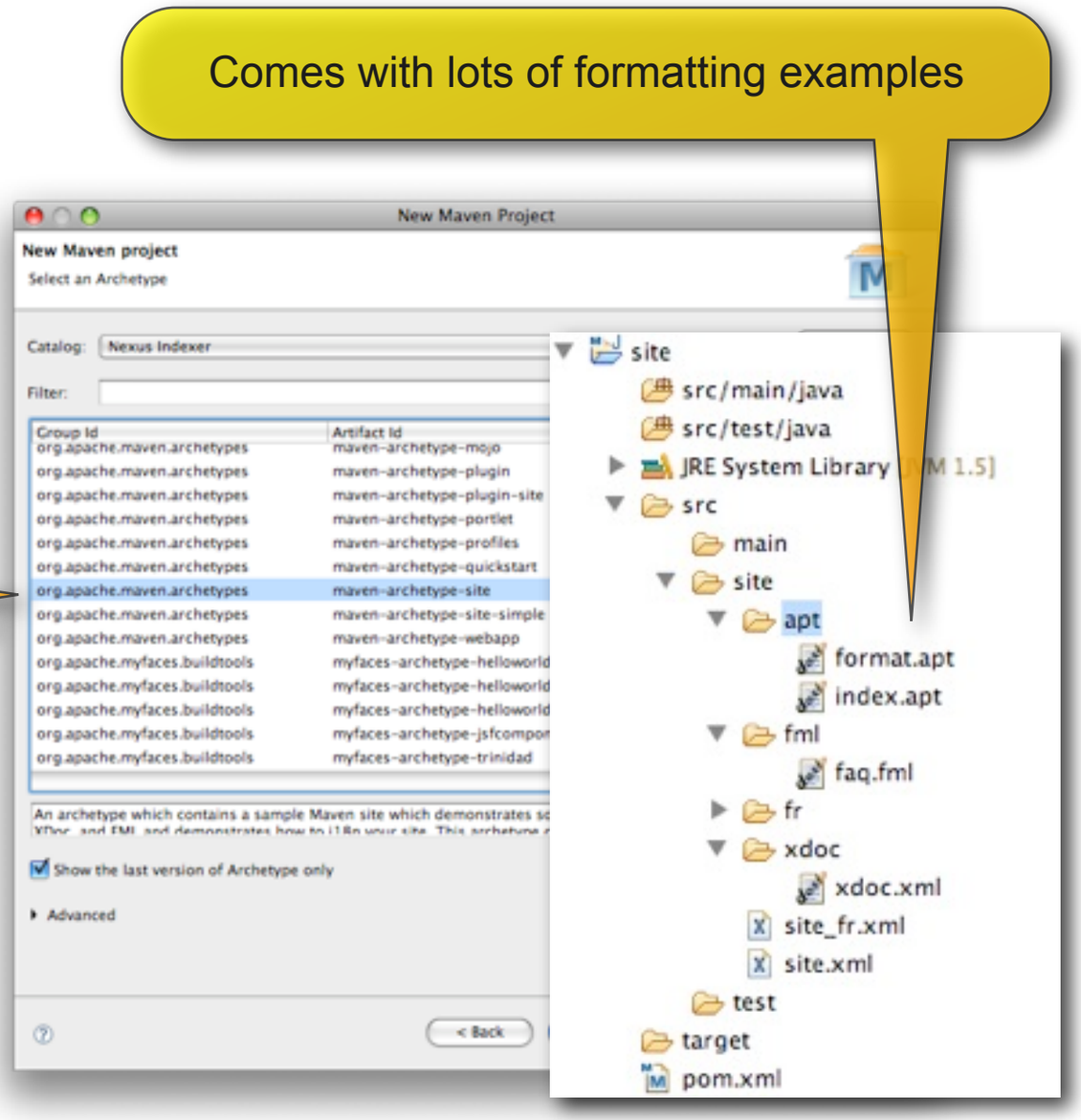
- You can define a site:
  - As part of an existing Maven project...
  - Or as a separate project...
  - The site archetype provides a project structure and sample files.

Use the maven-archetype-site archetype to get started

You can generate this archetype on top of an existing project(!)

(but not from within an IDE)

Comes with lots of formatting examples



Creating your site project

- You can also add a site to an existing project

```
$ mvn archetype:create -DarchetypeGroupId=org.apache.maven.archetypes -DarchetypeArtifactId=maven-archetype-site
-DgroupId=com.sonatype.training -DartifactId=babble
...
[INFO] ----------------------------------------------------------------------------
[INFO] Building Maven Default Project
[INFO]    task-segment: [archetype:create] (aggregator-style)
[INFO] ----------------------------------------------------------------------------
...
[INFO] ----------------------------------------------------------------------------
[INFO] Using following parameters for creating OldArchetype: maven-archetype-site:RELEASE
[INFO] ----------------------------------------------------------------------------
[INFO] Parameter: groupId, Value: com.sonatype.training
[INFO] Parameter: packageName, Value: com.sonatype.training
[INFO] Parameter: basedir, Value: /Users/someuser/Projects/sonatype/sonatype-training/lab-solutions
[INFO] Parameter: package, Value: com.sonatype.training
[INFO] Parameter: version, Value: 1.0-SNAPSHOT
[INFO] Parameter: artifactId, Value: babble
[INFO] ******************** End of debug info from resources from generated POM ***********************
[INFO] OldArchetype created in dir: /Users/someuser/Projects/sonatype/sonatype-training/lab-solutions/babble
[INFO] ----------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ----------------------------------------------------------------------------
[INFO] Total time: 11 seconds
[INFO] Finished at: Fri Mar 27 10:42:06 NZDT 2009
[INFO] Final Memory: 8M/15M
[INFO] ----------------------------------------------------------------------------
```

$ mvn archetype:create
-DarchetypeGroupId=org.apache.maven.archetypes
-DarchetypeArtifactId=maven-archetype-site
-DgroupId=com.sonatype.training -DartifactId=babble

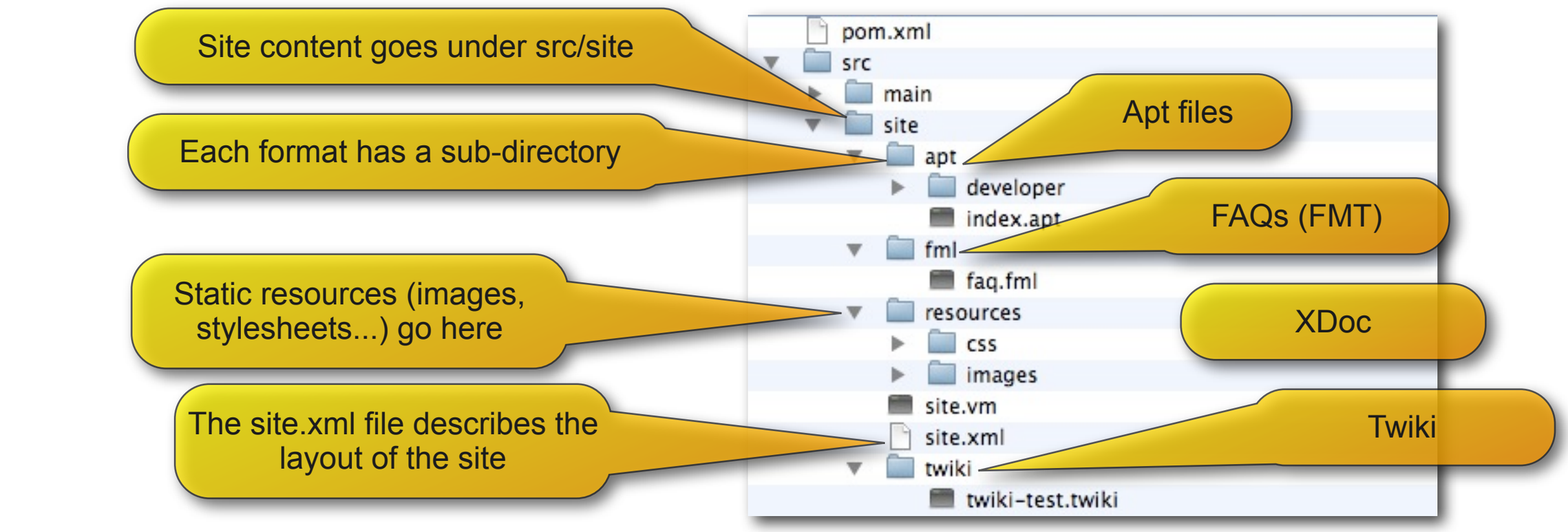
Adds a site template to an existing project

For multi-module projects, use the aggregator project

Run this command from a project's parent directory

Default site layout

- The site directory layout
  - A main layout definition file
  - And a folder for each format



Organizing your site

- Defining the site outline
  - The `site.xml` file defines the overall structure of the site

Left and right banners

Links at the top of the screen

Menus to content

Reports menu goes here

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<project name="Maven">
  <bannerLeft>
    <name>Maven</name>
    <src>http://maven.apache.org/images/apache-maven-project.png</src>
    <href>http://maven.apache.org/</href>
  </bannerLeft>
  <bannerRight>
    <src>http://maven.apache.org/images/maven-small.gif</src>
  </bannerRight>
  <body>
    <links>
      <item name="Apache" href="http://www.apache.org/"/>
      <item name="Maven 1.0" href="http://maven.apache.org/"/>
      <item name="Maven 2" href="http://maven.apache.org/maven2/"/>
    </links>
    <menu name="Maven 2.0">
      <item name="APT Format" href="format.html"/>
      <item name="FAQ" href="faq.html"/>
      <item name="Xdoc Example" href="xdoc.html"/>
    </menu>

    <menu ref="reports" />

  </body>
</project>
```

Organizing your site

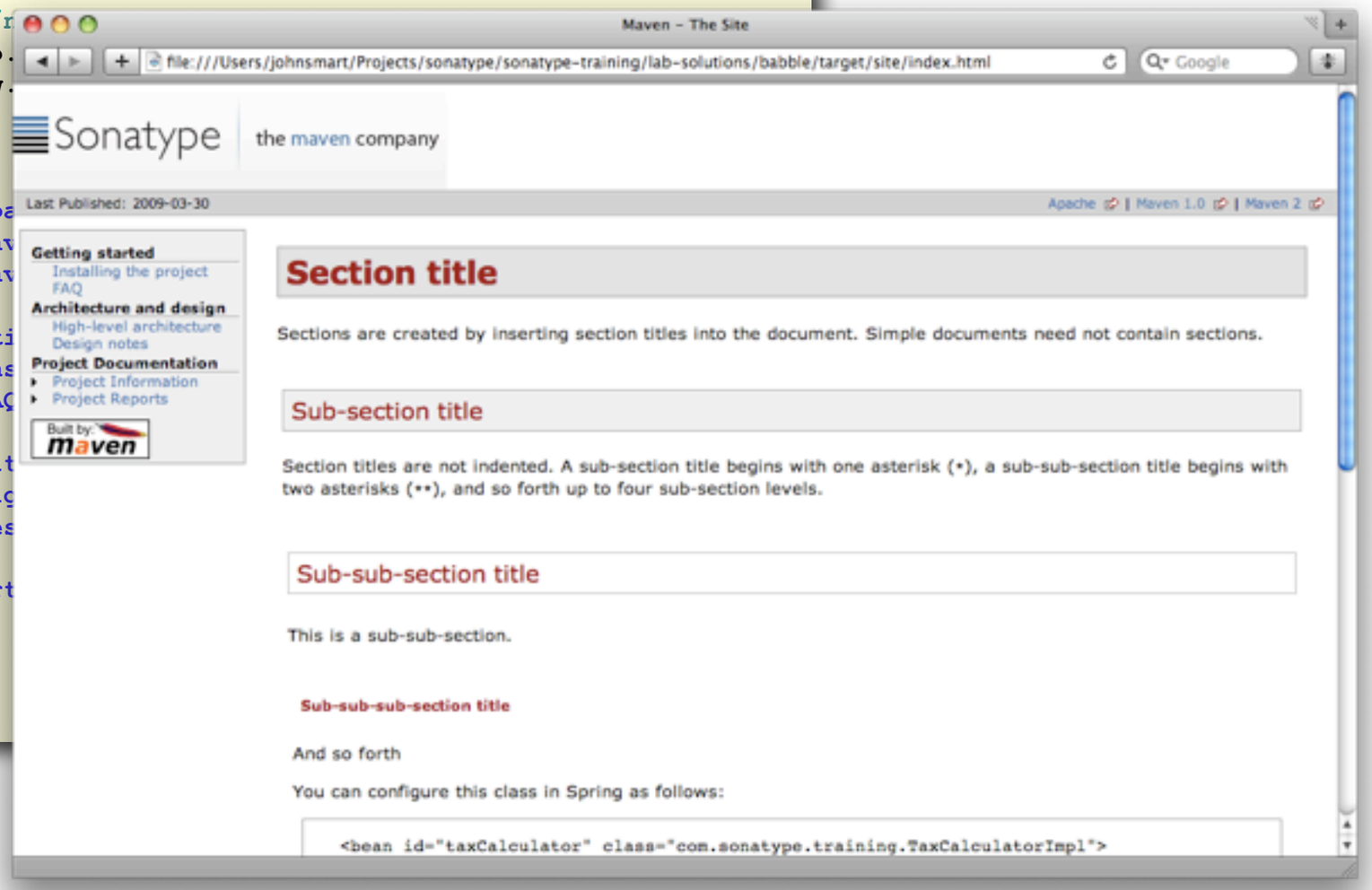
- Customizing the site outline
  - It is easy to personalize the site outline

Add your own logo

Customize the links

Customize the menus

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<project name="Maven">
  <bannerLeft>
    <name>Sonatype</
    <src>images/logo.
    <href>http://www.
  </bannerLeft>
  <body>
    <links>
      <item name="Apa
      <item name="Mav
      <item name="Mav
    </links>
    <menu name="Getti
      <item name="Ins
      <item name="FAQ
    </menu>
    <menu name="Archit
      <item name="Hig
      <item name="Des
    </menu>
    <menu ref="report

  </body>
</project>
```



Adding content to your site

- The Xdoc format
  - XML, very HTML-like format
  - An older format, used in Maven 1
  - Largely replaced by Apt in Maven 2

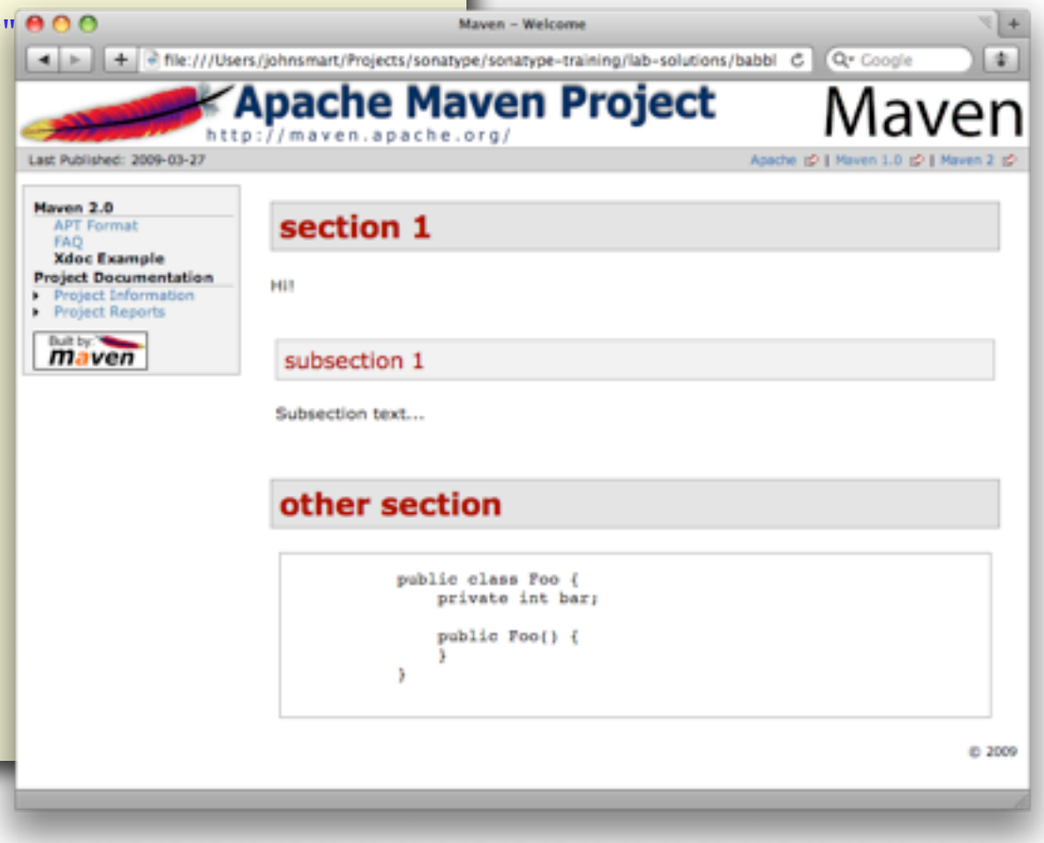
XML-based format

Structured in sections and subsections

Actual content can be any valid XHTML

Including source code

```
<?xml version="1.0"?>
<document>
  <properties>
    <title>Welcome</title>
    <author email="dev@maven.apache.org"
  </properties>
  <body>
    <section name="section 1">
      <p>Hi!</p>
      <subsection name="subsection 1">
        <p>Subsection text...</p>
      </subsection>
    </section>
    <section name="other section">
      <source>
          public class Foo {
              private int bar;

              public Foo() {
              }
          }
      </source>
    </section>
  </body>
</document>
```



Adding content to your site

- The APT format
  - Introduced in Maven 2
  - Light-weight wiki-style format
  - Relatively easy to learn and write
  - Powerful formatting features

Adding content to your site

- The APT format - structuring your document
  - APT documents are plain-text documents using a wiki-style syntax

```
The APT format
--------------

  In the following section, boxes containing text in typewriter-like font are
  examples of APT source.

* Document structure

  A short APT document is contained in a single text file. A longer document
  may be contained in a ordered list of text files. For instance, first text
  file contains section 1, second text file contains section 2, and so on.

  A file contains a sequence of paragraphs and ``displays'' (non paragraphs
  such as tables) separated by open lines.
  ...
```

A document title is a line with no indentation

Dashed underlines are optional

Sub-titles start with asterisks

Paragraph contents are indented

Paragraphs are separated by a blank line

The APT format

In the following section, boxes containing text in typewriter-like font are examples of APT source.

Document structure

A short APT document is contained in a single text file. A longer document may be contained in a ordered list of text files. For instance, first text file contains section 1, second text file contains section 2, and so on.

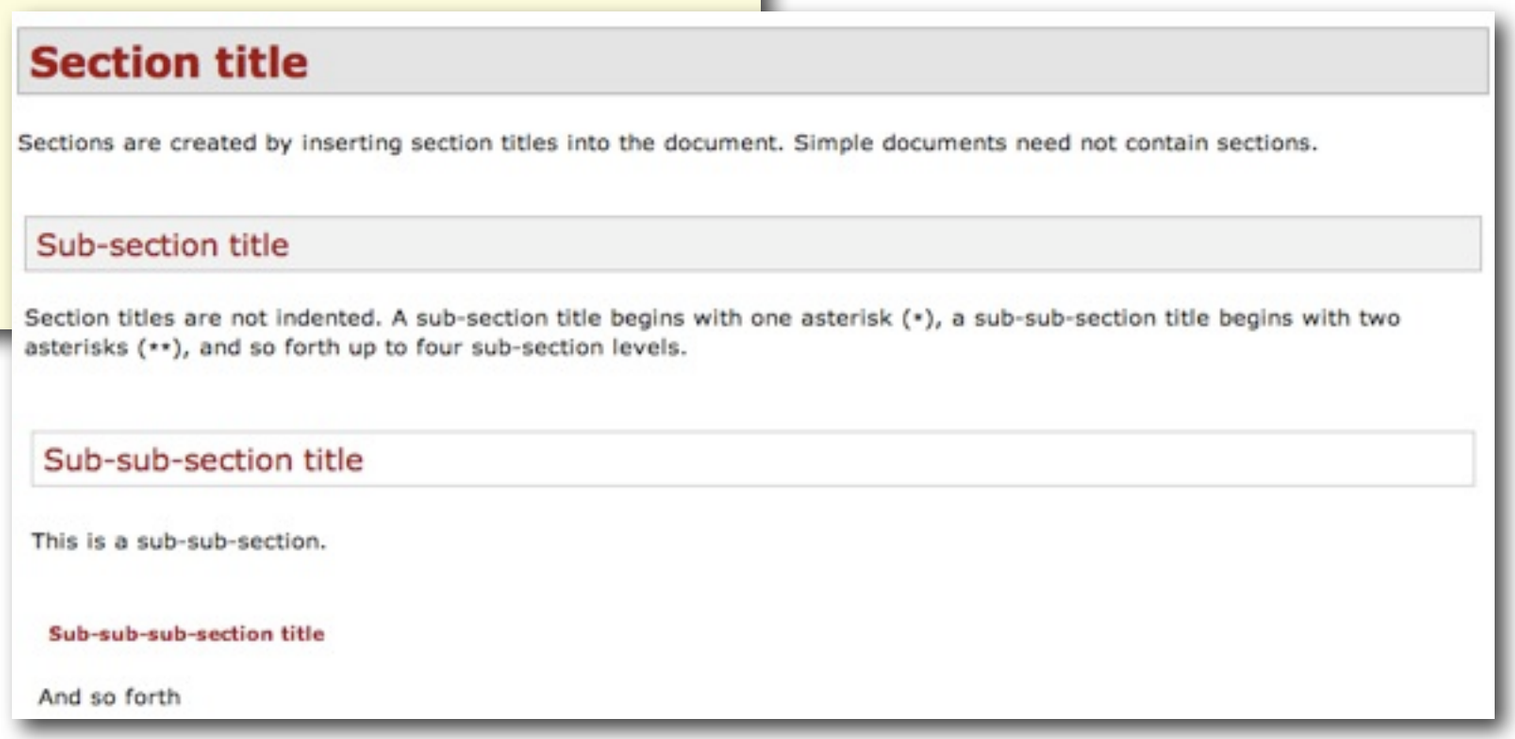
Adding content to your site

- The APT format - structuring your document
  - Asterisks for section titles

Section titles have no indentation

Sub-sections start with asterisks

```
Section title

  Sections are created by inserting section titles into the document. Simple
  documents need not contain sections.

* Sub-section title

  Section titles are not indented. A sub-section title begins with one
  asterisk (<<<*>>>), a sub-sub-section title begins with two asterisks
  (<<<**>>>), and so forth up to four sub-section levels.

** Sub-sub-section title

  This is a sub-sub-section.

*** Sub-sub-sub-section title

  And so forth
```



Adding content to your site

- The APT format - lists
  - Lists use indented asterisks

```
 * List item 1.

 * List item 2.

Paragraph contained in list item 2.

    * Sub-list item 1.

    * Sub-list item 2.

 * List item 3.
```

Bullet-point list entries

Text can be placed in a list entry

Sub-lists are indented further

- List item 1.
- List item 2.

  Paragraph contained in list item 2.

  - Sub-list item 1.
  - Sub-list item 2.
- List item 3.

Adding content to your site

- The APT format - code snippets
  - You can include code samples between lines of dashes

```
You can configure this class in Spring as follows:

----------------------

  <bean id="taxCalculator" class="com.sonatype.training.TaxCalculatorImpl">
     ...
  </bean>
----------------------
```

A code snippet

Anything here will be displayed “verbatim”

You can configure this class in Spring as follows:

```
<bean id="taxCalculator" class="com.sonatype.training.TaxCalculatorImpl">
   ...
</bean>
```

Adding content to your site

- The APT format - tables
  - A simple table layout format

```
*----------+----------+
|| Header 1 || Header 2 |
*----------+----------+
| Cell 1    | Cell 2    |
*----------+----------+
Caption
```

Headers start with '|'

Cells demarked with dashes and bars

Caption

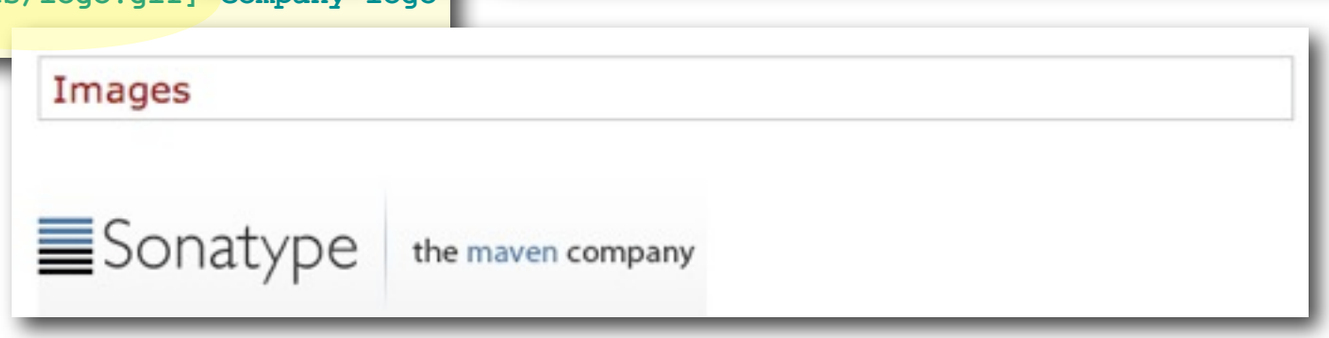
Header 1	Header 2
Cell 1	Cell 2

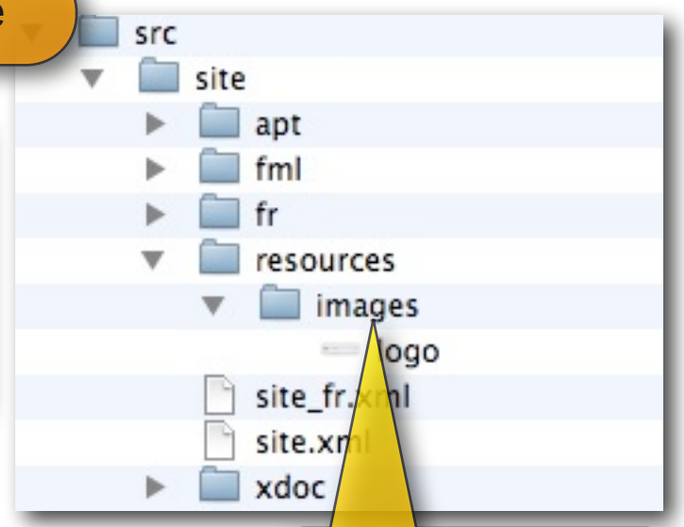
Adding content to your site

- The APT format - images
  - Place any images you need in the resources directory

```
** Images

[images/logo.gif] Company logo
```

Use [square brackets] to insert an image





Images go here

Adding content to your site

- Adding FAQ using the FML format
  - What is FML? An XML format for question-answer structured documents

```
<?xml version="1.0"?>
<faqs id="General FAQ">
  <part id="General">
    <faq id="where">
      <question>Where did Maven come from?</question>
      <answer>
        <p>
          Maven was created by a group of software developers who were tired
          of wasting their time fiddling around with builds and wanted to get
          down to brass tacks and actually develop software!
        </p>
      </answer>
    </faq>
    <faq id="why">
      <question>Why is maven so wi
      <answer>
        <p>
          Maven saves you so much
          you will have time to le
          day, and train for that
        </p>
      </answer>
    </faq>
  </part>
</faqs>
```

FAQs can be organized into “parts”

Each FAQ has a question and an answer

FAQ

1. Where did Maven come from?
2. Why is maven so wildly popular?

Where did Maven come from?

Maven was created by a group of software developers who were tired of wasting their time fiddling around with builds and wanted to get down to brass tacks and actually develop software!

[top]

Why is maven so wildly popular?

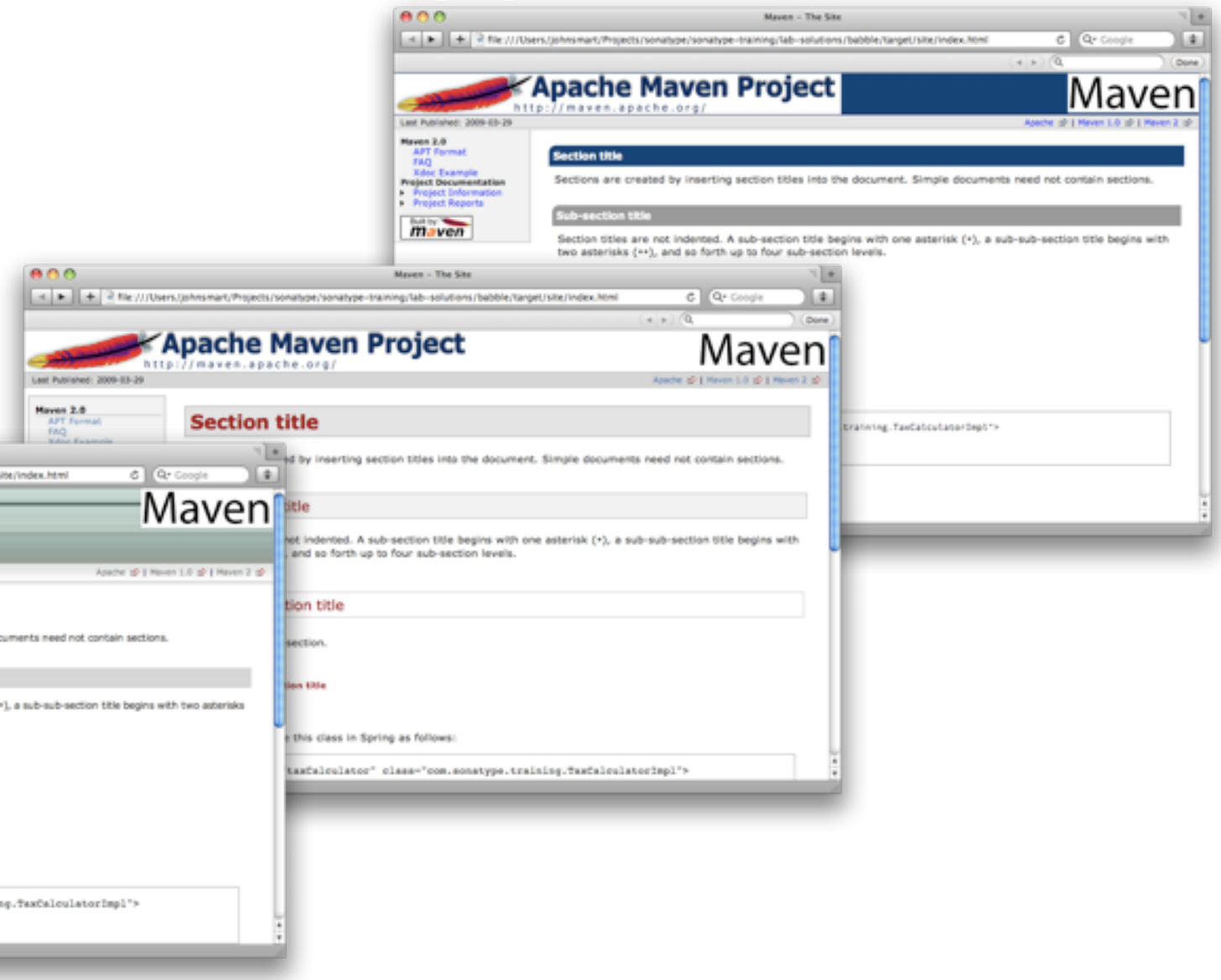
Maven saves you so much time in your software development efforts that you will have time to learn a second language, relax ten hours a day, and train for that marathon you've always wanted to run!

[top]

Site
look & feel

Changing the look and feel

- Using an alternate skin
  - You can change the look and feel by changing skins
  - Many skins available:
    - maven-classic-skin
    - maven-default-skin
    - maven-stylus-skin

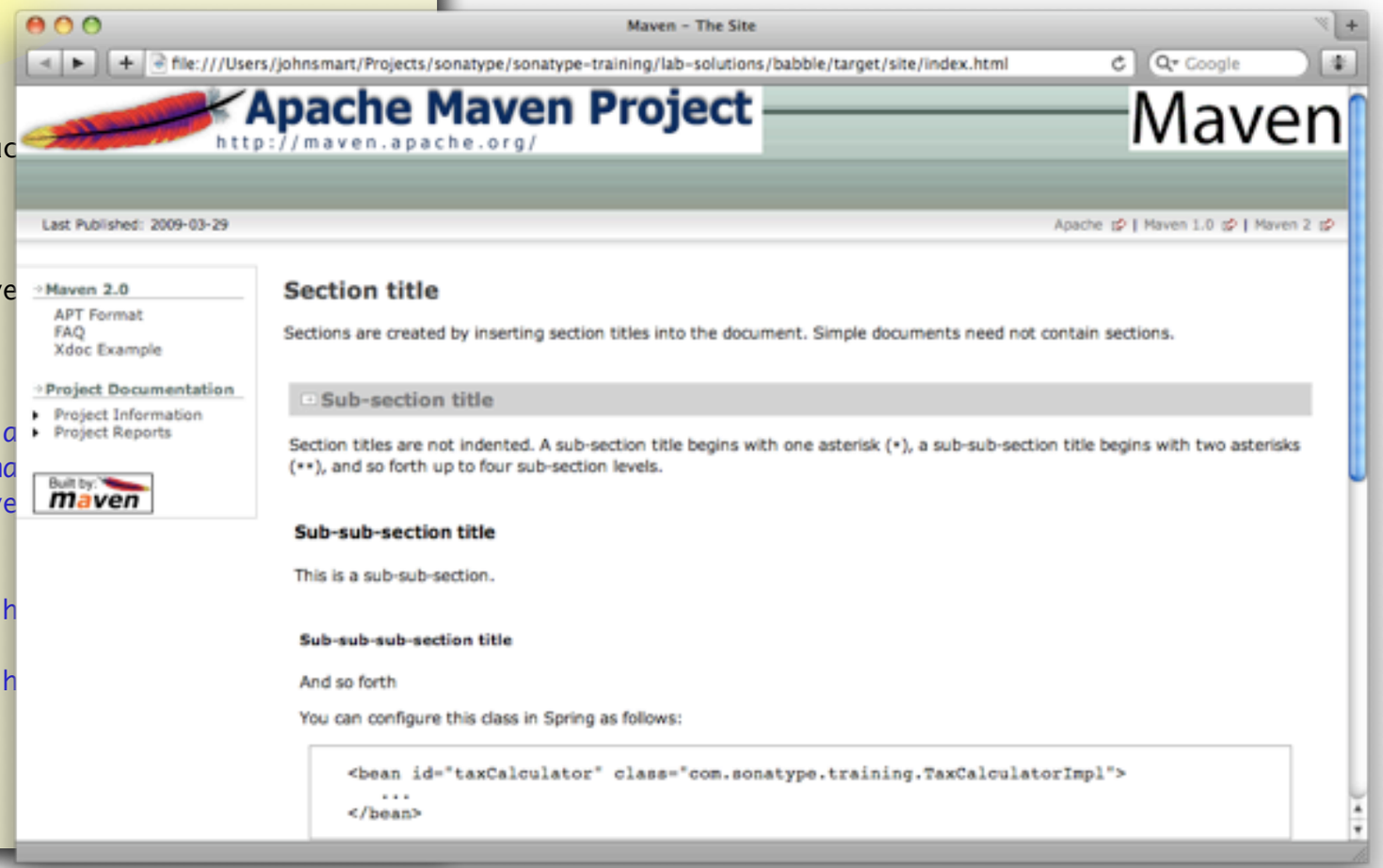


Changing the look and feel

- Using an alternate skin
  - Change the skin in the site.xml file

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<project name="Maven">
  <skin>
    <groupId>org.apache.maven.skins</groupId>
    <artifactId>maven-stylus-skin</artifactId>
    <version>1.1</version>
  </skin>
  <bannerLeft>
    <name>Maven</name>
    <src>http://maven.apache.org/images/apac
    <href>http://maven.apache.org/</href>
  </bannerLeft>
  <bannerRight>
    <src>http://maven.apache.org/images/mave
  </bannerRight>
  <body>
    <links>
      <item name="Apache" href="http://www.a
      <item name="Maven 1.0" href="http://ma
      <item name="Maven 2" href="http://mave
    </links>
    <menu name="Maven 2.0">
      <item name="APT Format" href="format.h
      <item name="FAQ" href="faq.html"/>
      <item name="Xdoc Example" href="xdoc.h
    </menu>
    <menu ref="reports" />
  </body>
</project>
```

Use the “stylus” skin



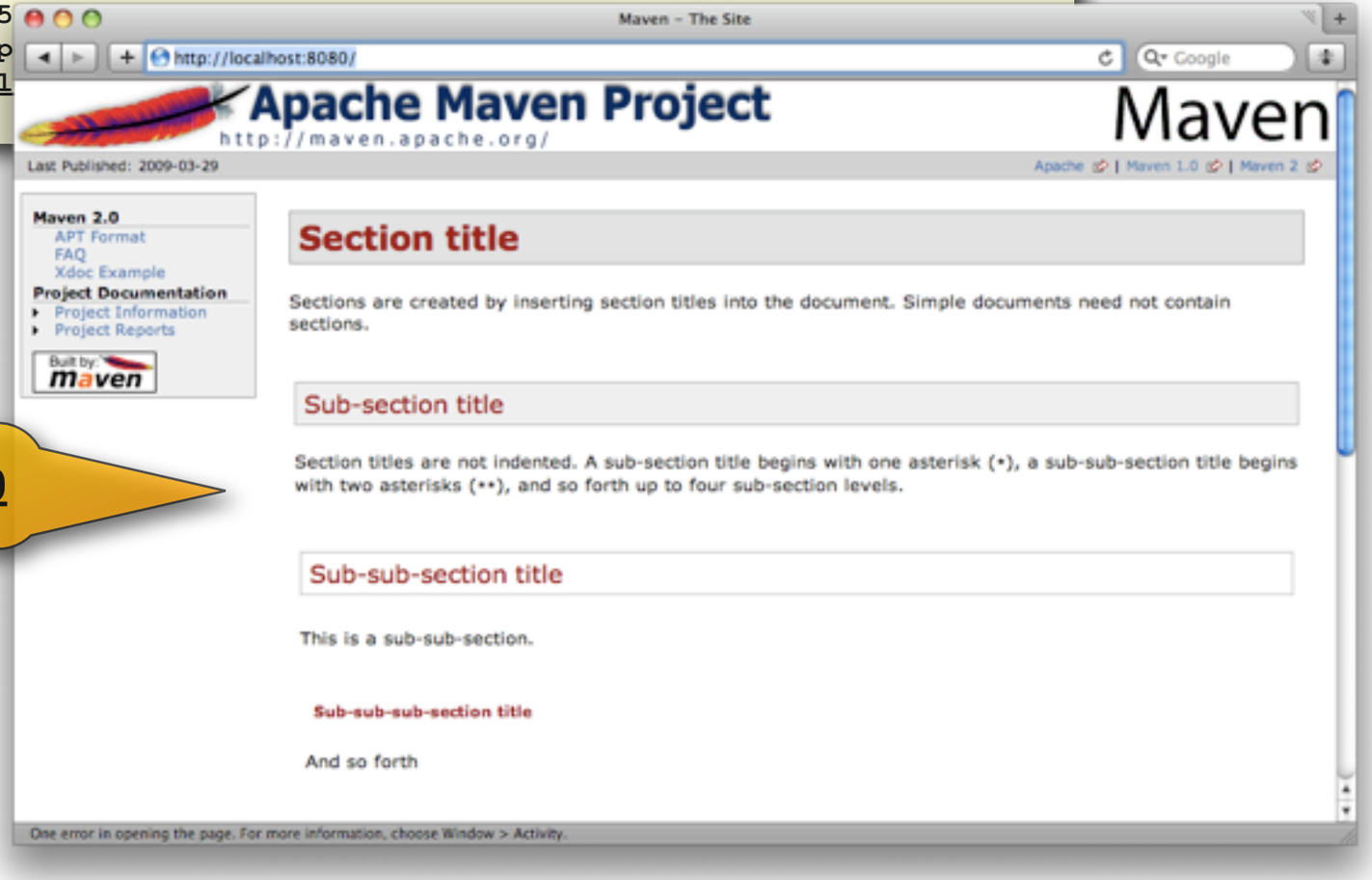
Running the Site

Developing your site

- Use **mvn site:run** for fast turn-around
  - Run the site using Jetty
  - Get quick feedback on content changes

```
$ mvn site:run
...
[INFO] Starting Jetty on http://localhost:8080/
2009-03-29 22:11:09.078::INFO:  jetty-6.1.5
2009-03-29 22:11:09.458::INFO:  NO JSP Supp
2009-03-29 22:11:09.660::INFO:  Started Sel
```

Site runs on **http://localhost:8080**



Deploying your site

- Distributing your site
  - Copy site contents to a remote server
  - Configured in the `<distributionManagement>` section of your pom.xml file

```
<project>
  ...
  <distributionManagement>
    <site>
      <id>internal.website</id>
      <url>scp://devserver.mycompany.com/var/www/projects/babble</url>
    </site>
  </distributionManagement>
  ...
</project>
```

Uses common protocols such as FTP, SCP and DAV

Define username and password details in the settings.xml file

```
<settings>
  ...
  <servers>
    <server>
      <id>internal.website</id>
      <username>apache</username>
      <password>t0ps3cr3t</password>
    </server>
    ...
  </servers>
  ...
</settings>
```

Site PDFs

PDf Genertion

- PDF generating standalone plugin, reporting plugin
- Can generate an aggregate of all submodule sites
- `mvn site pdf:pdf`

  or

```
<reports>
  <report>maven-pdf-plugin</report>
<reports>
```

Sample Project - Wicket With Unneeded Dependencies

v. 1.0-SNAPSHOT

Project Documentation

mccm06

2010-06-28

Maven Intermediate Concepts

Part 8

Reporting

Site Reporting

- Generating Reports with Maven
  - New reports are easy to integrate using the reporting plugins
  - Many reporting plugins available
    - Javadoc
    - Test results
    - Code quality (Checkstyle, PMD, Findbugs...)
    - Code coverage (Cobertura, Emma, Clover...)
    - Change logs
    - TODO lists
    - ..
  - Report data can also be used by other tools like Hudson or Sonar

Technical Reports

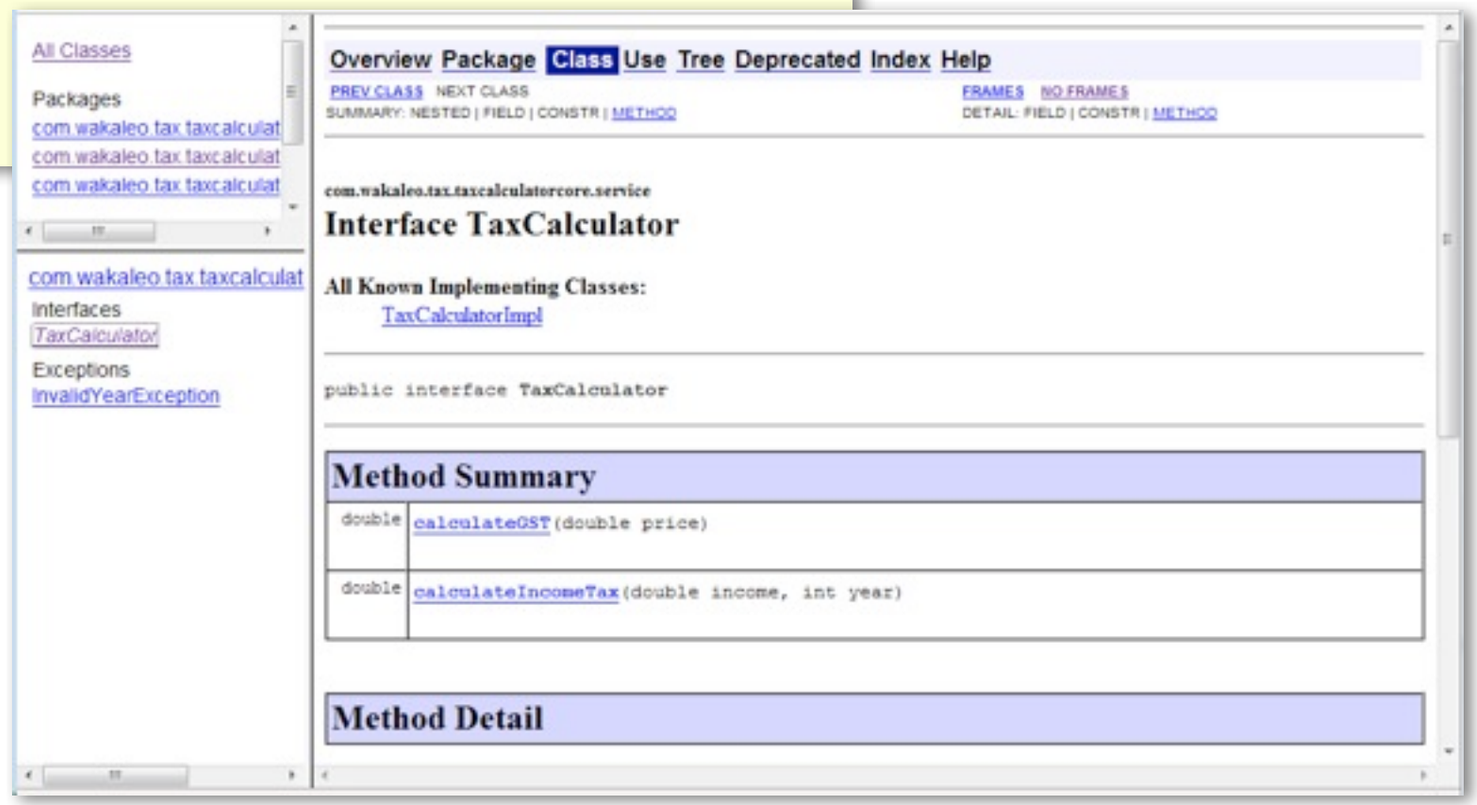
Technical documentation

- Automated technical documentation in Java
  - Javadoc
  - UMLGraph - *UML embedded in your Javadocs*
  - DOxygen - *a more complete alternative to Javadoc*

Technical documentation

- Integrating Javadoc
  - Simply add the maven-javadoc-plugin:

```
<project...>
    <reporting>
        <plugins>
            <plugin>
                <artifactId>maven-javadoc-plugin</artifactId>
            </plugin>
            ...
        </plugins>
    </reporting>
</project>
```



Technical documentation

- More advanced Javadoc
  - Javadoc with multi-module projects

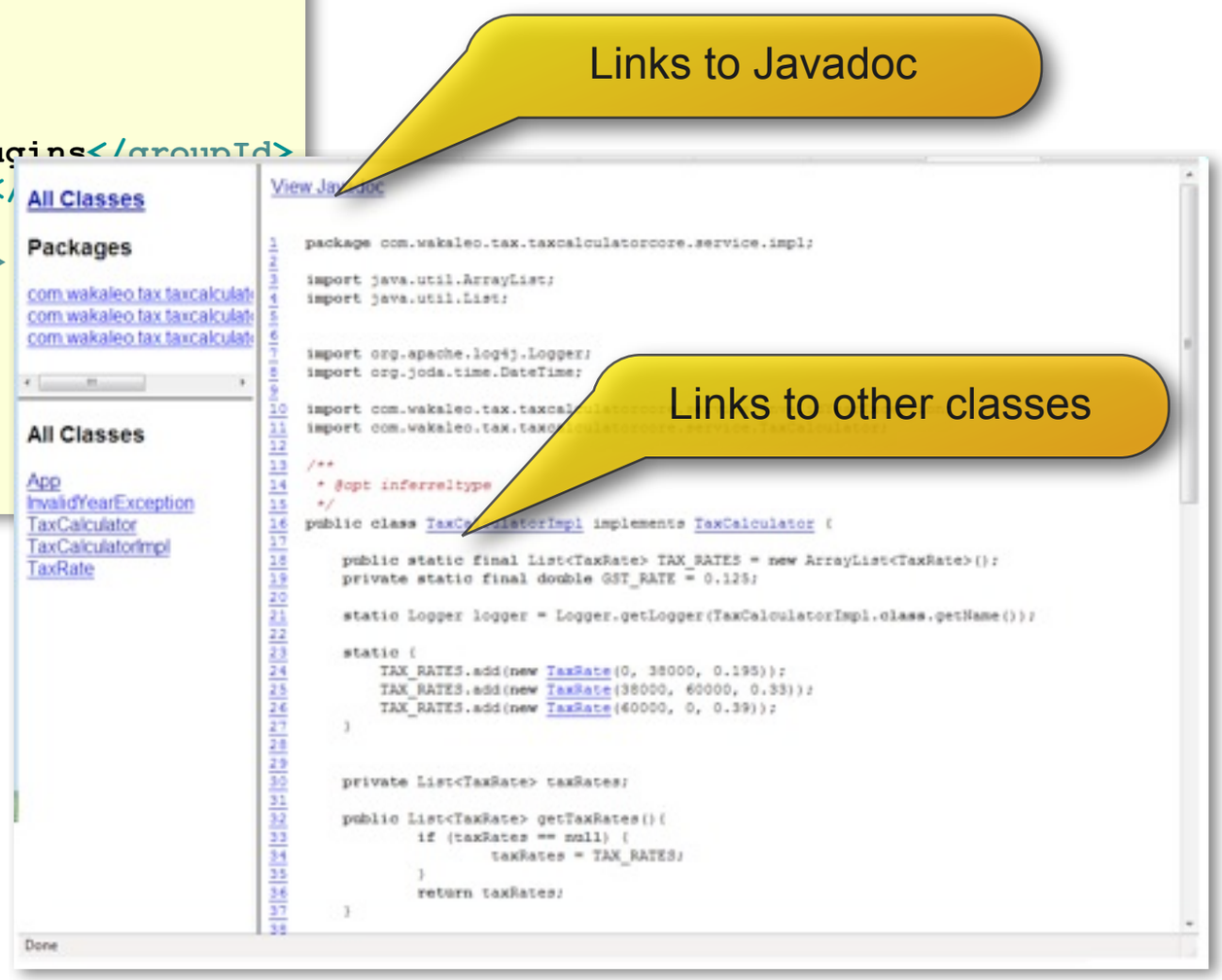
```
<project...>
    <reporting>
        <plugins>
            <plugin>
                <artifactId>maven-javadoc-plugin</artifactId>
                <configuration>
                    <aggregate>true</aggregate>
                </configuration>
            </plugin>
            ...
        </plugins>
    </reporting>
</project>
```

Combine Javadoc from all the modules into one site

Browsable source code

- Integrating JXR
  - Cross-referenced HTML source code
  - Useful for integration with other reports

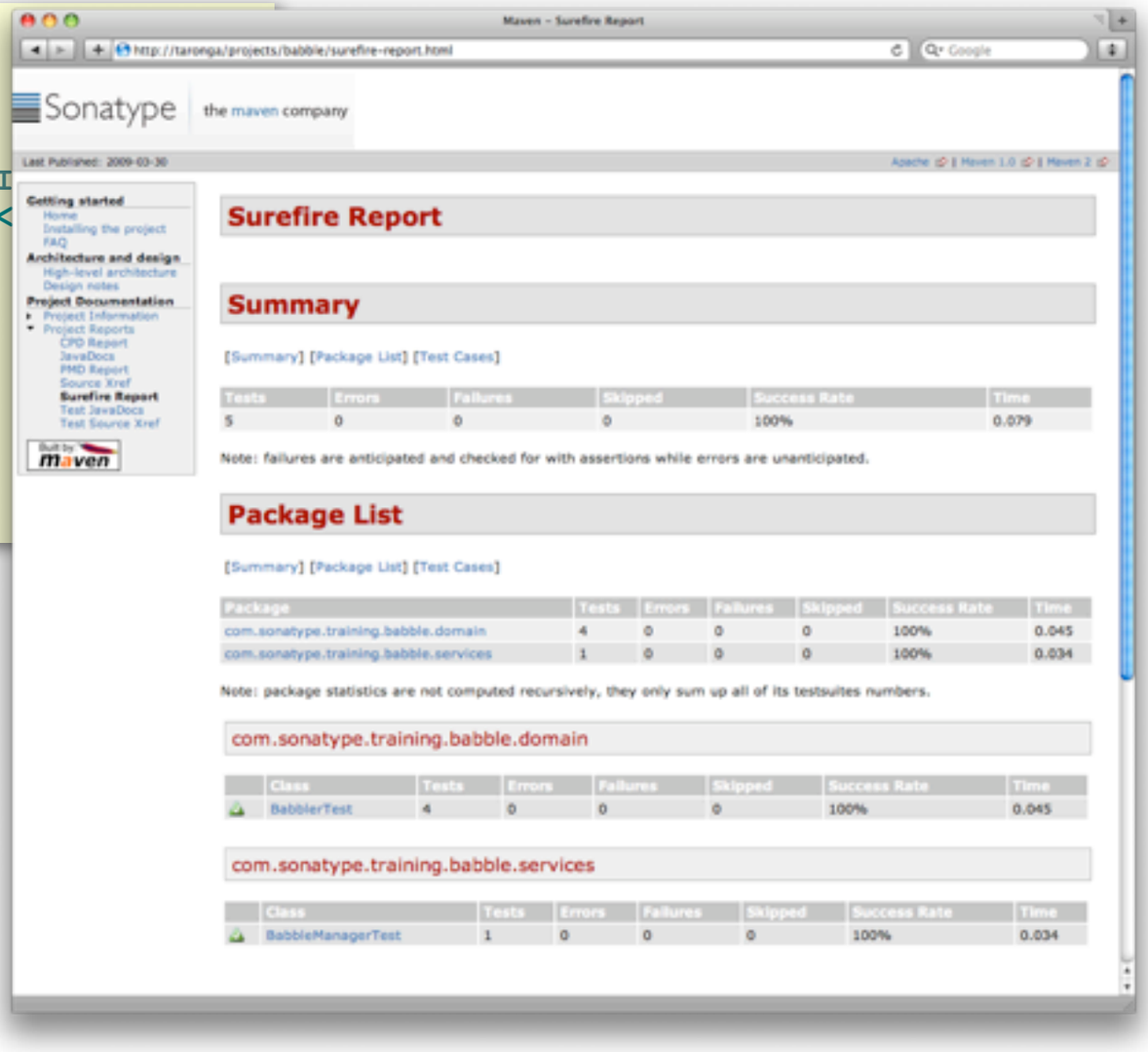
```
<project...>
    <reporting>
        <plugins>
            <plugin>
                <groupId>org.apache.maven.plugins</groupId>
                <artifactId>maven-jxr-plugin</artifactId>
                <configuration>
                  <aggregate>true</aggregate>
                </configuration>
            </plugin>
            ...
        </plugins>
    </reporting>
</project>
```



Displaying test results

- The surefire reports plugin
  - Default configuration good for most situations
  - You need to configure for multi-module projects

```
<project...>
  <reporting>
    <plugins>
      <plugin>
        <groupId>org.apache.maven.plugins</groupI
        <artifactId>maven-surefire-report-plugin<
        <configuration>
          <aggregate>true</aggregate>
        </configuration>
      </plugin>
      ...
    </plugins>
  </reporting>
</project>
```



Code Quality Metrics

Code quality metrics

- Many code quality and code coverage metrics tools available
  - Checkstyle
  - PMD
  - FindBugs
  - Crap4j (Change Risk Analysis and Predictions)
  - Clover
  - Cobertura
  - ...
- Most generate results in HTML and XML
- XML data can be used by other tools (e.g. Hudson)

Code quality metrics

- Code quality reports - some examples
  - Enforcing best practices - PMD

```
<reporting>
    <plugins>
        ...
        <plugin>
            <groupId>org.apache.maven.plugins</groupId>
            <artifactId>maven-pmd-plugin</artifactId>
            <version>2.4</version>
            <configuration>
                <targetJdk>1.5</targetJdk>
                <excludes>
                    <exclude>**/generated/*.java</exclude>
                </excludes>
                <aggregate>true</aggregate>
            </configuration>
        </plugin>
    </plugins>
</reporting>
```

Use the PMD report plugin

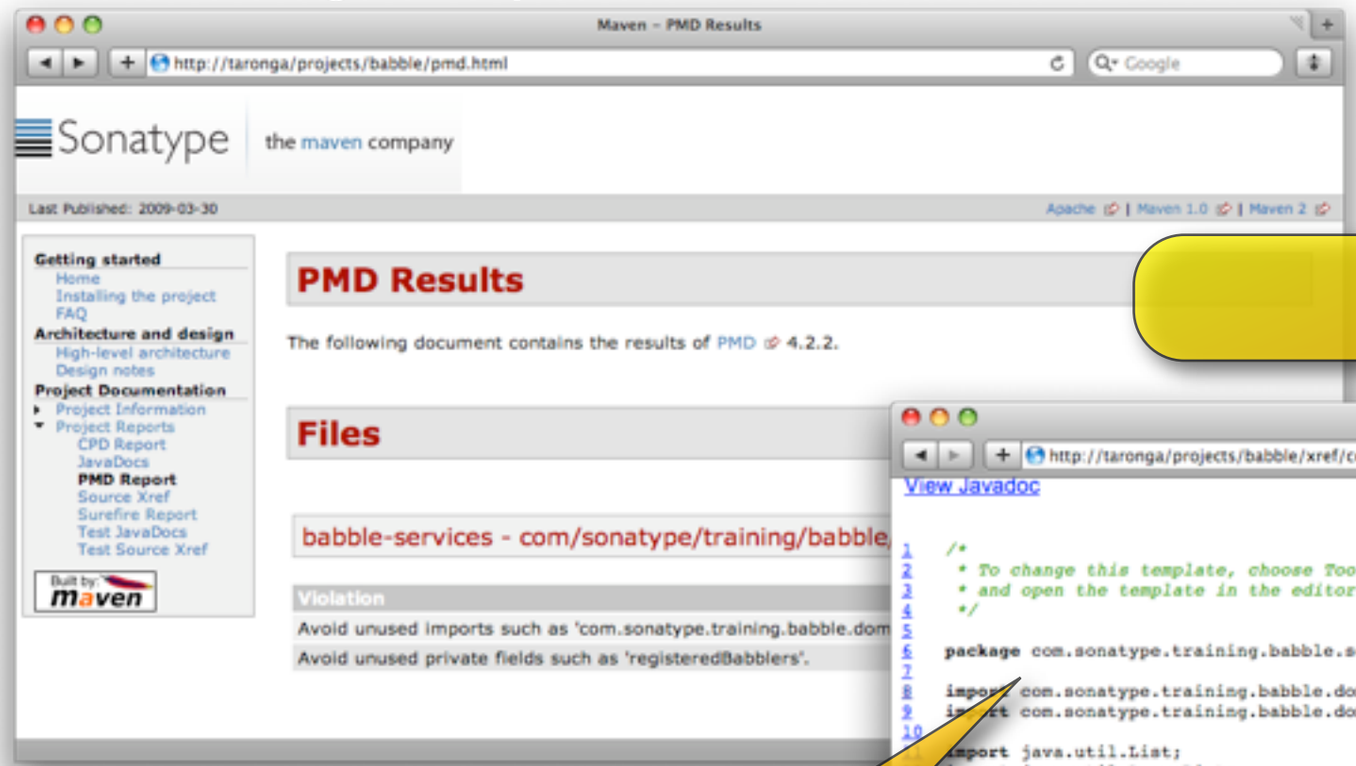
Allow Java 5 features

Exclude certain classes from the analysis

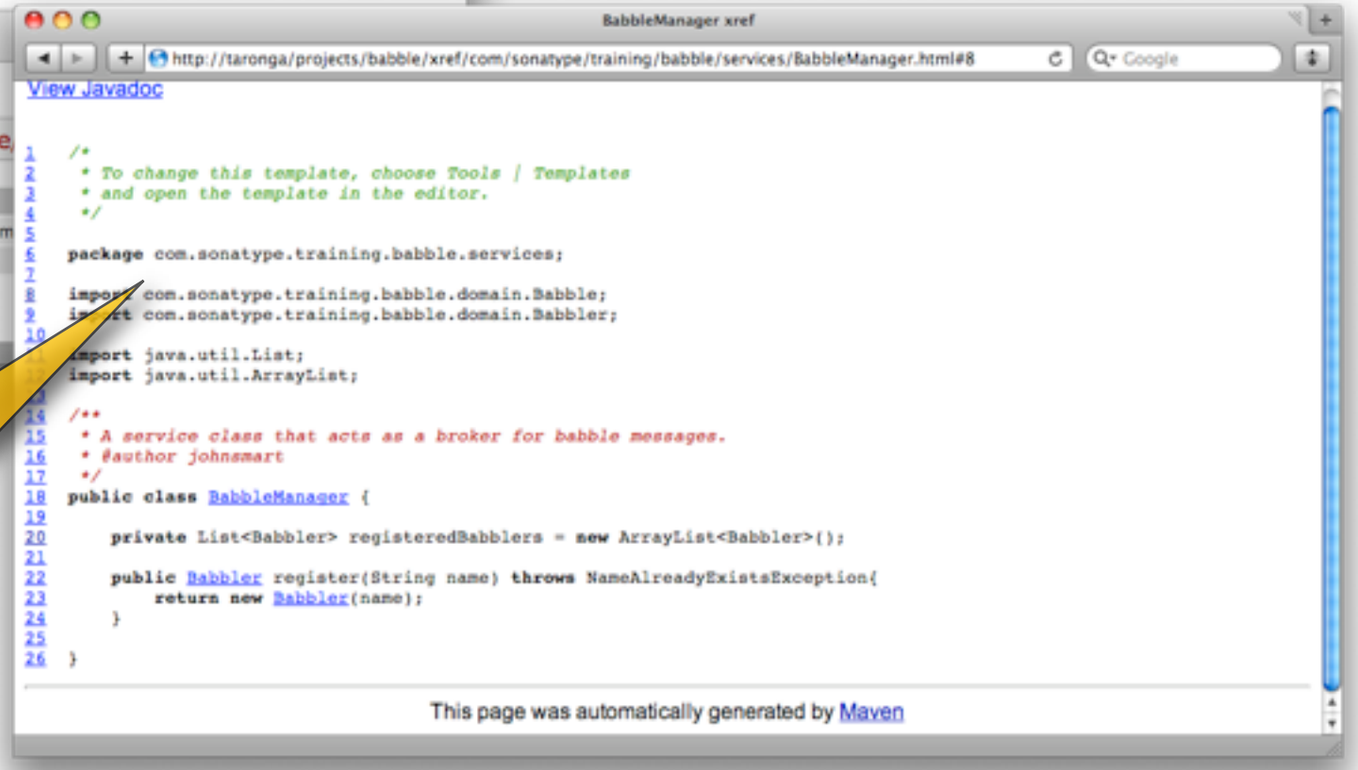
Aggregate reports for multi-module projets

Code quality metrics

- Code quality reports - some examples
  - Enforcing best practices - PMD



Aggregated PMD report



JXR links to source code

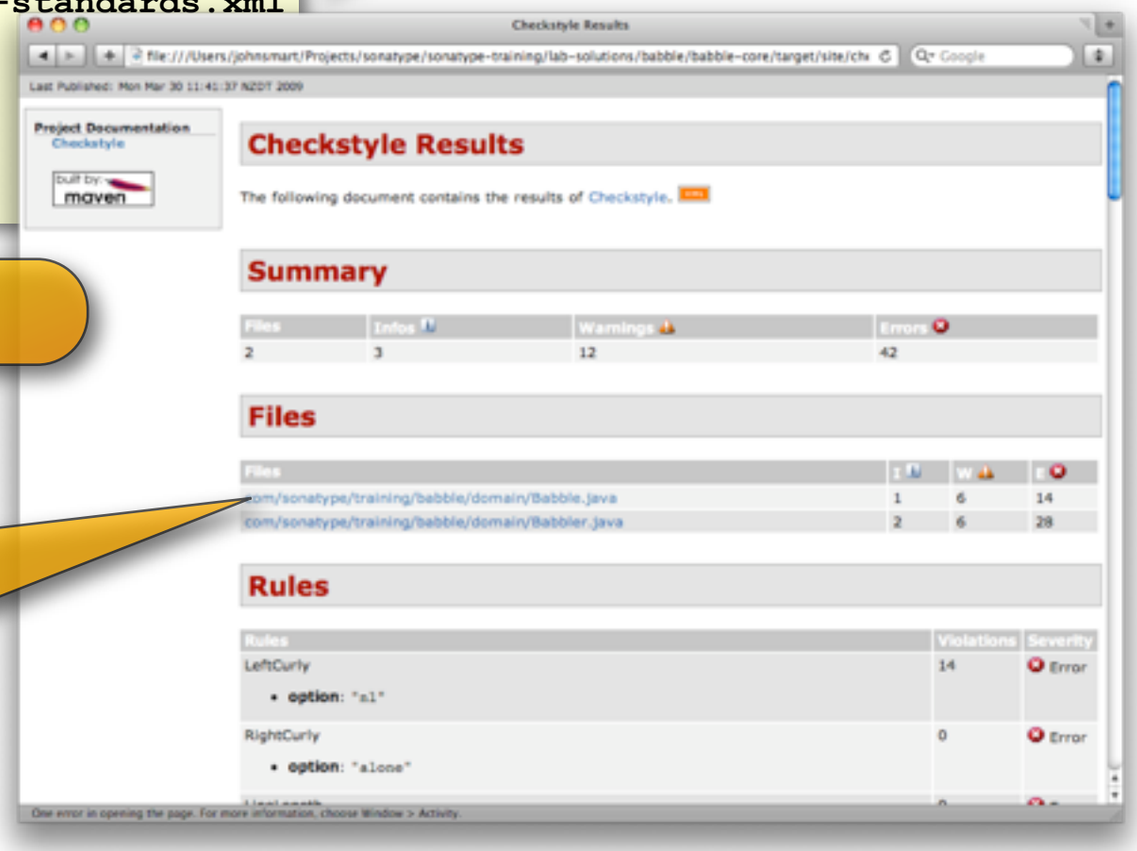
Code quality metrics

- Code quality reports - some examples
  - Enforcing coding standards - Checkstyle

```
<reporting>
  <plugins>
    ...
    <plugin>
      <artifactId>maven-checkstyle-plugin</artifactId>
      <configuration>
        <configLocation>
          http://svnserver/config/company-coding-standards.xml
        </configLocation>
      </configuration>
    </plugin>
  </plugins>
</reporting>
```

Enterprise-specific rules

A checkstyle report



NOTE: Checkstyle reports are not aggregated

Overview
- **Introduction**
- Goals
- Usage

Examples
- Report Formats
- Sample Cobertura Report

Project Documentation
- Project Information
- Project Reports

Cobertura Maven Plugin

This plugin provides the features of Cobertura within the Maven 2 environment.

The report generated by this plugin is the result of executing the Cobertura tool against your compiled classes to help you determine how well the unit testing efforts have been, and can then be used to identify which parts of your Java program are lacking test coverage.

Goals Overview

- cobertura:check Check the Last Instrumentation Results.
- cobertura:clean Clean up rogue files that cobertura maven plugin is tracking.
- cobertura:dump-datafile Cobertura Datafile Dump Mojo.
- cobertura:instrument Instrument the compiled classes.
- cobertura:cobertura Instruments, Tests, and Generates a Cobertura Report.

Usage

Instructions on how to use the Cobertura Maven Plugin can be found on the usage page.

Examples

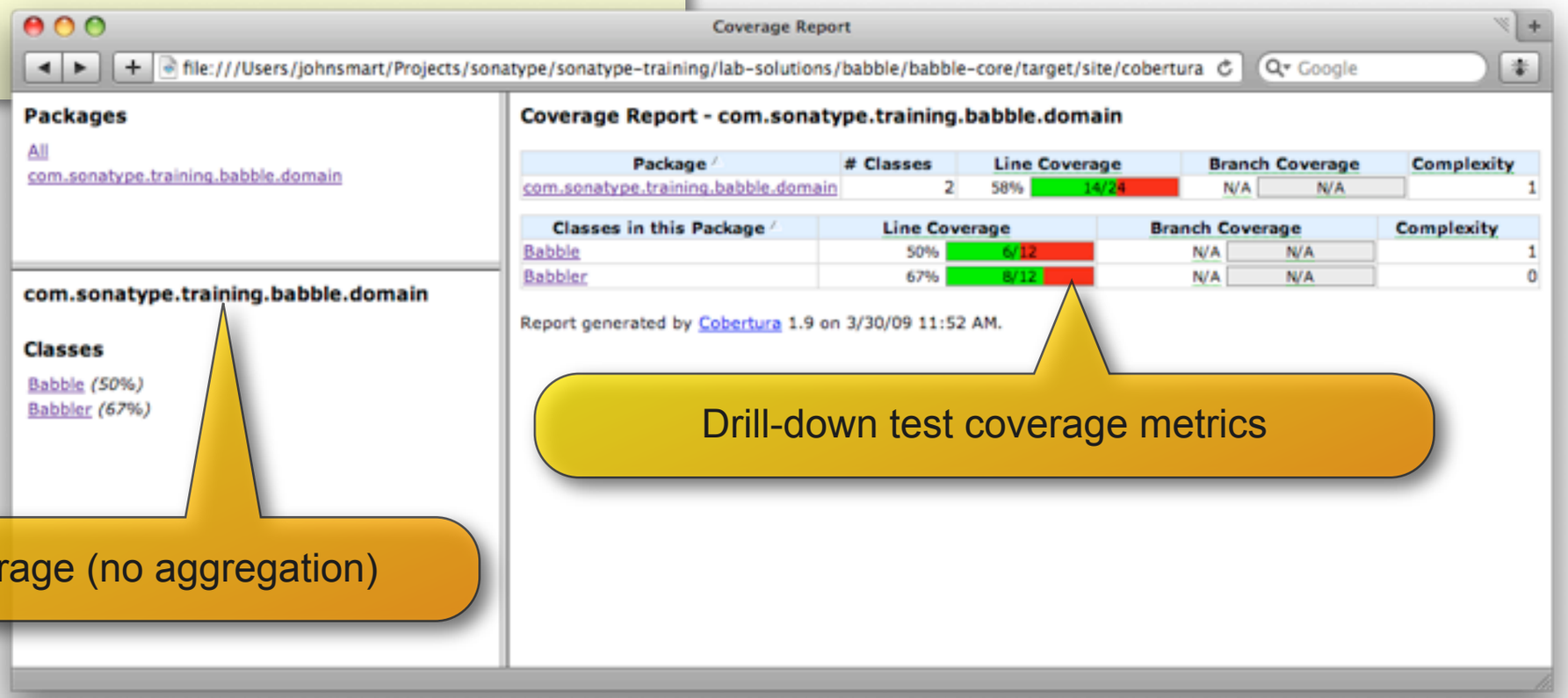
To provide you with better understanding of some usages of the Cobertura Maven Plugin, you can take a look into the following example:

- Report Formats

Code quality metrics

- Code quality reports - some examples
  - Measuring code coverage - Cobertura

```
<reporting>
  <plugins>
    ...
    <plugin>
      <groupId>org.codehaus.mojo</groupId>
      <artifactId>cobertura-maven-plugin</artifactId>
      <version>2.2</version>
    </plugin>
  </plugins>
</reporting>
```



Cobertura

- Plugin Homepage
  - http://mojo.codehaus.org/cobertura-maven-plugin/
- Usage
  - http://mojo.codehaus.org/cobertura-maven-plugin/usage.html


Sonar &
Maven

Sonar

- Complementary tool to Maven Reports, Hudson
- Adds time dimension to statistics
- Effortless integration with Maven builds
- Scalable from 1 project to 1000 projects

sonar

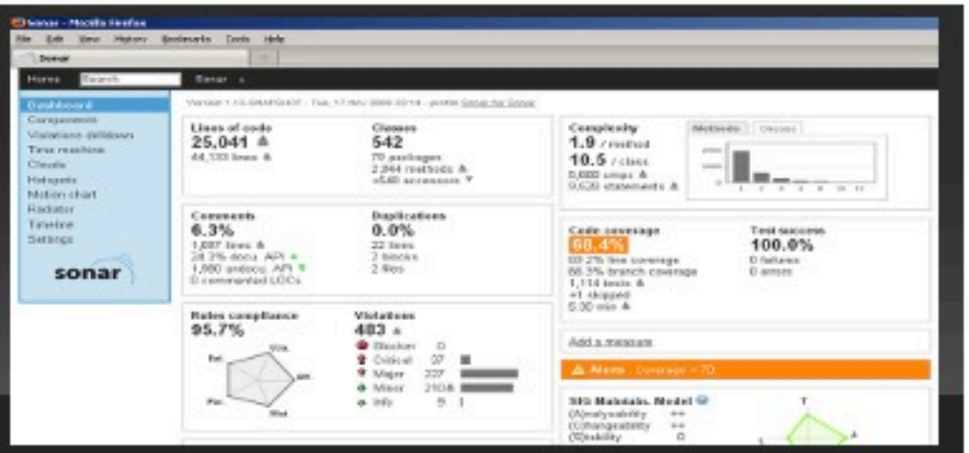
codehaus open source

19th Annual PRODUCTIVITY AWARD

Download Features Screencasts Roadmap Documentation Community Blog

Put your technical debt under control

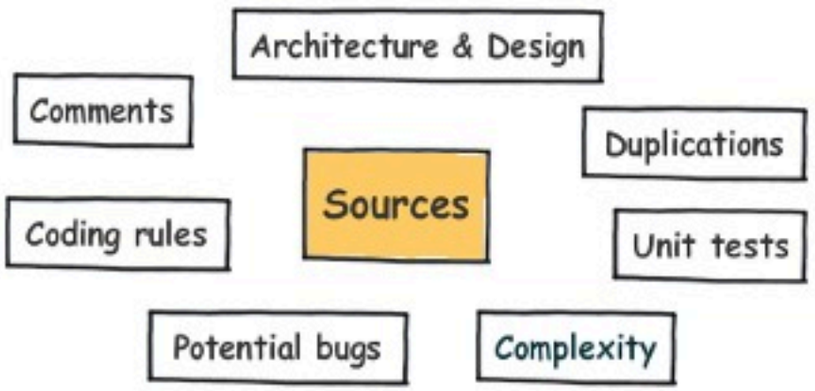
Productivity is falling ?
Confess your source code to clean it up !



Mission Platform Figures

All in one

Sonar is an open platform to manage code quality. As such, it covers the 7 axes of code quality:



Extend with plugins

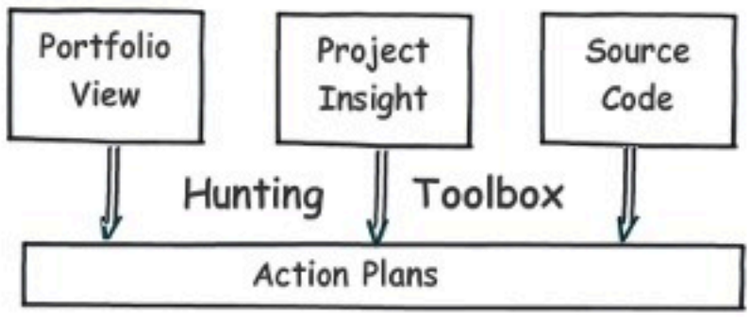
Covering new languages, adding rules engines, computing advanced metrics can be done through a powerful extension mechanism. More than 30 plugins are already available.

Languages covered

Java is built in. Plugins enable to cover PL/SQL and C++.

In 3 clicks

Sonar has got a very efficient way of navigating, a balance between high-level view, dashboard, TimeMachine and defect hunting tools. This enables to quickly uncover projects and / or components that are in Technical Debt to establish action plans.



Quality is central

Sonar is a web-based application. Rules, alerts, thresholds, exclusions, settings… can be configured online. By leveraging its database, Sonar not only allows to combine metrics altogether but also to mix them with historical measures.

Get started

1. Download latest version (**2.0** on March 10, 2010)
2. Unzip and start
3. Analyze projects
4. Ready to improve quality

Sonar in action

To see more, visit Nemo, the online instance of Sonar dedicated to open source projects.

Blog

Subscribe to our blog by email or directly through the feed

- Fight Back Design Erosion by Breaking Cycles with Sonar
- Sonar 2.0 in screenshots
- Sonar in the news

Sonar Execution

- Start Sonar
  - `sonar.sh start`
- Clean execution to ensure Sonar analysis will succeed
  - `mvn clean install -Dtest=false -DfailIfNoTests=false`
- Sonar analysis
  - `mvn sonar:sonar`

Terminal — bash — bash

bash | bash | bash

```
[INFO]  Execute maven plugin maven-pmd-plugin done: 2089 ms
[INFO]  Sensor PmdSensor...
[INFO]  Sensor PmdSensor done: 237 ms
[INFO]  Sensor ProfileSensor...
[INFO]  Sensor ProfileSensor done: 22 ms
[INFO]  Sensor ProjectLinksSensor...
[INFO]  Sensor ProjectLinksSensor done: 43 ms
[INFO]  Sensor VersionEventsSensor...
[INFO]  Sensor VersionEventsSensor done: 111 ms
[INFO]  Sensor Maven dependencies...
[INFO]  Sensor Maven dependencies done: 110 ms
[INFO]  Sensor SurefireSensor...
[INFO]  parsing /Users/mccm06/Documents/Teach/Courses/Mastering-Maven-2.0/examples/maven-training_git/sample02-dependency/target/surefire-reports
[INFO]  Sensor SurefireSensor done: 16 ms
[INFO]  Execute decorators...
[INFO]  ANALYSIS SUCCESSFUL, you can browse http://localhost:9000
[INFO]  Database optimization...
[INFO]  Database optimization done: 381 ms
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 1 minute 13 seconds
[INFO] Finished at: Sun Jun 27 23:32:46 MDT 2010
[INFO] Final Memory: 42M/89M
[INFO] ------------------------------------------------------------------------
[sample02-dependency (master)]>
```

The Sonar Dashboard

- http://localhost:9000

Home | Search | MasterProject | Configuration | Log in

Projects
Motion chart
Radiator
Views

sonar

	Name	Lines of code	Technical Debt ratio	Coverage	Duplicated lines (%)	Build time
	MasterProject	5,983,917	17.0%	18.4%	6.6%	2010-03-17

	Name	Lines of code	Technical Debt ratio	Coverage	Duplicated lines (%)	Build time
✓	AisLib application framework	12,187	9.6%	38.6%	1.1%	2010-03-13
⚠	Tapestry 5 Project	57,213 ▲	6.7%	51.8%	0.2%	2010-03-15
✓	Commons Collections	20,901	10.1% ▲	79.8%	3.3%	2010-03-14
✓	MicroEmulator	28,344	11.7% ▲		2.3%	2010-03-14
⚠	Apache Jackrabbit	206,604 ▲	16.6%	26.4%	4.6%	2010-03-14
⚠	Unitils	18,585	14.9%	2.8%	3.8%	2010-03-15
✓	javagit	6,127	11.1% ▲	61.2%	0.3%	2010-03-14
✓	Wicket Parent	104,703	9.3%	44.7%	1.1%	2010-03-15
⚠	Commons Chain	3,901	14.4% ▼	64.5%	21.9%	2010-03-14
⚠	Commons IO	6,779 ▲	5.2% ▲	82.0%	2.3%	2010-03-14
⚠	Commons SCXML	7,331	9.8% ▲	69.8%	7.2%	2010-03-14
⚠	Sonar	31,558 ▲	6.2%	68.6%	0.0%	2010-03-17

Sonar

http://nemo.sonarsource.org/plugins/home/org.sonar.plugins.motionchart.MotionChartPa

Bamboo ... | Cobertu... | Introduc... | Depend... | Install a... | Pom | Sonar | Sonar | SLF4J – j...

Home | Search | Configuration | Log in

- Projects
- Motion chart
- Radiator
- Views

sonar

Period: Six months

Lin

Spring Batch, 9/24/09

Spring Web Services, 9/24/09

JBoss Microcontainer Kernel Parent POM, 9/24/09

FlatPack, 3/17/10

Coverage

80
60
40
20
0

50 60 70 80 90

Color: Rules compliance

80
60

Size: Duplicated lines (%)

50

Select | Deselect all

- Hudson main module
- IWebJTracker
- IWebMvc
- JBehave Root
- JBoss Application Serv...
- JBoss Microcontainer ...
- JEuclid
- JFreeChart
- JOnAS
- Jackcess
- Jahia Project Root
- Jajuk
- Jakarta BCEL
- Java Calendar Tools

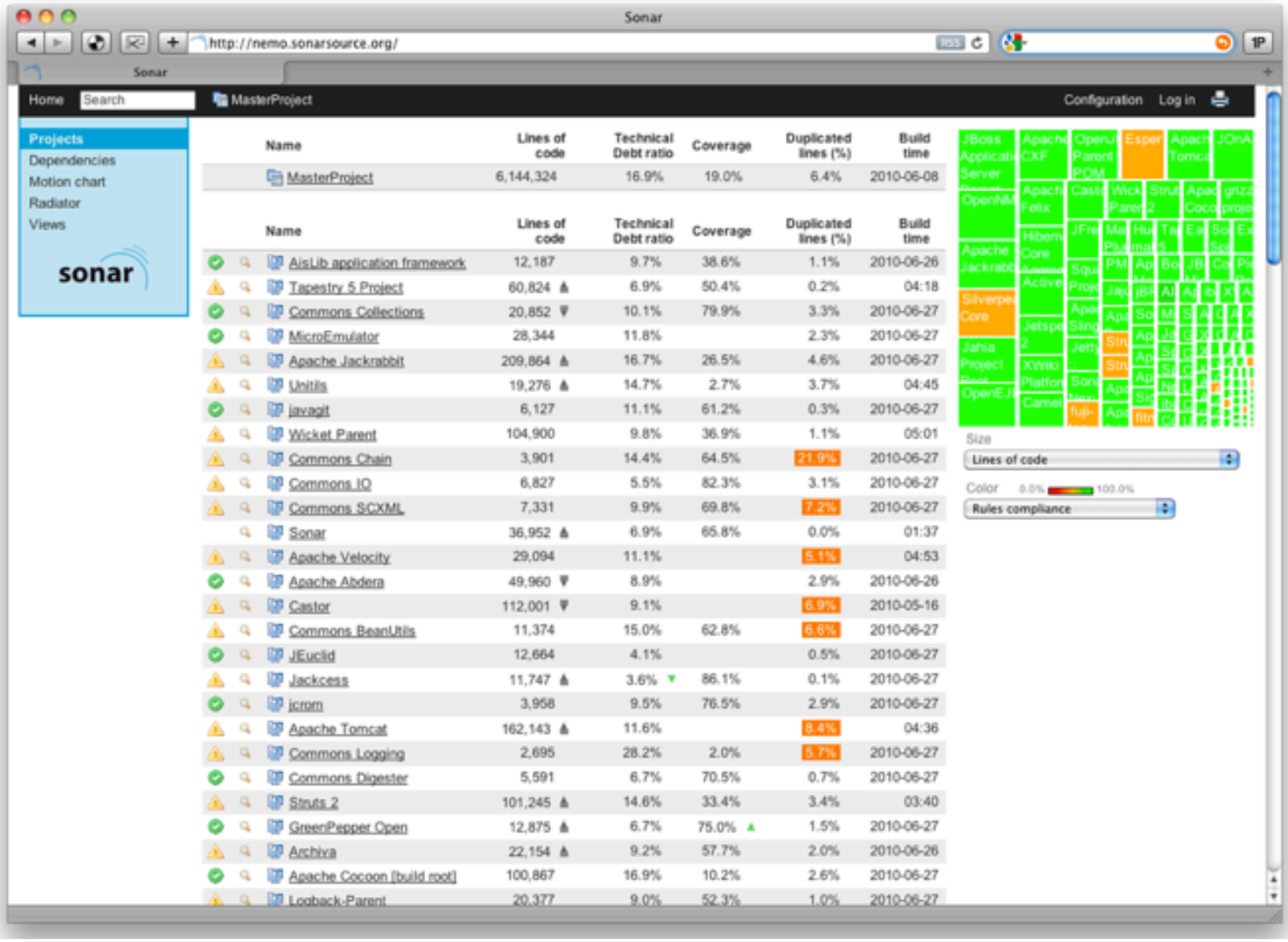
Trails

Rules compliance | Log

3/17/10

Nemo

- Public instance, analyzing open source projects
  - http://nemo.sonarsource.org/



Sonar References

- Homepage
  - http://sonar.codehaus.org/
- Usage Guide
  - http://docs.codehaus.org/display/SONAR/Collect+data

labs

- Lab 12 - Adding reports to your site

Maven Intermediate Concepts

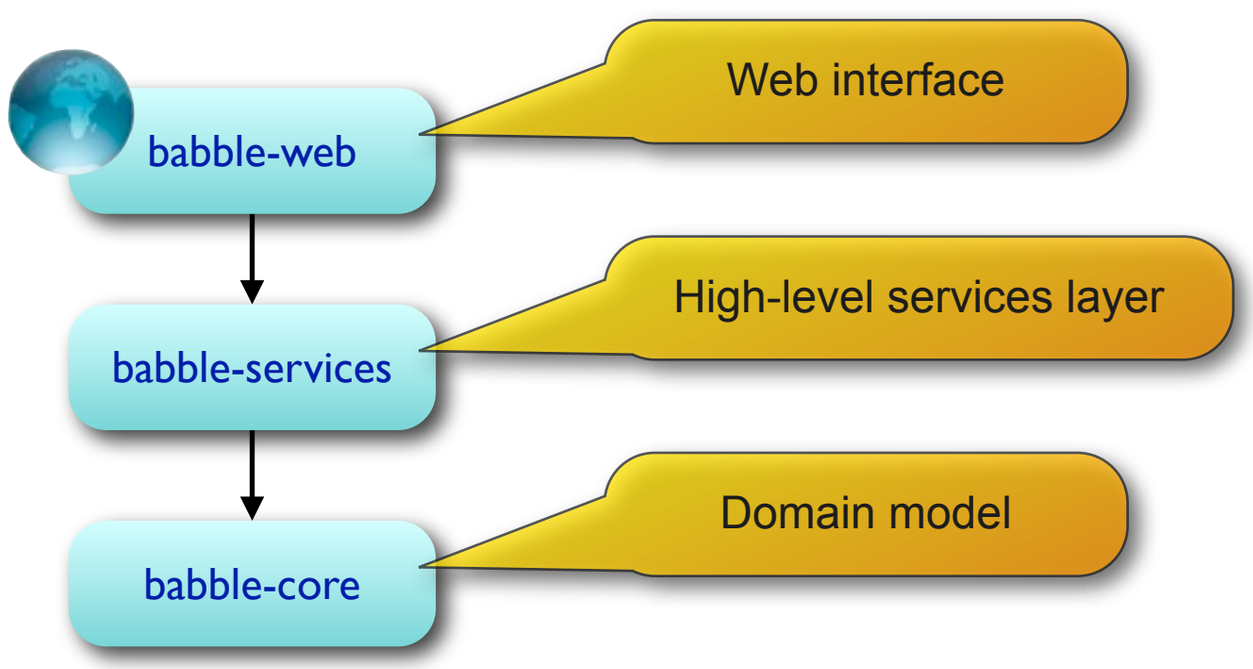
Part 9

Developing Web Applications with Maven

Web Projects

Web projects in Maven

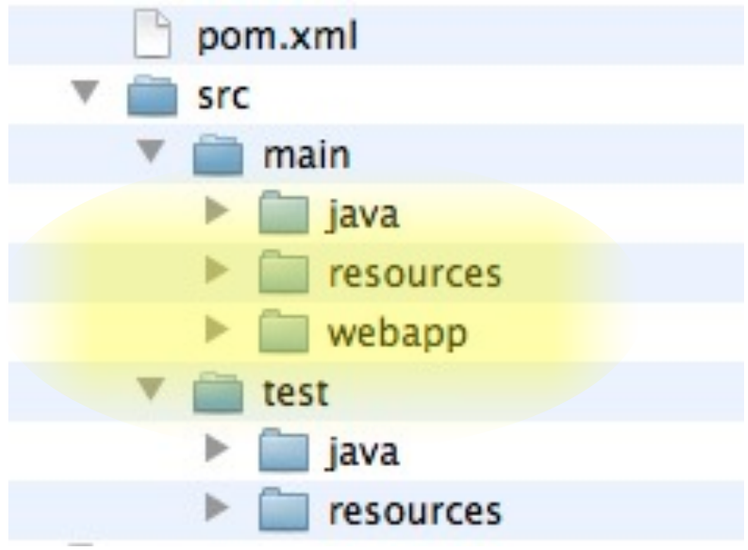
- Writing web applications in Maven
  - Use a separate web app module
    - Separation of concerns
    - Isolate the display technology from the business code
    - Cleaner and more flexible architecture



Web projects in Maven

- The Maven Webapp Directory Structure
  - Production source code goes in `src/main`

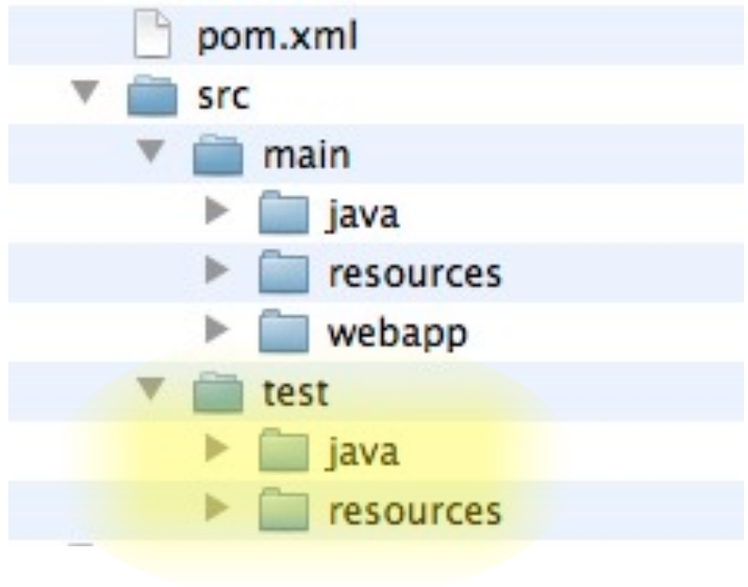
`src/main/java`	Java source code
`src/main/resource`	Other resources your application needs
`src/main/webapp`	The web application directory for a WAR project



Web projects in Maven

- The Maven Webapp Directory Structure
  - Test source code goes in `src/test`

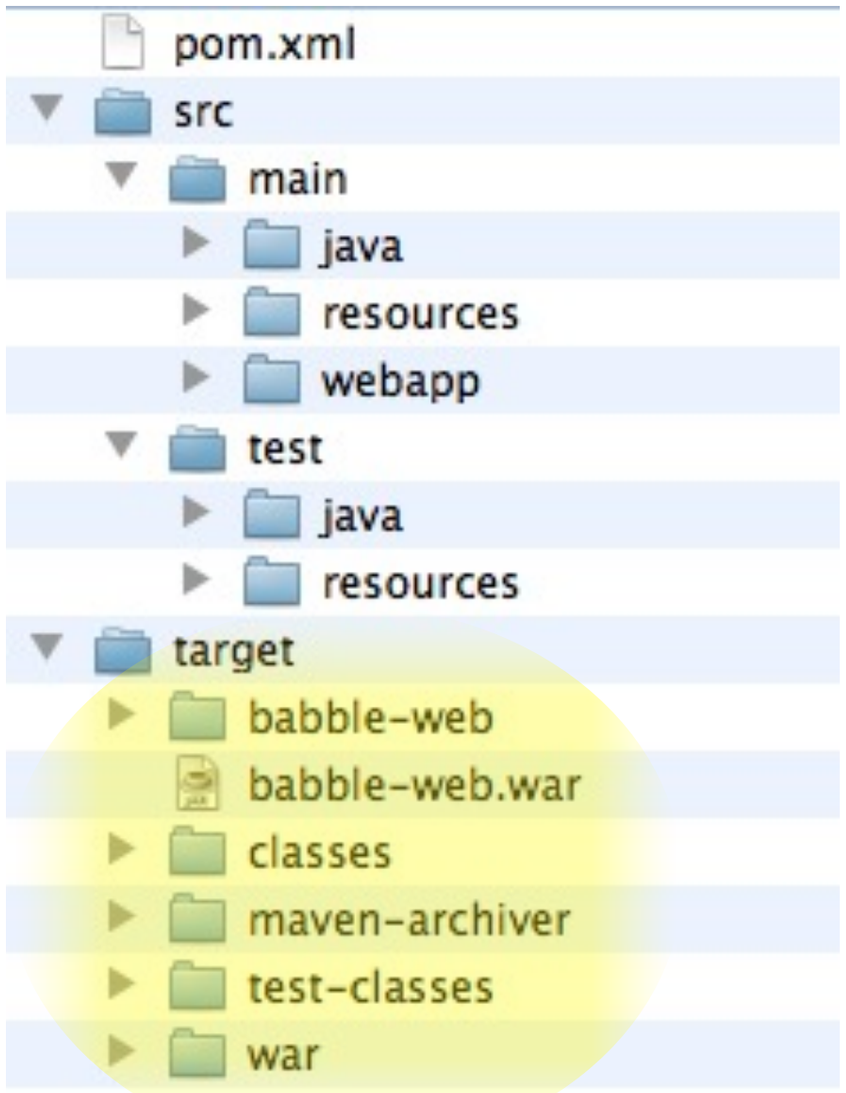
`src/test/java`	Test classes source code
`src/test/resource`	Resources used for testing
`src/test/filters`	Filters to be used for testing purposes



Web projects in Maven

- The Maven Webapp Directory Structure
  - Compiled code and reports go in `target`

`target/classes`	Compiled Java classes
`target/test-classes`	Compiled test classes
`target/surefire-reports`	Unit test reports
`target/war`	Working directory
`target/babble-web`	Exploded web application
`target/babble-web.war`	Packaged web application



Web projects in Maven

- Building a web application in Maven
  - Generate a WAR file

    `$ mvn war:war` or `$ mvn package`

  - Generate an 'exploded' WAR file

    `$ mvn war:exploded`

Web projects in Maven

- Testing your Maven web application
  - Jetty - an open source embedable web server
    - Runs stand-alone or as en embedded server
    - Can be run from within Maven
    - Light-weight and easy to configure

Jetty

Working with Jetty

- Enabling Jetty in your web project
  - Jetty is simple to configure:

```
<project>
    <build>
      <pluginManagement>
        <plugins>
          <plugin>
            <groupId>org.mortbay.jetty</groupId>
            <artifactId>maven-jetty-plugin</artifactId>
            <version>6.1.15</version>
          </plugin>
        </plugins>
      </pluginManagement>
    </build>
```

Use the Jetty plugin

Working with Jetty

- Enabling Jetty in your web project
  - Jetty is simple to configure:

```
<project>
    <build>
      <pluginManagement>
        <plugins>
          <plugin>
            <groupId>org.mortbay.jetty</groupId>
            <artifactId>maven-jetty-plugin</artifactId>
            <version>6.1.15</version>
            <configuration>
              <scanIntervalSeconds>5</scanIntervalSeconds>
              <contextPath>/mywebapp</contextPath>
              <connectors>
                <connector implementation="org.mortbay.jetty.nio.SelectChannelConnector">
                  <port>8081</port>
                  <maxIdleTime>60000</maxIdleTime>
                </connector>
              </connectors>
            </configuration>
          </plugin>
        </plugins>
      </pluginManagement>
    </build>
```

More advanced configuration

Context path

Port

Working with Jetty

- Running Jetty
  - Start Jetty and leave it running
  - Web page modifications are available immediately
  - Code changes are automatically redeployed
  - Even code changes in other modules are detected!

Working with Jetty

- Running Jetty
  - An example

$ mvn jetty:run

```
$ mvn jetty:run
...
[INFO] Preparing jetty:run
...
[INFO] [jetty:run]
[INFO] Configuring Jetty for project: Tax Calculator web application
[INFO] Webapp source directory = C:\dev\work\tax-calculator\tax-calculator-webapp\src\main\webapp
[INFO] web.xml file = C:\dev\work\tax-calculator\tax-calculator-webapp\src\main\webapp\WEB-INF\web.xml
[INFO] Classes = C:\dev\work\tax-calculator\tax-calculator-webapp\target\classes
2008-04-26 17:14:55.152::INFO:  Logging to STDERR via org.mortbay.log.StdErrLog
[INFO] Context path = /tax-calculator-webapp
[INFO] Tmp directory =  determined at runtime
[INFO] Web defaults = org/mortbay/jetty/webapp/webdefault.xml
[INFO] Web overrides =  none
[INFO] Webapp directory = C:\dev\work\tax-calculator\tax-calculator-webapp\src\main\webapp
[INFO] Starting jetty 6.1.15 ...
2008-04-26 17:14:56.226::INFO:  jetty-6.1.15
2008-04-26 17:14:56.539::INFO:  Started SelectChannelConnector@0.0.0.0:8080
[INFO] Started Jetty Server
```

Working with Jetty

- Running Integration tests on Jetty
  - Use for web tests (Selenium, JWebUnit,...)
  - Start Jetty just before the integration-test phase
  - Shut it down afterwards

```
<plugin>
  <groupId>org.mortbay.jetty</groupId>
  <artifactId>maven-jetty-plugin</artifactId>
  <version>6.1.18</version>
  <configuration>
    <scanIntervalSeconds>5</scanIntervalSeconds>
    <stopPort>9966</stopPort>
    <stopKey>foo</stopKey>
  </configuration>
  ...
```

Configure Jetty

```
  ...
  <executions>
    <execution>
      <id>start-jetty</id>
      <phase>pre-integration-test</phase>
      <goals>
        <goal>run</goal>
      </goals>
      <configuration>
        <daemon>true</daemon>
      </configuration>
    </execution>
    <execution>
      <id>stop-jetty</id>
      <phase>post-integration-test</phase>
      <goals>
        <goal>stop</goal>
      </goals>
    </execution>
  </executions>
</plugin>
```

Start Jetty before the integration tests

Run Jetty in the background

Shut down Jetty afterwards

labs

- Lab 13 - Running your webapp in Jetty

Maven Intermediate Concepts

Part 10

Scripting in Maven

Scripting in Maven

- Why run scripts in Maven?
  - Low level or specific procedural tasks
  - Insert custom scripting at particular points in the lifecycle
- Groovy is a great way to script Maven builds
  - Concise and readable scripting language
  - Close to Java
  - Access to the Maven Project variables

Scripting in Maven

- Groovy in Maven
  - Embedding Groovy scripting

```
<build>
  <plugins>
    <plugin>
      <groupId>org.codehaus.groovy.maven</groupId>
      <artifactId>gmaven-plugin</artifactId>
      <version>1.0-rc-5</version>
      <executions>
        <execution>
          <phase>verify</phase>
          <goals>
            <goal>execute</goal>
          </goals>
          <configuration>
            <source>
              println "Hi there I am in ${project.name}"
            </source>
          </configuration>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

The gmaven plugin

Run this script at the 'verify' phase

Inline Groovy scripting

```
$ mvn verify
...
[INFO] [groovy:execute {execution: default}]
Hi there I am in ebank-core version 1.0.0-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------------
```

Scripting in Maven

- Groovy in Maven
  - GMaven gives you full access to the Maven project properties

```
...
<configuration>
  <source>
    println "I am in ${project.name} version ${project.version}
    project.dependencies.each {
      println "Group: $it.groupId; Artifact: $it.artifactId; Version: $it.version"
    }
  </source>
</configuration>
...
```

```
$ mvn verify
...
[INFO] [groovy:execute {execution: default}]
I am in ebank-core version 1.0.0-SNAPSHOT
Group: hsqldb; Artifact: hsqldb; Versiopn: 1.8.0.7
Group: junit; Artifact: junit; Versiopn: 4.5
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------------
```

Scripting in Maven

- Groovy in Maven
  - You can also call external Groovy scripts

```
<build>
  <plugins>
    <plugin>
      <groupId>org.codehaus.groovy.maven</groupId>
      <artifactId>gmaven-plugin</artifactId>
      <version>1.0-rc-5</version>
      <executions>
        <execution>
          <phase>verify</phase>
          <goals>
            <goal>execute</goal>
          </goals>
          <configuration>
            <source>${project.basedir}/src/main/script/myscript.groovy</
source>
          </configuration>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

Run a groovy script in your project

Scripting in Maven

- Groovy in Maven
  - You can also call external Groovy scripts

```
<build>
  <plugins>
    <plugin>
      <groupId>org.codehaus.groovy.maven</groupId>
      <artifactId>gmaven-plugin</artifactId>
      <version>1.0-rc-5</version>
      <executions>
        <execution>
          <phase>verify</phase>
          <goals>
            <goal>execute</goal>
          </goals>
          <configuration>
            <source>http://mydomain.com/myscript.groovy</source>
          </configuration>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

Or run a remote Groovy script

Scripting in Maven

- Groovy in Maven
  - To use Java libraries, you need to declare them in your dependencies

Declare your dependencies in your <dependencies> section

```
<dependencies>
    ...
    <dependency>
        <groupId>commons-lang</groupId>
        <artifactId>commons-lang</artifactId>
        <version>2.4</version>
    </dependency>
</dependenci
```

Then add the dependencies to the <classpath>

```
<configuration>
  <classpath>
    <element>
      <groupId>commons-lang</groupId>
      <artifactId>commons-lang</artifactId>
    </element>
  </classpath>
  <source>
    import org.apache.commons.lang.SystemUtils
    println SystemUtils.IS_OS_MAC_OSX ? "I'm a Mac" : "I'm not"
    </source>
  </configuration>
```

Then import classes as usual

Maven Intermediate Concepts

Part 11

Setting up a Maven Repository Manager

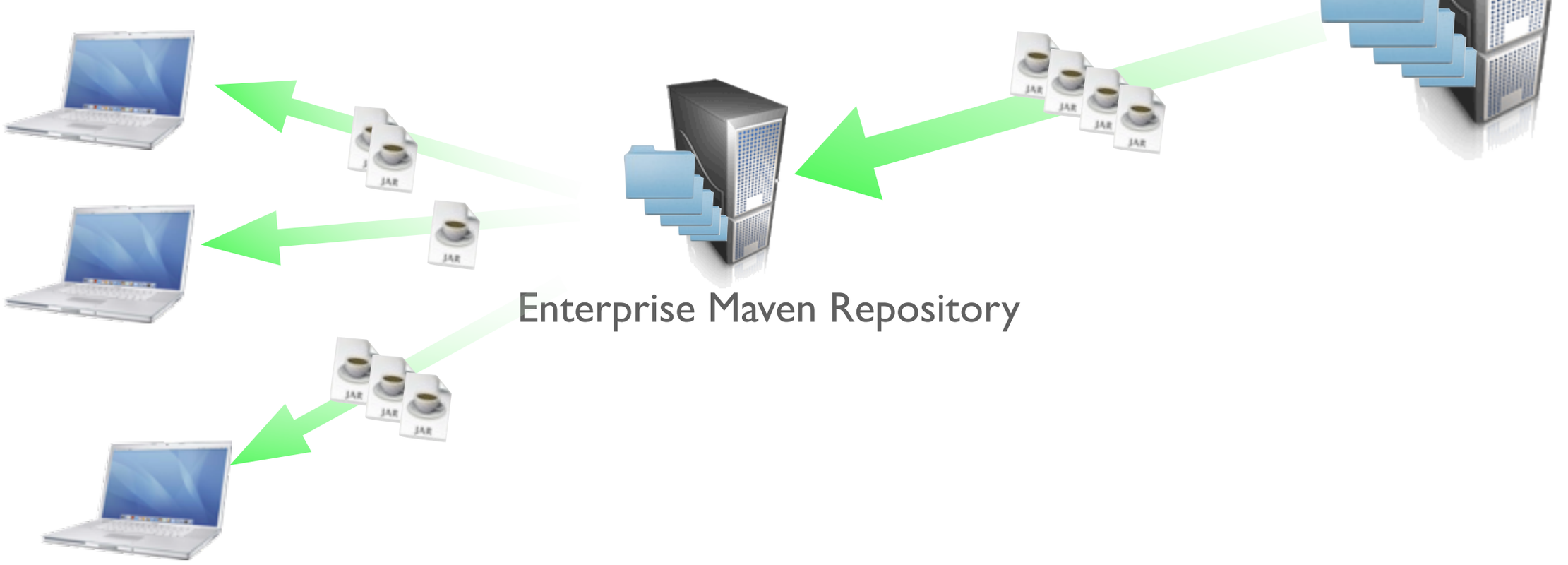
Enterprise Repositories

Enterprise Repositories

- Why use an Enterprise Repository?
  - Proxy/cache for downloading JARs from public repositories
  - Improve speed and reliability
  - Saves bandwidth
  - Allows better control over what is downloaded
  - Store and share enterprise libraries
  - Store and distribute proprietary third-party libraries

Enterprise Repositories

- How does an Enterprise Repository work?



Enterprise Repositories

- Nexus – an Enterprise Repository Manager
  - Easy to install
  - Easy to configure (web interface)
  - Easy to use

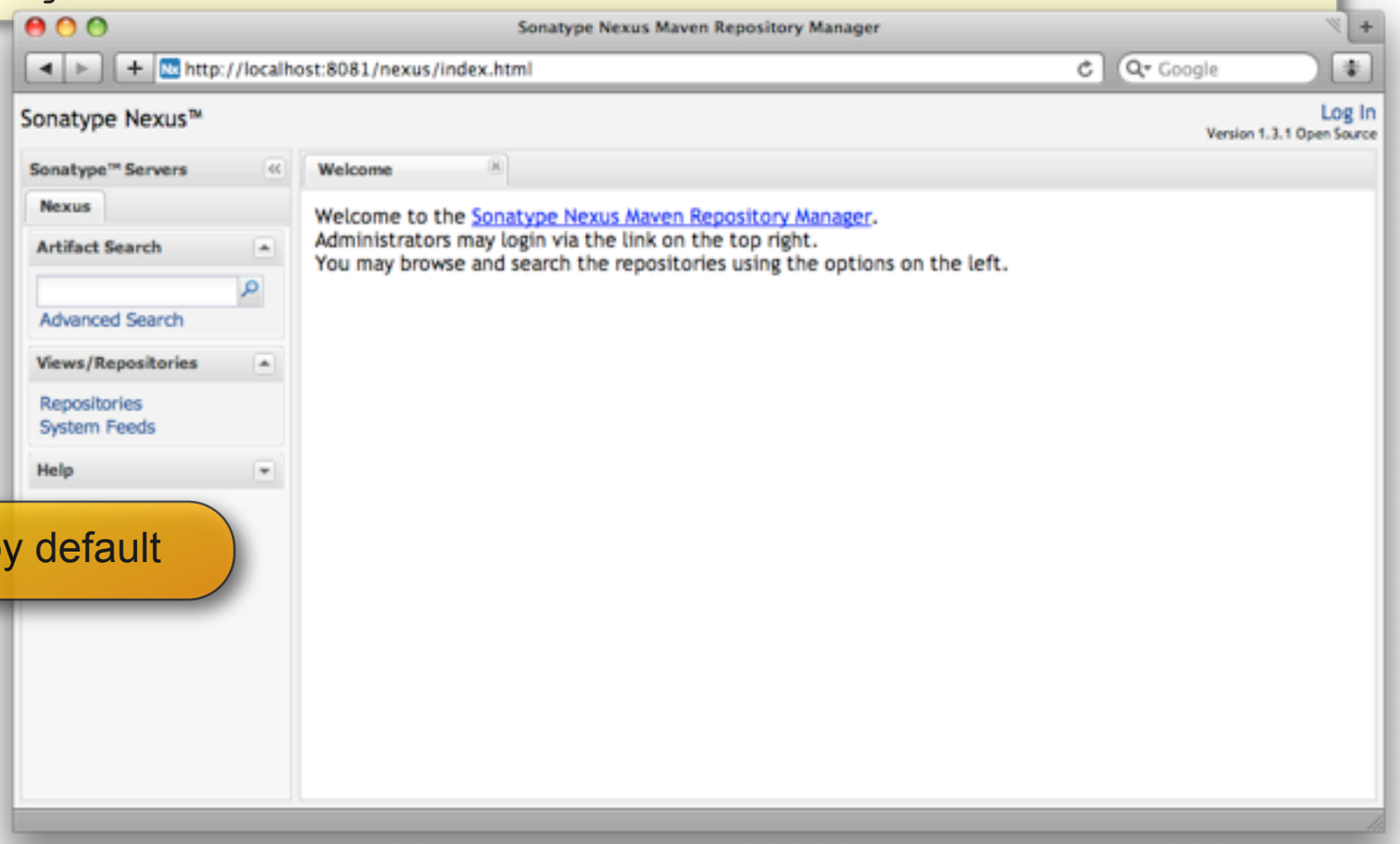
Installing Nexus

Installing Nexus

- Installing and running Nexus
  - Download and unzip the Nexus binary
  - Nexus can be run out-of-the-box (runs on Jetty)

```
$ sudo /usr/local/nexus-webapp-1.3.1/bin/jsw/macosx-universal-32/nexus start
Starting Sonatype Nexus Repository Manager...
Started Sonatype Nexus Repository Manager.
```

Choose the script for your OS



Nexus runs on port 8081 by default

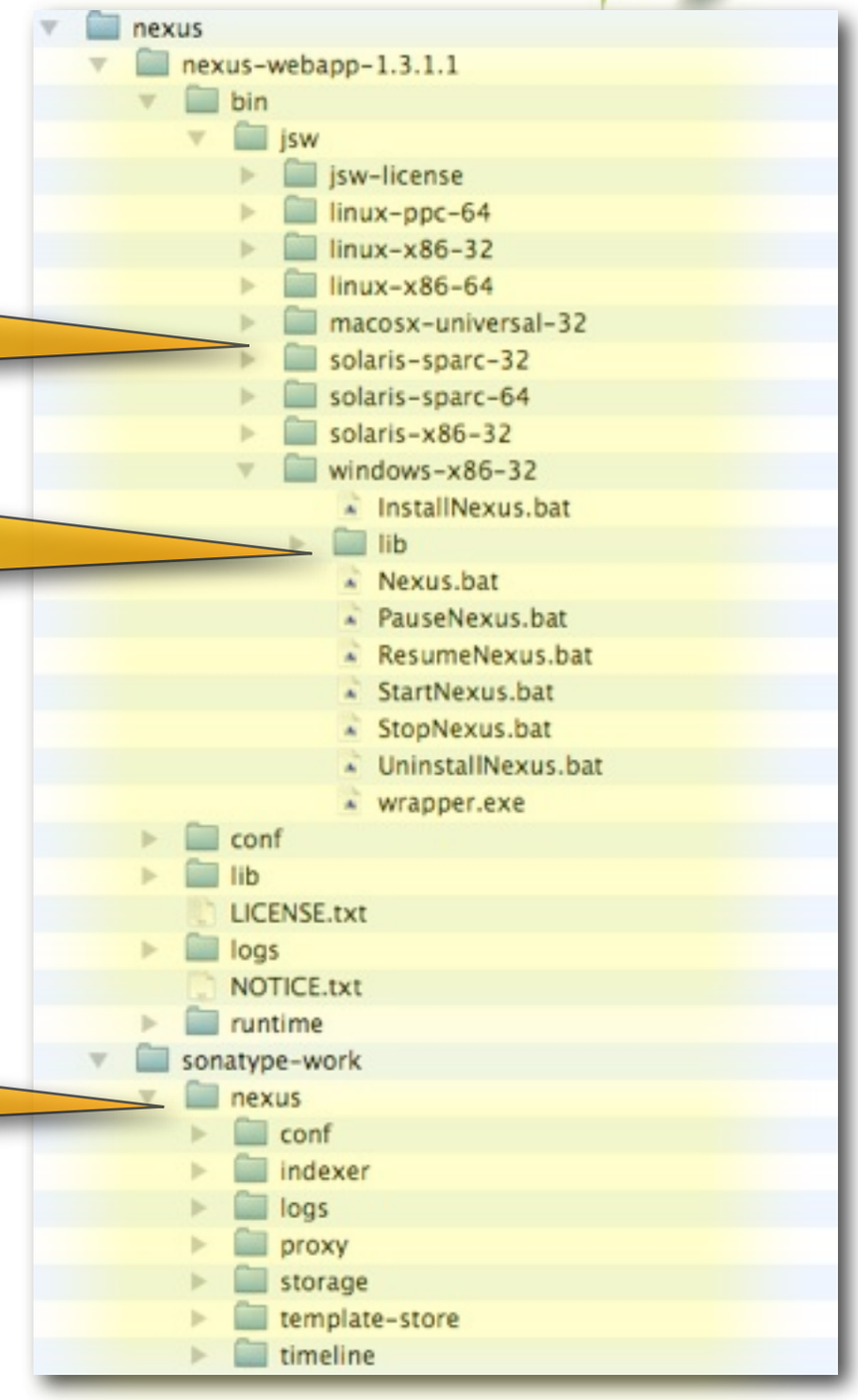
Installing Nexus

- Installing and running Nexus
  - The Nexus directory structure

Nexus binaries

Scripts for each O/S

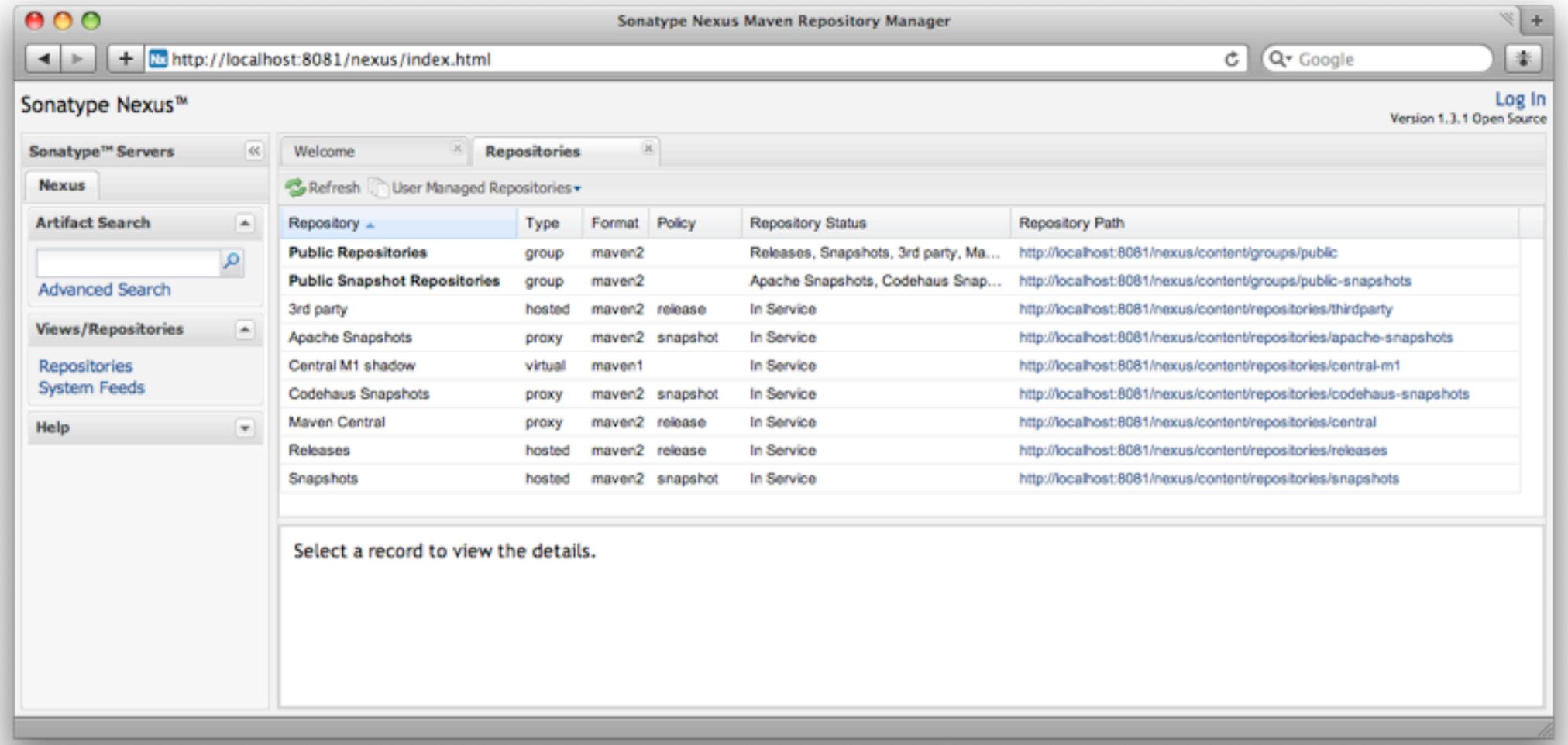
Local workspace



Using Nexus

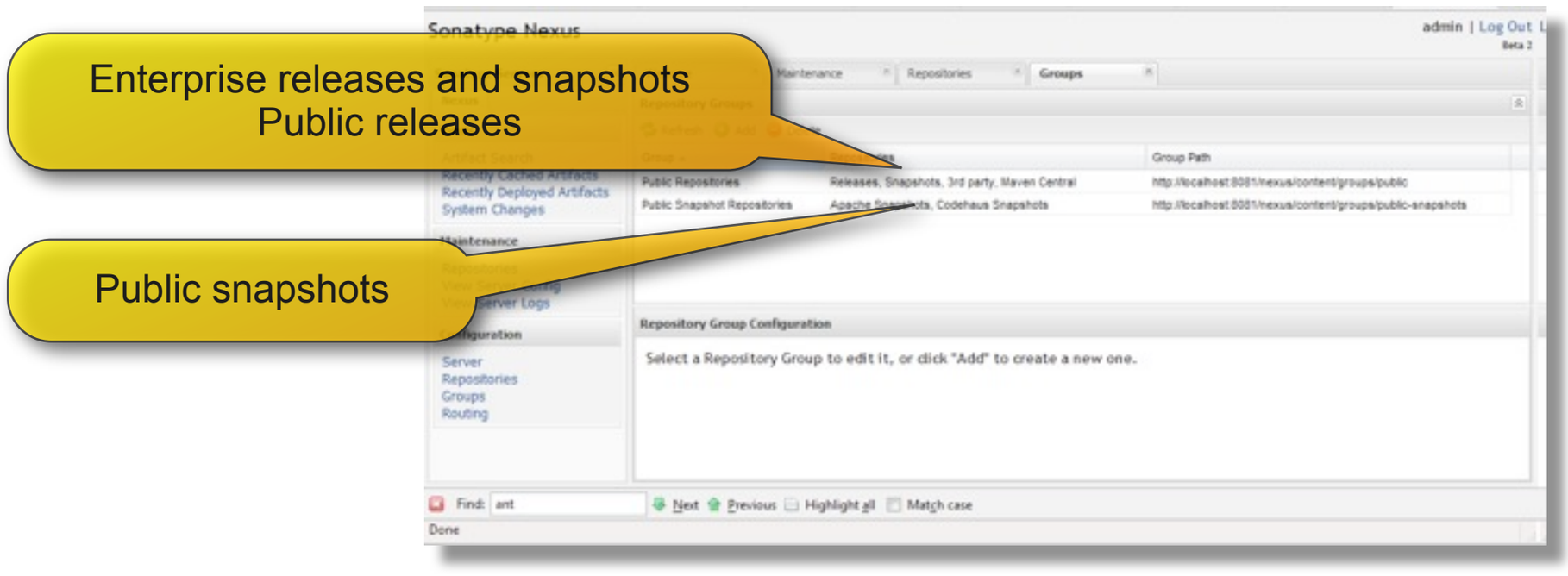
Using Nexus

- Browsing the Nexus repositories
  - Nexus comes with many repositories pre-configured



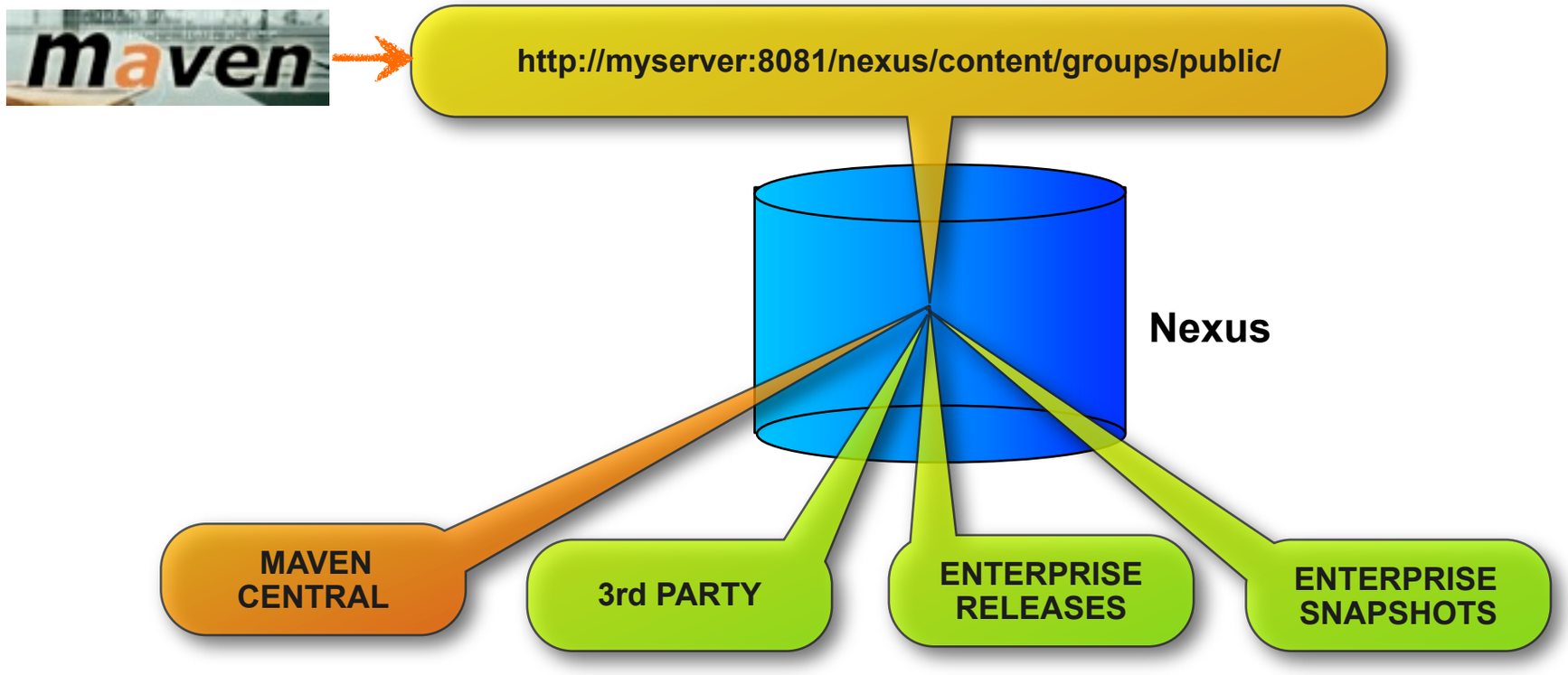
Using Nexus

- Repository Groups
  - Repositories are organized into groups
  - Two groups are predefined: Public Repositories and Public Snapshot Repositories



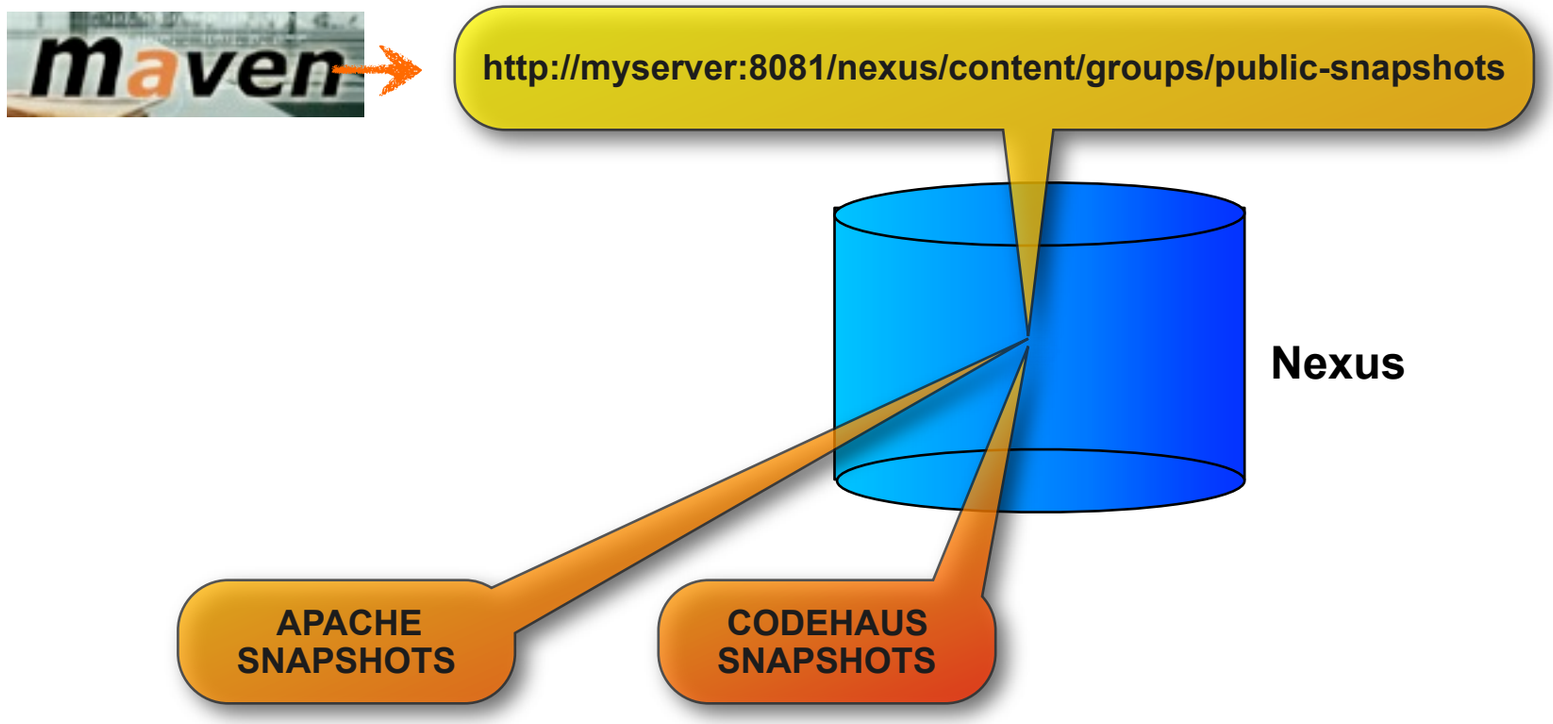
Using Nexus

- Repository Groups
  - Groups are accessed via their URLs
    - The public repository:



Using Nexus

- Repository Groups
  - Groups are accessed via their URLs
    - The public snapshot repository:



Using Nexus

- Using Nexus with Maven
  - Define a mirror in your ~/.m2/settings.xml
  - Maven will now look in Nexus for artifacts coming from the Maven Central repository.

```
<settings>
    ...
    <mirrors>
        <mirror>
            <id>Nexus</id>
            <name>Nexus Public Mirror</name>
            <url>http://localhost:8081/nexus/content/groups/public</url>
            <mirrorOf>central</mirrorOf>
        </mirror>
    </mirrors>
</settings>
```

Using Nexus

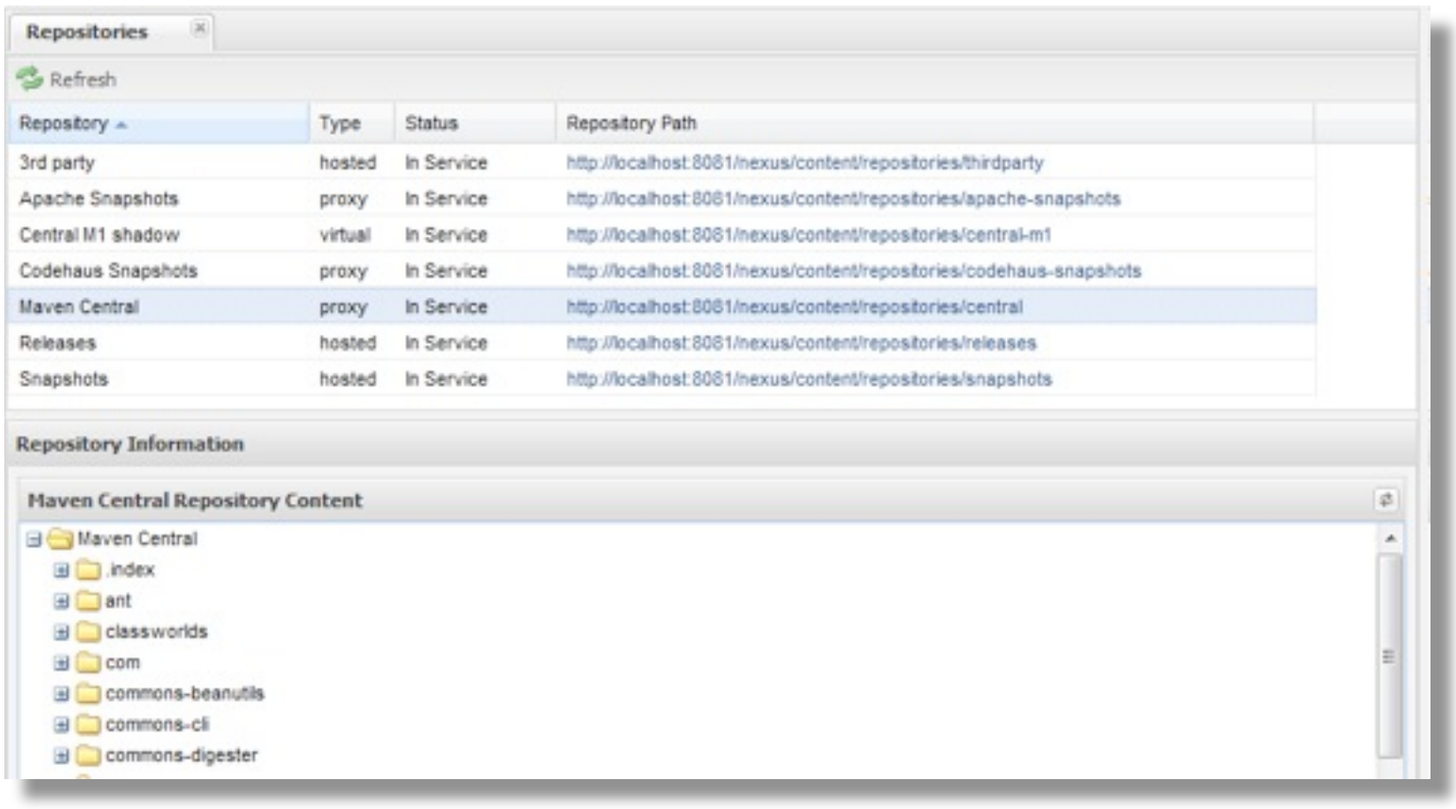
- Using Nexus with Maven
  - Or use a wildcard mirror setting
  - Maven will now get ALL dependencies from here

```
<settings>
    ...
    <mirrors>
        <mirror>
            <id>Nexus</id>
            <name>Nexus Public Mirror</name>
            <url>http://localhost:8081/nexus/content/groups/public</url>
            <mirrorOf>*</mirrorOf>
        </mirror>
    </mirrors>
</settings>
```

Managing Nexus

Managing Nexus

- The Nexus Repositories
  - Nexus handles several types of repository



Managing Nexus

- The Nexus Repositories
  - Nexus handles several types of repository
    - Proxy repositories
    - Hosted repositories
    - Virtual repositories

Managing Nexus

- The Nexus Repositories – Proxy repositories
  - Proxies for public repositories on the internet
    - Central Maven repository
    - Apache snapshots
    - Codehaus snapshots

Managing Nexus

- The Nexus Repositories – Hosted repositories
  - JARs hosted on the Nexus server
  - Used for internal or 3rd party JARs, eg Oracle JDBC libraries
    - 3rd party
    - Snapshots
    - Releases

Managing Nexus

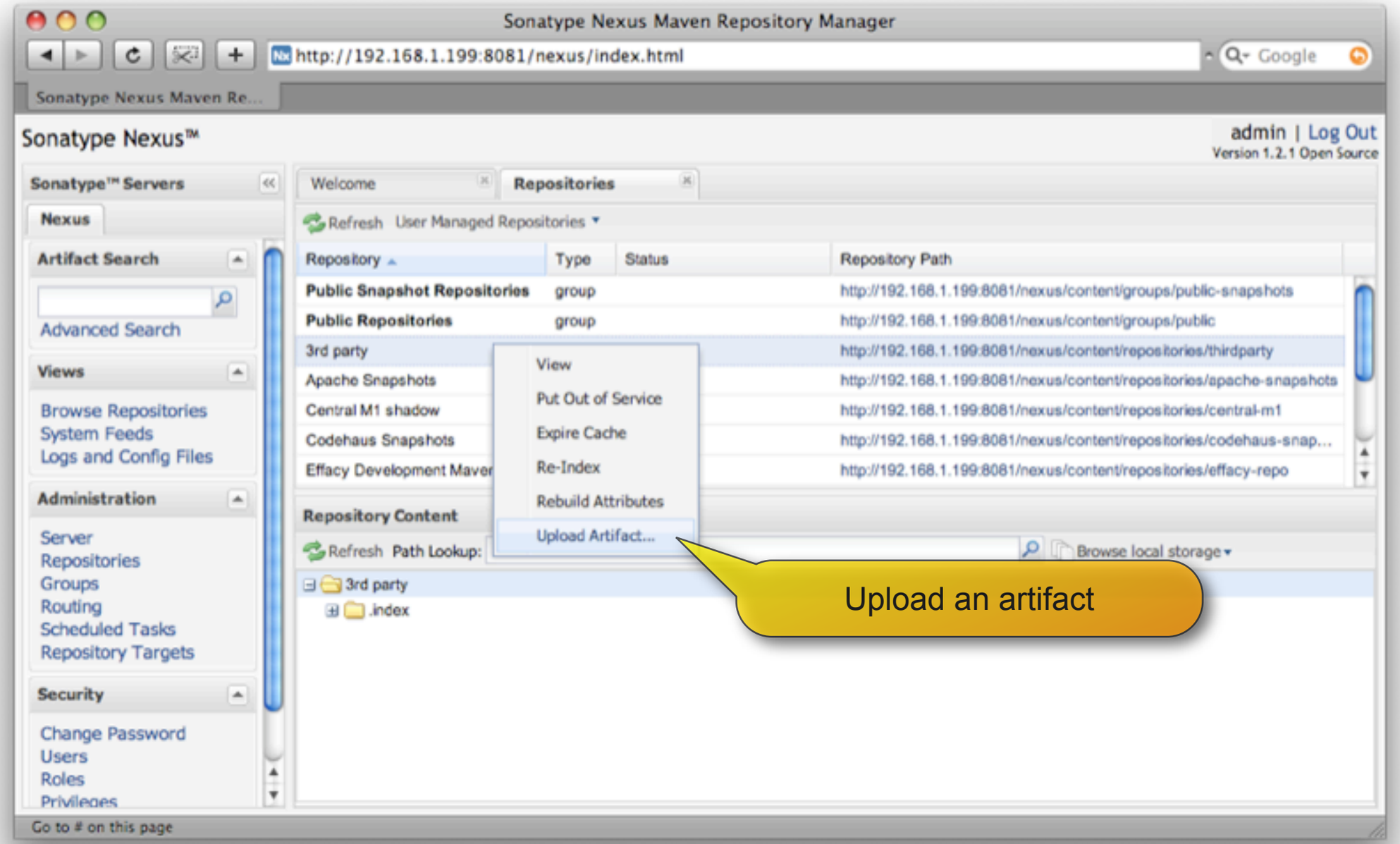
- The Nexus Repositories – Virtual repositories
  - Used to connect to old Maven 1 repositories

Managing Nexus

- The Nexus Repositories – uploading an artifact
  - Manually upload a third-party library
    - Some common libraries cannot be listed on the public repositories due to licensing issues:
      - JTA
      - JMS
      - Proprietary JDBC drivers (Oracle...)
- Allow vendors to deliver their libraries into your repository

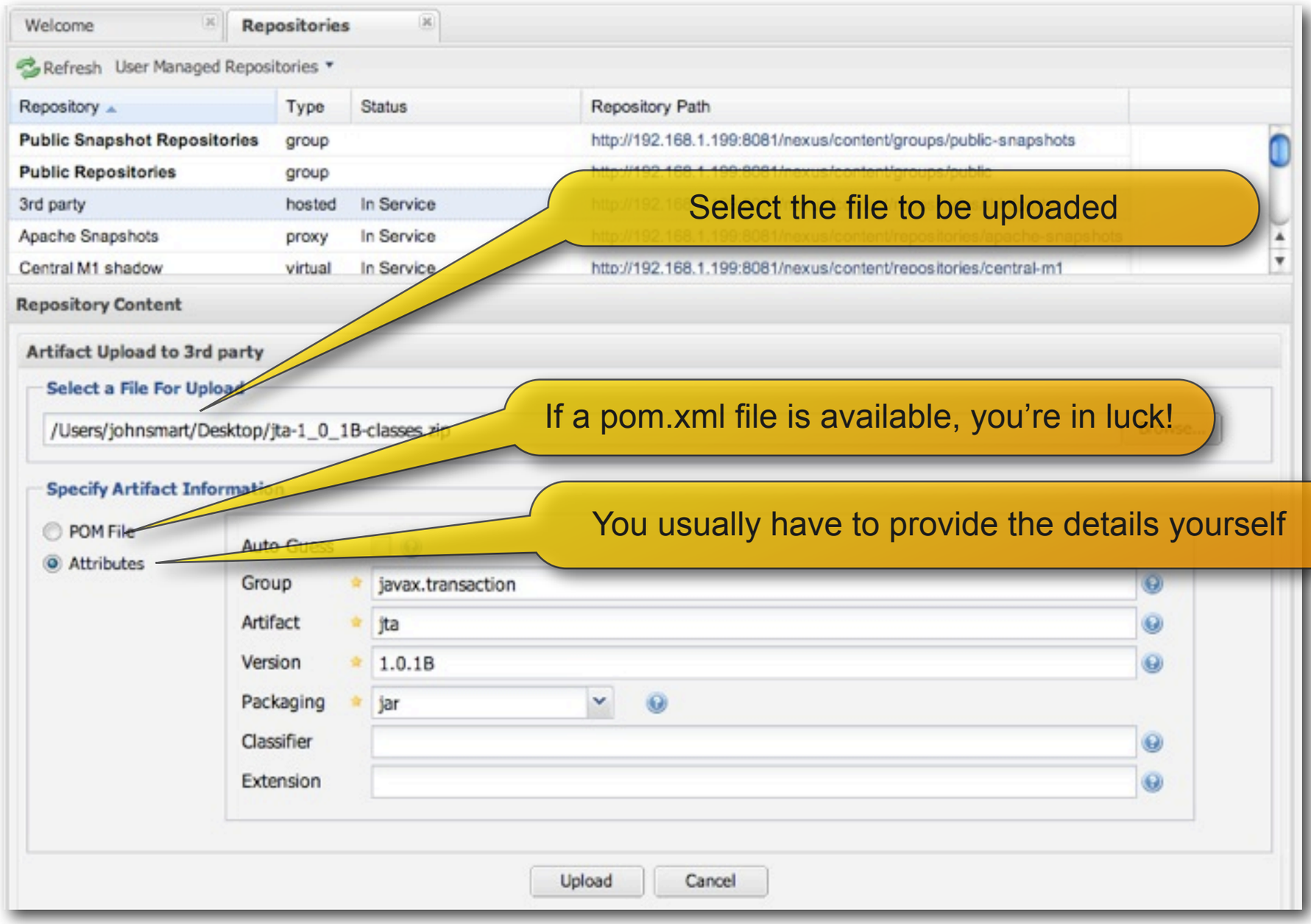
Managing Nexus

- The Nexus Repositories – uploading an artifact



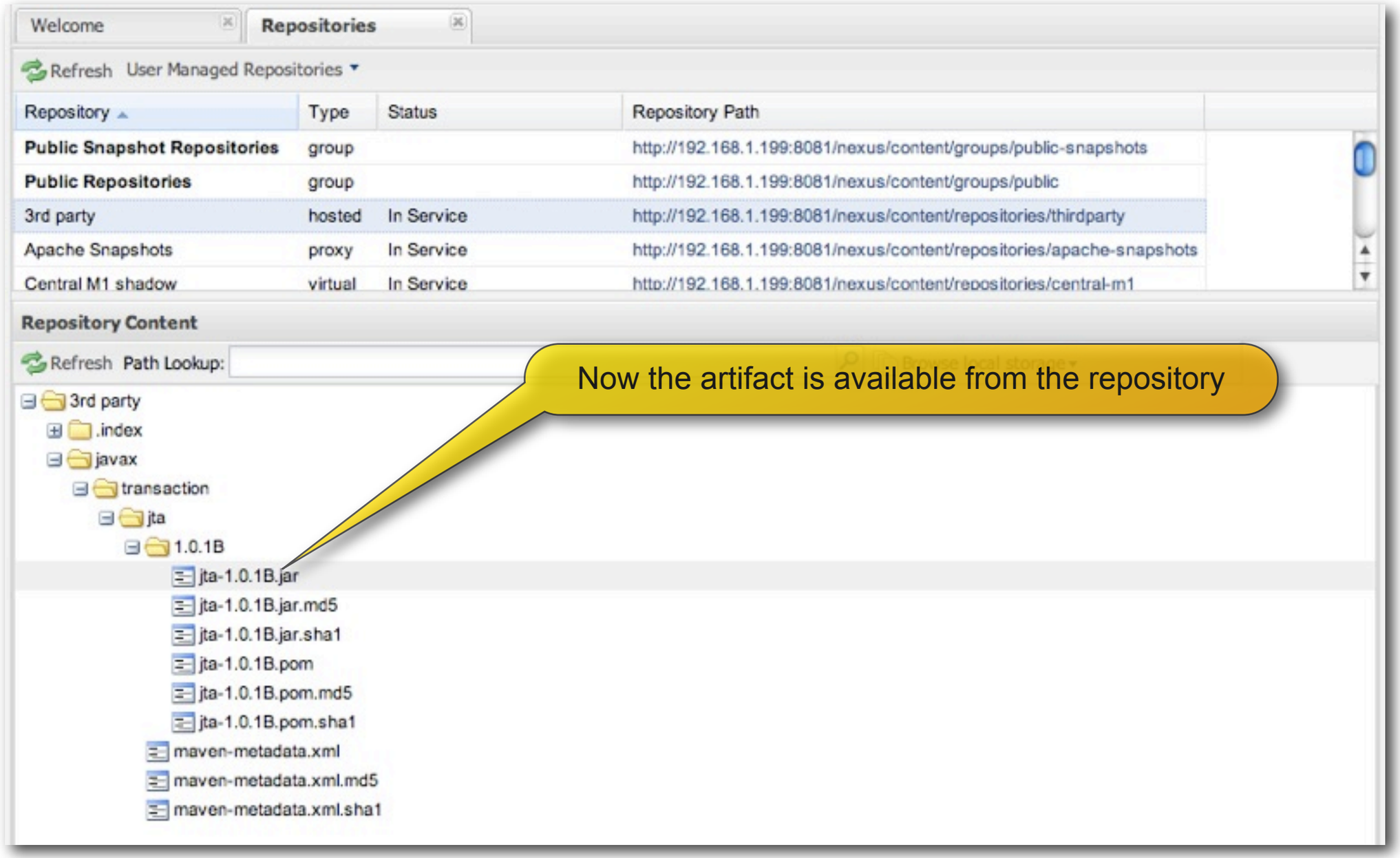
Managing Nexus

- The Nexus Repositories – uploading an artifact



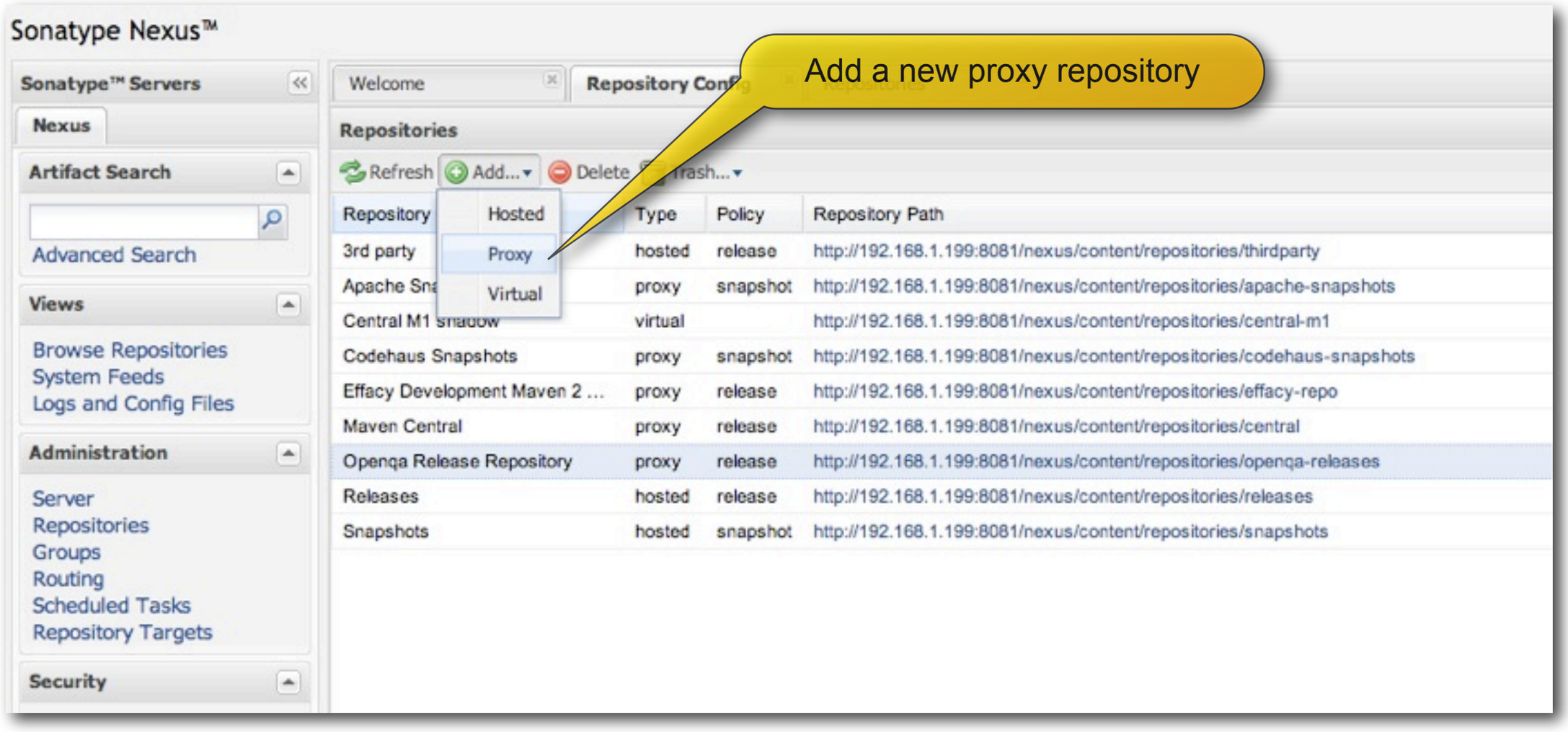
Managing Nexus

- The Nexus Repositories – uploading an artifact



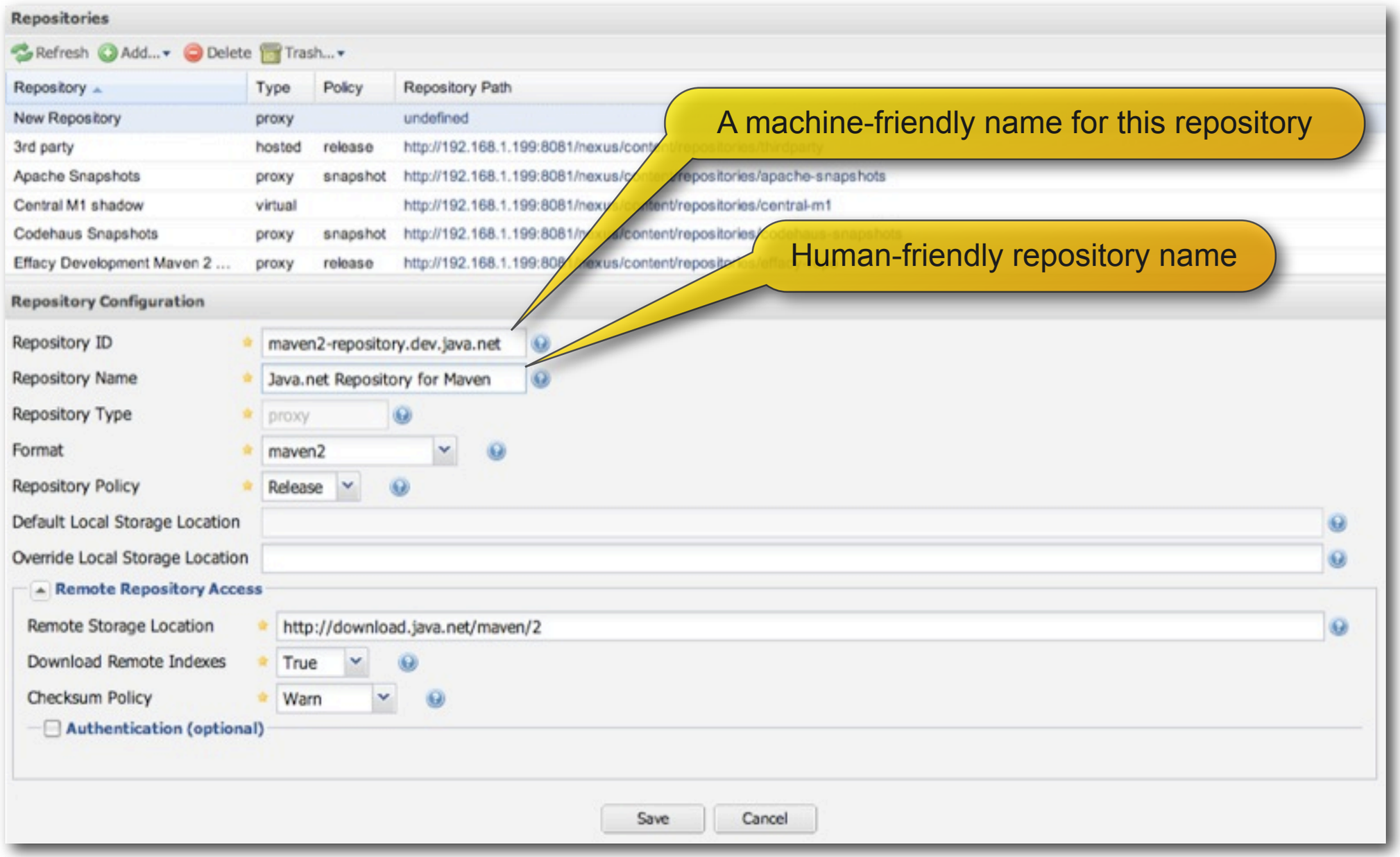
Managing Nexus

- The Nexus Repositories – adding a new repository



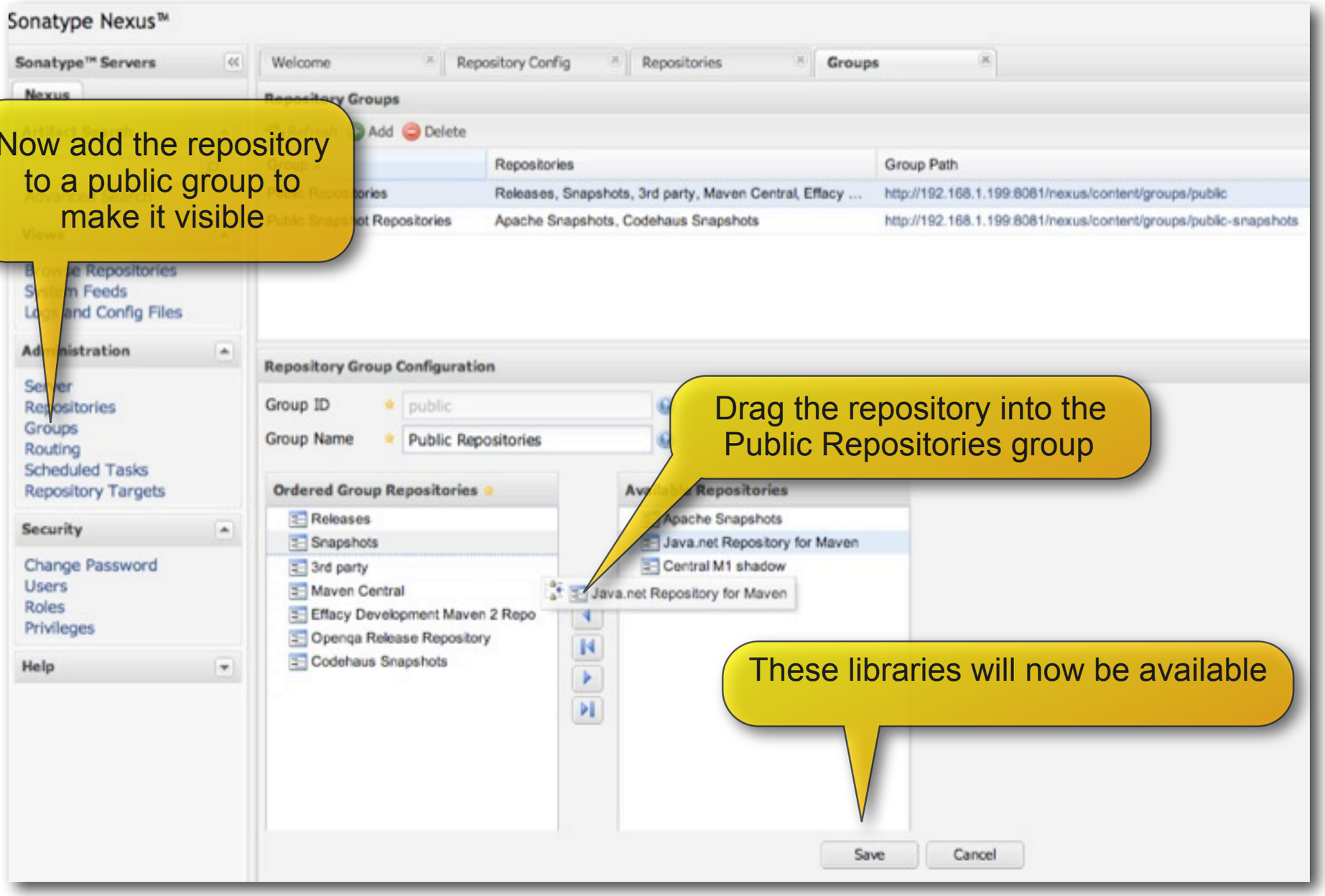
Managing Nexus

- The Nexus Repositories – adding a new repository



Managing Nexus

- The Nexus Repositories – adding a new repository



Deploying to Nexus

Deploying your application

- The Maven deployment process
  - Install in your local repository

```
$ mvn install
```

Available for other projects or modules on your machine

  - Then deploy to a remote server

```
$ mvn deploy
```

Available for other developers

Deploying your application

- Deploying to a Nexus repository

```
<project>
    ...
    <distributionManagement>
        <repository>
            <id>releases</id>
            <name>Internal Releases</name>
            <url>http://buildserver:8081/nexus/content/repositories/releases</url>
        </repository>
    </distributionManagement>
</project>
```

Nexus Repository Server URL

Target repository

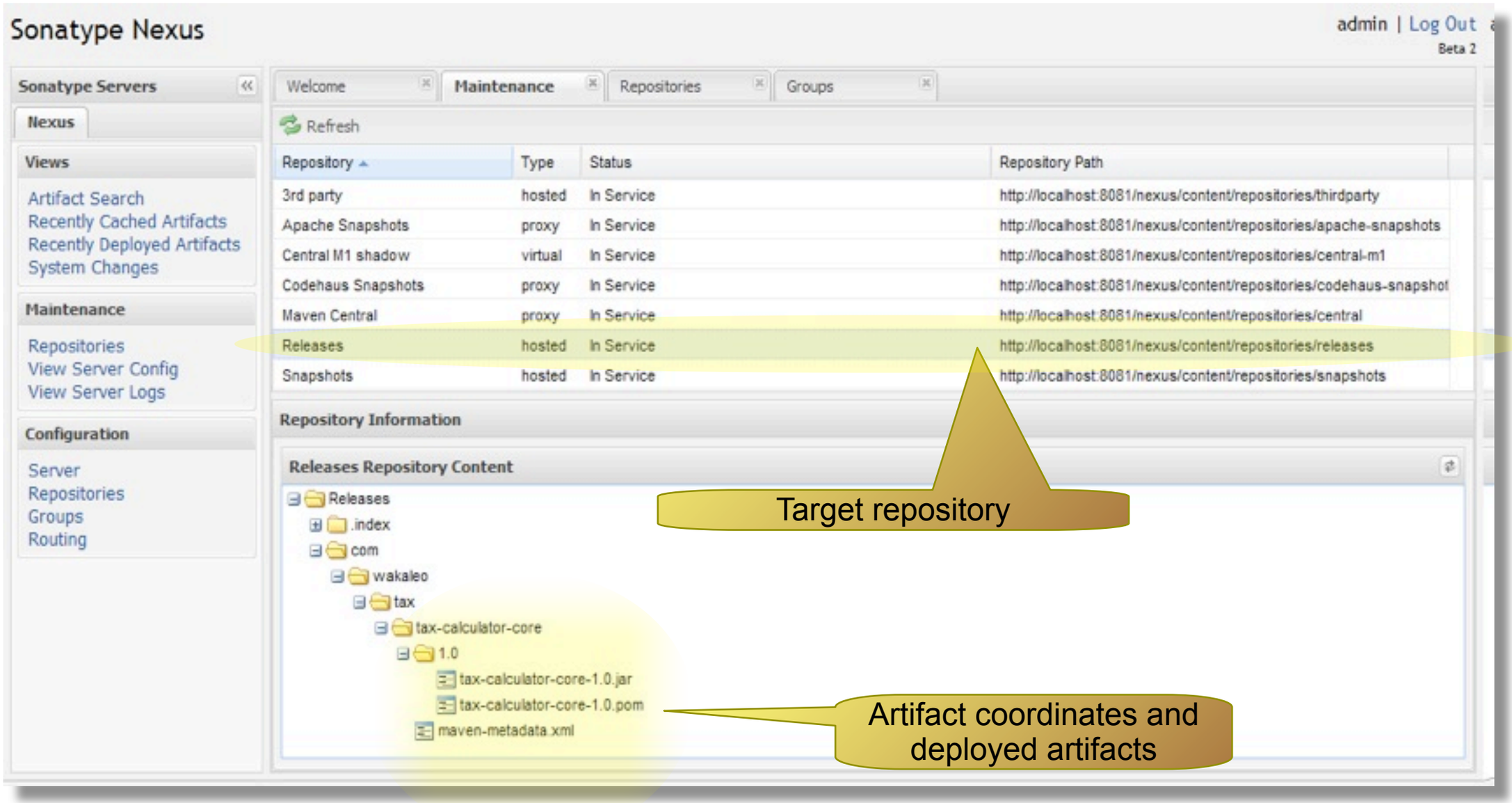
settings.xml

```
<settings>
   ...
   <servers>
     <server>
       <id>releases</id>
       <username>admin</username>
       <password>admin123</password>
     </server>
   </servers>
   ...
</settings>
```

You also need to configure an (appropriate) username and password for this server

Deploying your application

- Deploying to a Nexus repository
  - Artifacts are deployed to the Nexus server



labs

- Lab 14 - Using Nexus

Maven Intermediate Concepts

Part 12

Automating the Release Process

Snapshots and Releases

Release Management

- Snapshots and releases
  - A SNAPSHOT represents work in progress
    - Each release produces a new time-stamped artifact
    - Snapshot versions are identified by the SNAPSHOT keyword

```
<project>
    ...
    <groupId>com.sonatype.training</groupId>
    <artifactId>babble</artifactId>
    <packaging>pom</packaging>
    <version>1.0-SNAPSHOT</version>
    ...
```

A SNAPSHOT version

Release Management

- Snapshots and releases
  - A RELEASE represents a finished product
    - A stable, tested and officially released artifact
    - A released artifact is unique

```
<project>
    ...
    <groupId>com.sonatype.training</groupId>
    <artifactId>babble</artifactId>
    <packaging>pom</packaging>
    <version>1.0</version>
    ...
```

A RELEASE version

Release Management

- Deploying a snapshot
  - Snapshots can only be deployed to a Snapshot repository
  - Needs to be configured in the `<distributionManagement>` section

```
<project>
    ...
    <distributionManagement>
       <snapshotRepository>
            <id>local-snapshots</id>
            <name>Internal Snapshots</name>
            <url>http://localhost:8081/nexus/content/repositories/snapshots</url>
        </snapshotRepository>
        ...
    </distributionManagement>
    ...
```

Define where snapshots should go

settings.xml

```
<settings>
   ...
   <servers>
     <server>
       <id>local-snapshots</id>
       <username>admin</username>
       <password>admin123</password>
     </server>
   </servers>
   ...
</settings>
```

And configure an (appropriate) username and password for this server

Release Management

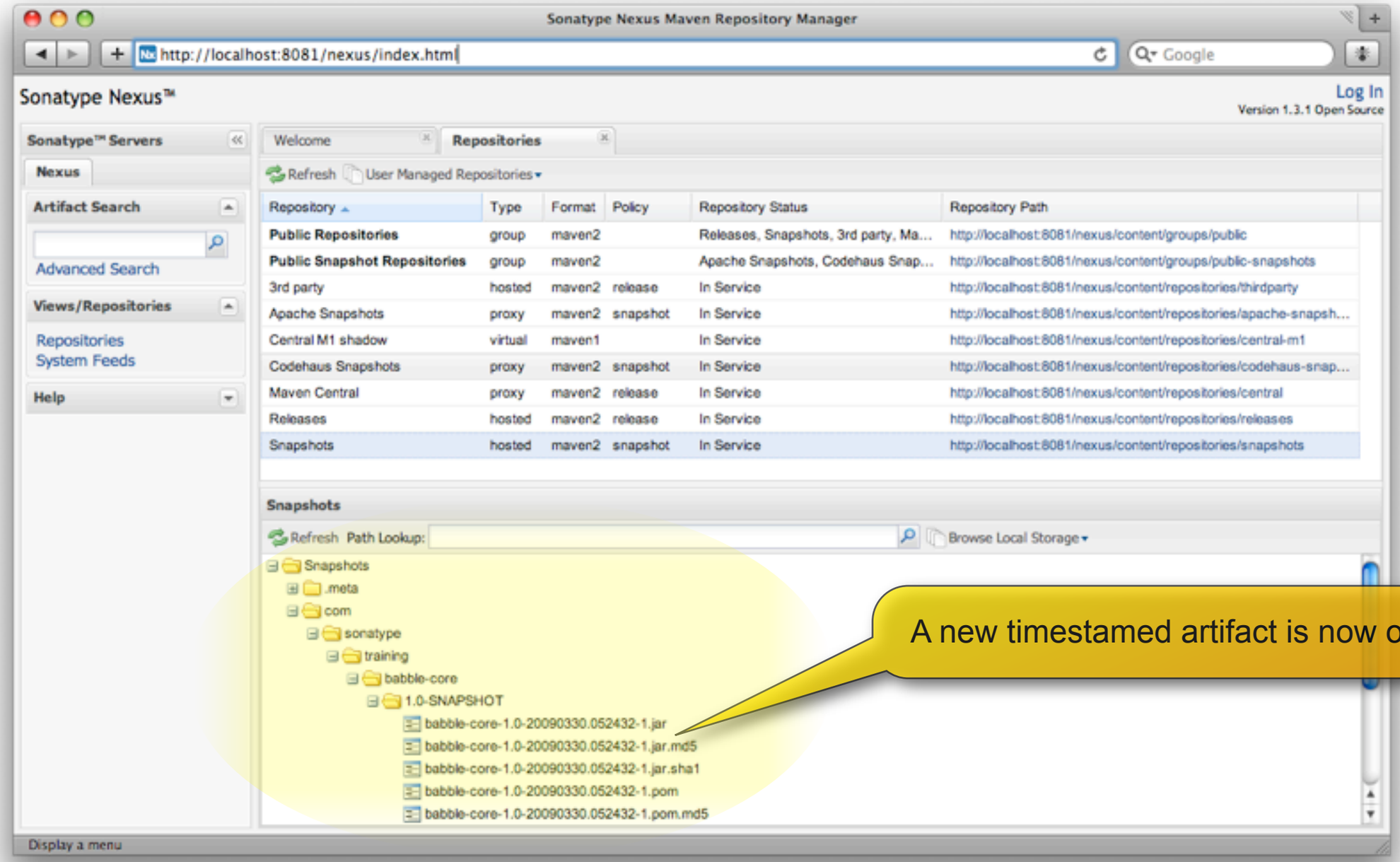
- Deploying a snapshot
  - Now use **mvn deploy** to deploy your SNAPSHOT

```
$ mvn deploy
[INFO] Scanning for projects...
[INFO] ------------------------------------------------------------------------
[INFO] Building babble-core
[INFO]    task-segment: [deploy]
[INFO] ------------------------------------------------------------------------
...
Uploading: http://localhost:8081/nexus/content/repositories/snapshots/com/sonatype/training/
babble-core/1.0-SNAPSHOT/babble-core-1.0-20090330.052432-1.jar
3K uploaded  (babble-core-1.0-20090330.052432-1.jar)
...
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------------
```

Uploading snapshot to Nexus

Release Management

- Deploying a snapshot




Automating
Releases

Release Management

- Automating releases
  - Deploying a release involves a number of standard steps:
    - Commit all current changes to Subversion
    - Update the version number (release version) and commit the changes
    - Tag the release version
    - Build and deploy this version
    - Update the version number (development version) and commit the changes

Release Management

- Use the maven-release-plugin to automate these steps
  - Uses the SCM block in your pom.xml file

```
<scm>
    <connection>scm:svn:https://myserver/.../trunk/babble</connection>
    <developerConnection>scm:svn:https://myserver/...trunk/babble</developerConnection>
</scm>
```

  - Also works fine with other version control systems

```
<scm>
    <connection>scm:git:git://github.com/someproj/babble.git</connection>
    <developerConnection>scm:git:git://github.com/someproj/babble.git</developerConnection>
</scm>
```

Using git

  - Easy to configure

```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-release-plugin</artifactId>
    <configuration>
       <tagBase>https://myserver/.../releases/babble</tagBase>
       <username>${scm.username}</username>
       <password>${scm.password}</password>
    </configuration>
</plugin>
```

(Optional) Releases go here

Authentication (property values go in settings.xml)

Release Management

- Use the maven-release-plugin with multi-module projects
  - Sometimes needs a little extra configuration

```
<plugin>
    <groupId>org.apache.maven.plugins</groupId>
    <artifactId>maven-release-plugin</artifactId>
    <configuration>
       <preparationGoals>clean verify install</preparationGoals>
    </configuration>
</plugin>
```

Multi-module projects may need this option

Release Management

- Preparing a release

```
$ mvn release:prepare
```

  - Maven will:
    - Check that there is no uncommitted code
    - Check that there are no snapshot dependencies
    - Ask you to confirm the release version, release tag, and new development version

Release Management

- Preparing a release - release:prepare in action

```
$ mvn release:prepare
[INFO] Scanning for projects...
[INFO] Reactor build order:
[INFO]   babble
[INFO]   babble-core
[INFO]   babble-services
[INFO]   babble web application
[INFO] ------------------------------------------------------------------------
[INFO] Building babble
[INFO]    task-segment: [release:prepare] (aggregator-style)
[INFO] ------------------------------------------------------------------------
[INFO] [release:prepare]
[INFO] Resuming release from phase 'map-release-versions'
What is the release version for "babble"? (com.sonatype.training:babble) 1.0.5: :
What is the release version for "babble-core"? (com.sonatype.training:babble-core)
1.0.5: :
What is the release version for "babble-services"?
(com.sonatype.training.babble:babble-services) 1.0.5: :
What is the release version for "babble web application"?
(com.sonatype.training:babble-web) 1.0.5: :
What is SCM release tag or label for "babble"? (com.sonatype.training:babble)
babble-1.0.5: :
What is the new development version for "babble"? (com.sonatype.training:babble)
1.0.6-SNAPSHOT: :
What is the new development version for "babble-core"?
(com.sonatype.training:babble-core) 1.0.6-SNAPSHOT: :
What is the new development version for "babble-services"?
(com.sonatype.training.babble:babble-services) 1.0.6-SNAPSHOT: :
What is the new development version for "babble web application"?
(com.sonatype.training:babble-web) 1.0.6-SNAPSHOT: :
...
[INFO] Working directory: /Users/someuser/labs/labs-git
[INFO] Executing: /bin/sh -c cd /Users/someuser/labs/labs-git && git push
[INFO] Working directory: /Users/someuser/labs/labs-git
[INFO] Release preparation complete.
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------------
```

Confirm the release version numbers

Confirm the release tag

Confirm the new development version numbers

Update the SCM

Release Management

- Preparing a release

```
$ mvn release:prepare
```

  - Maven will also:
    - Update the SNAPSHOT version number to a release version number
    - Perform a build to verify everything is ok
    - Commit the modified POMs to the SCM
    - Create a tag in the SCM for this release
    - Update the POM version number to the next SNAPSHOT version
    - Commit the modified POMs to the SCM

Release Management

- Preparing a release in batch mode

```
$ mvn release:prepare -B
```

  - Maven will use the default version numbers
  - Useful for a Continuous Integration environment

Release Management

- Deploying the release

```
$ mvn release:perform
```

  - Maven will
    - Checkout the release we just tagged
    - Build the application
    - Deploy the application

labs

- Lab 15 - Automating Releases

Maven Intermediate Concepts

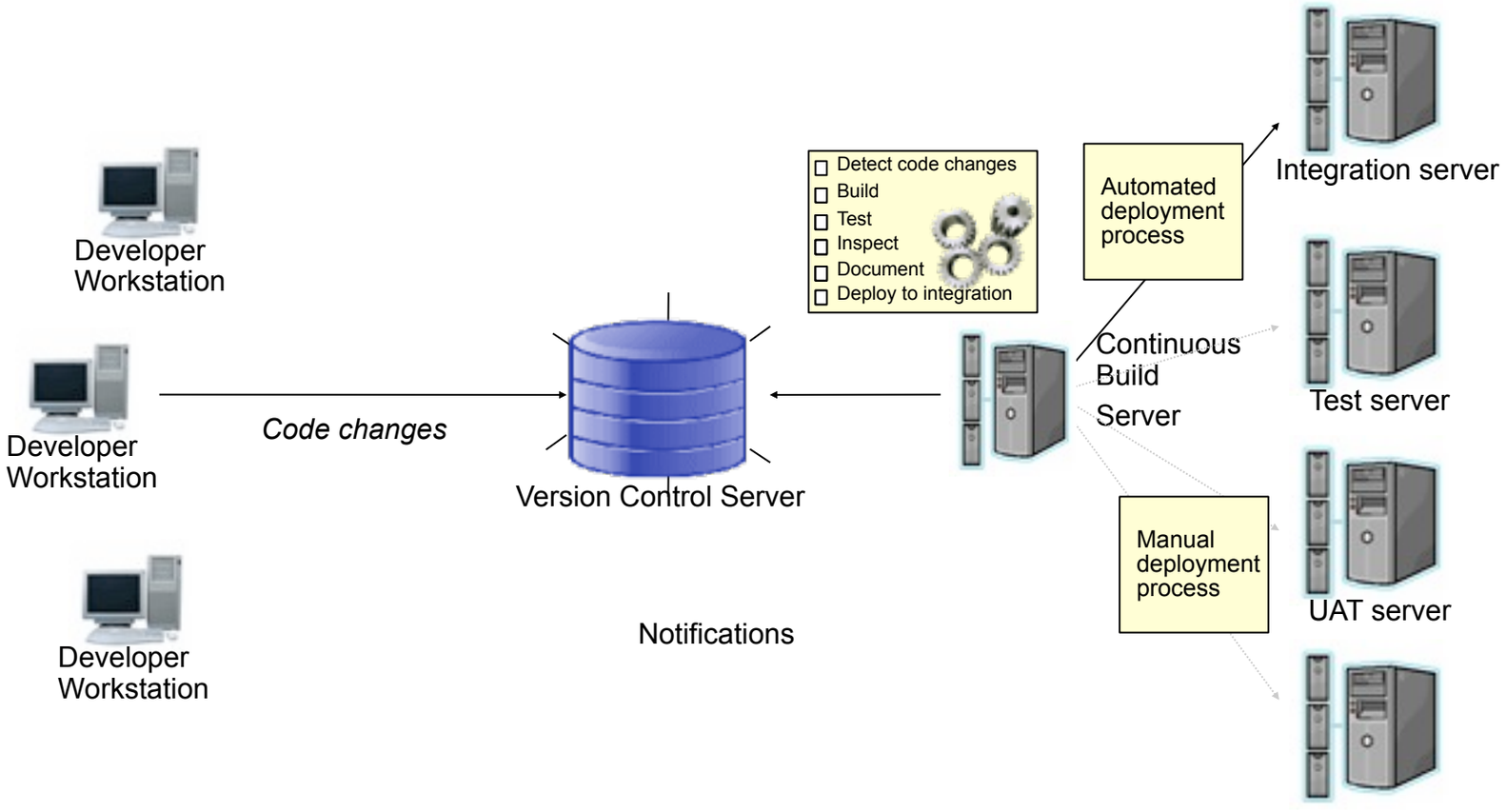
Part 13

Continuous Integration with Hudson

Continuous Integration

Continuous Integration

- What is Continuous Integration?



Continuous Integration

- Benefits of Continuous Integration?
  - Continuous Integration – an industry best practice
    - Smoother integration
    - Automatic regression testing
    - Regular working releases
    - Earlier functional testing
    - Faster and easier bug fixes
    - Better visibility

Hudson

Continuous Integration

- Introducing Hudson
  - An open source Continuous Integration server
    - Easy to install
    - Easy to configure
    - Stores artifacts
    - Nice reporting features
    - Distributed builds
    - Lots of plugins

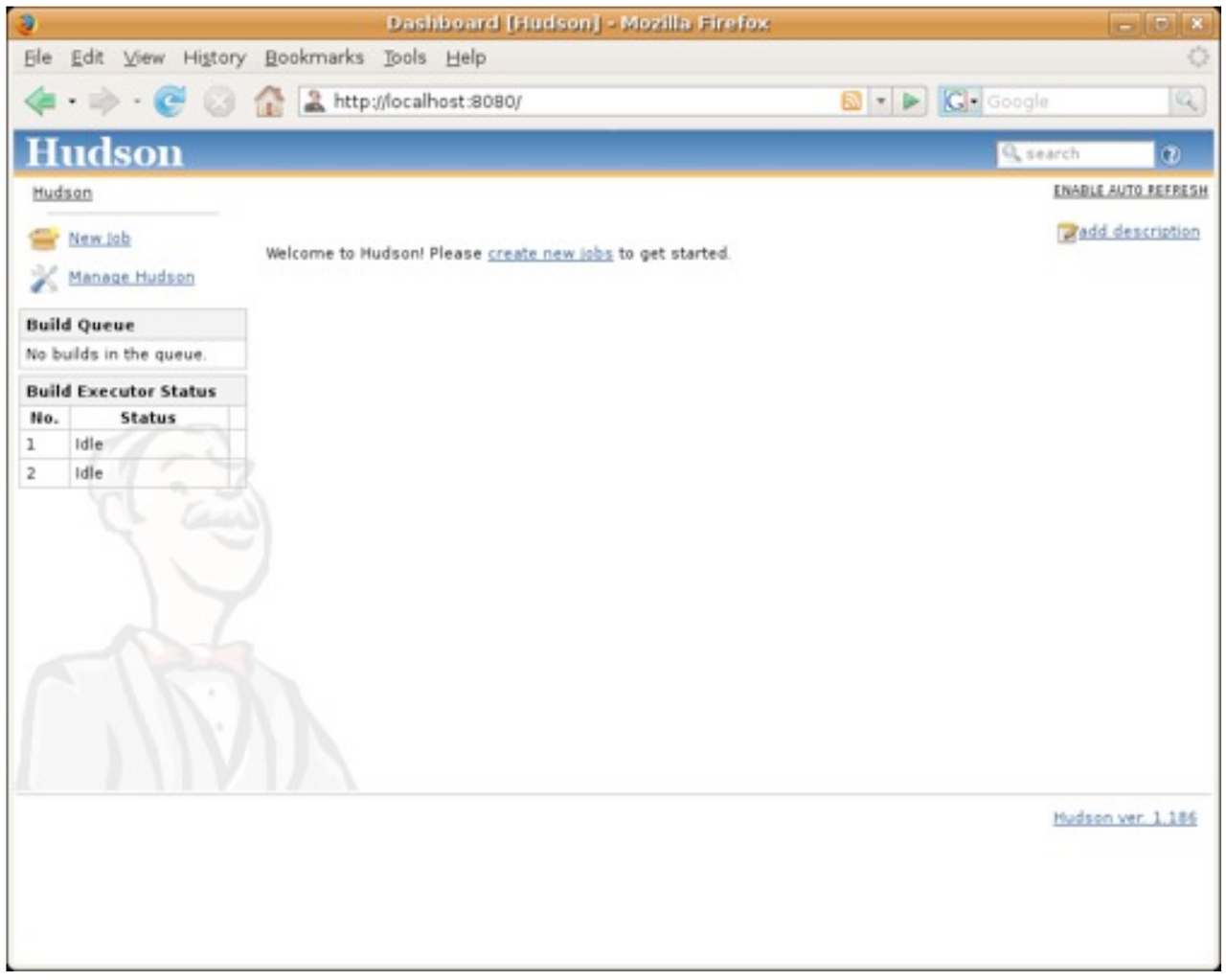
Continuous Integration

- Installing Hudson
  - Download the hudson.war file from the website
  - Two installation options
    - As a stand-alone application
    - Running in a servlet container

Continuous Integration

- Running Hudson as a stand-alone application
  - Run from the command line
  - Uses an embedded web server

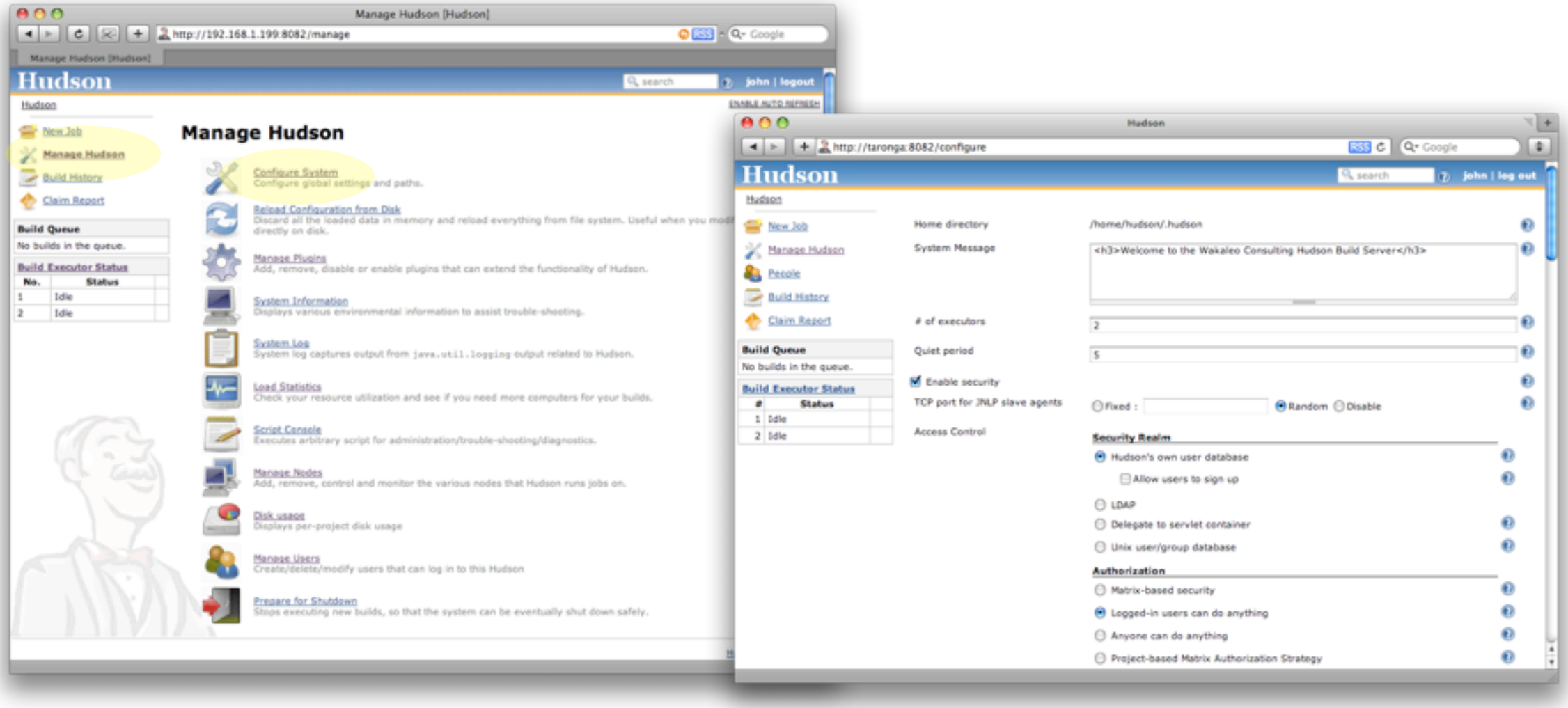
```
$ java -jar hudson.war
```



Hudson & Maven

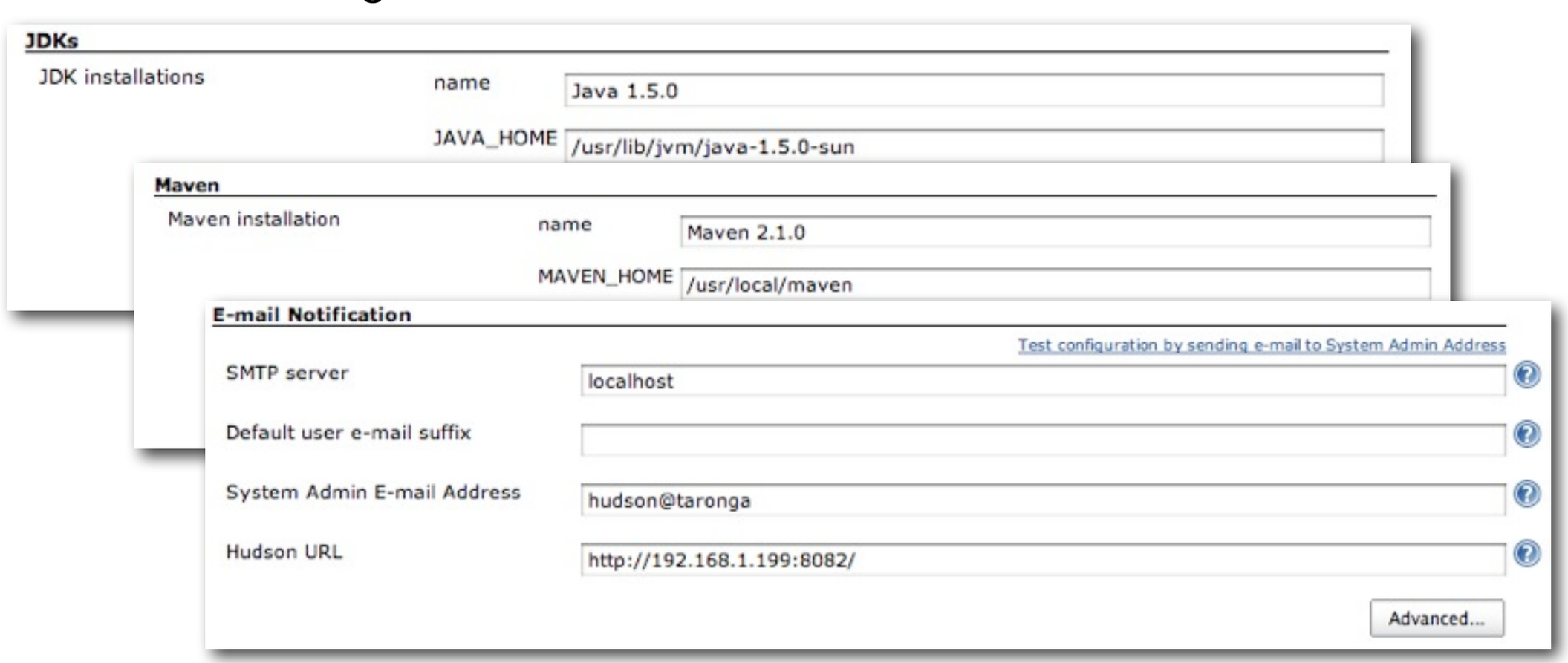
Continuous Integration

- Configuring Hudson for Maven
  - Hudson configuration is done in the *Manage Hudson* screen
  - To set up Java and Maven, go to the *Configure System* screen



Continuous Integration

- Configuring Hudson for Maven
  - The main things to configure are:
    - JDK installation(s)
    - Maven installation(s)
    - Mail server configuration

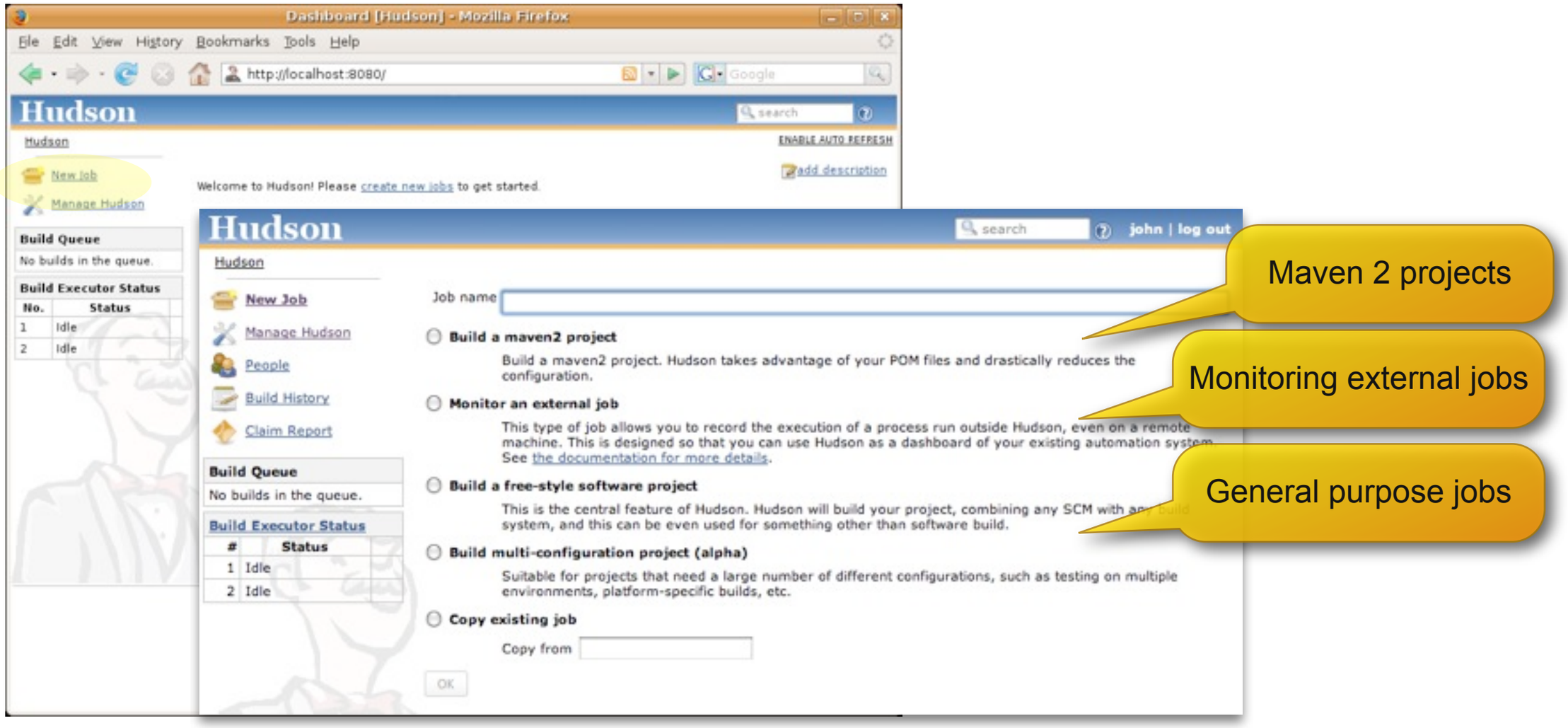


Continuous Integration

- Hudson build jobs
  - A job is a particular execution of an automated script
  - A project may require several “jobs”

Continuous Integration

- Setting up a Maven build job in Hudson
  - Hudson has several types of build jobs

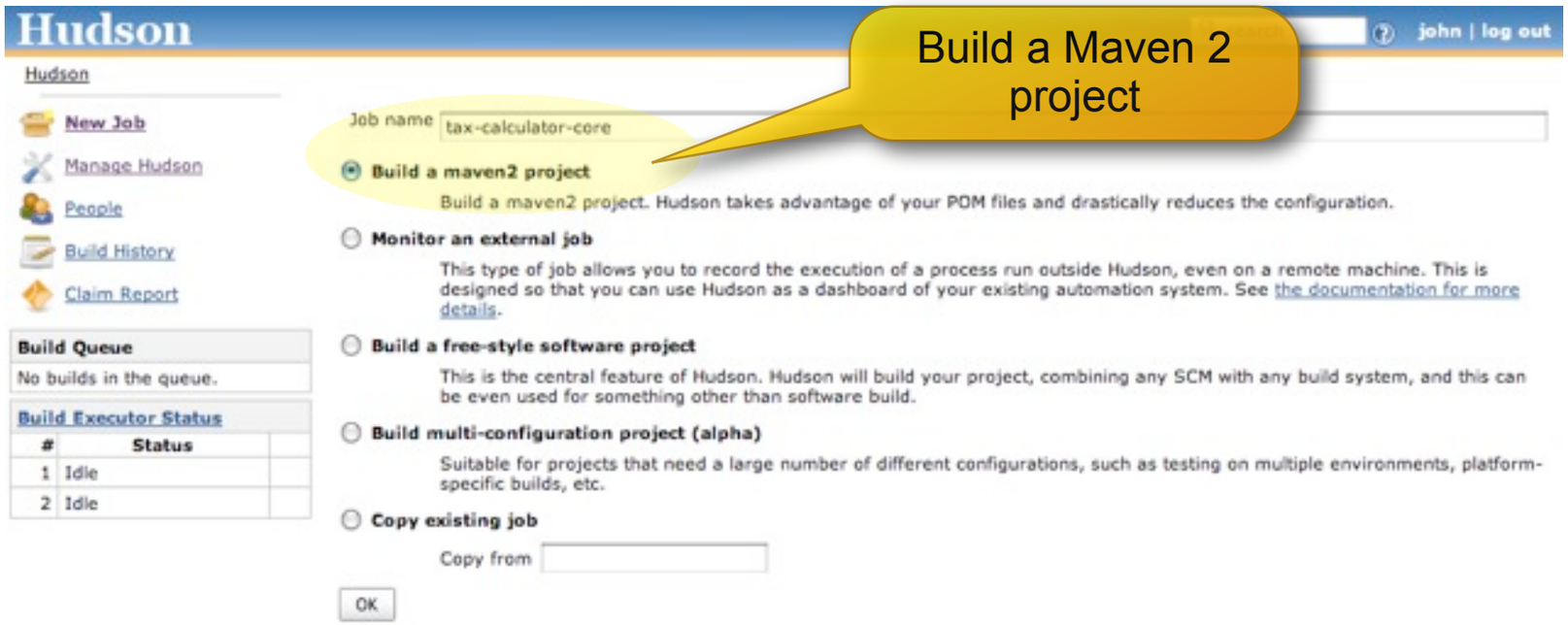


Continuous Integration

- Setting up a Maven build job in Hudson
  - Freestyle jobs
    - Build any type of projects (Ant, Maven, Makefile, Shell script...)
    - Work with all the reporting plugins
    - Require the most work to configure
  - Maven 2 jobs
    - Hudson reads the pom.xml file to make setting up the project easier.
    - Build projects in the correct order based on the Maven dependencies
    - Less reporting plugins are available than with free-style projects

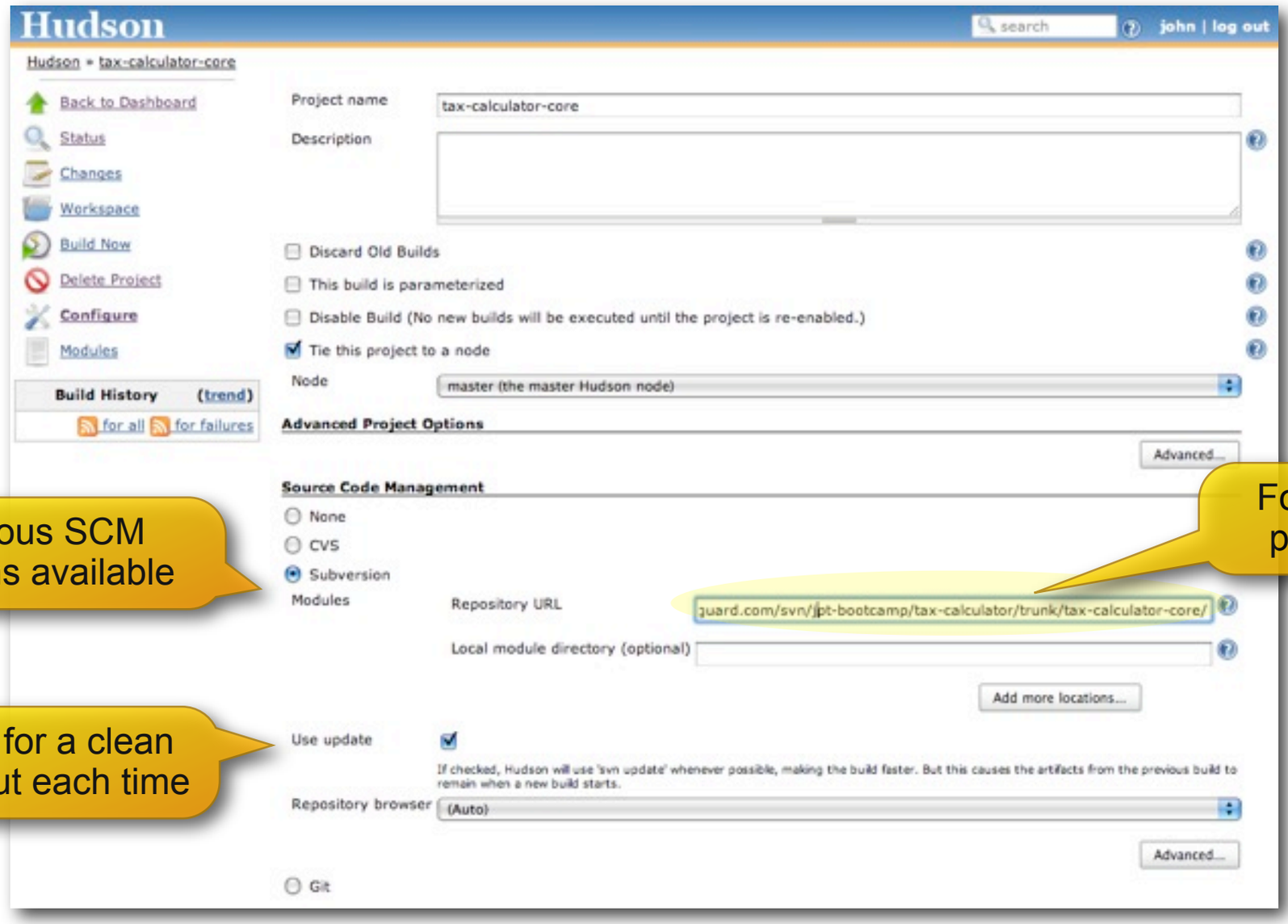
Continuous Integration

- Setting up a Maven build job in Hudson
  - Creating a new Maven build job



Continuous Integration

- Setting up a Maven build job in Hudson
  - Enter SCM details - where does the code come from?



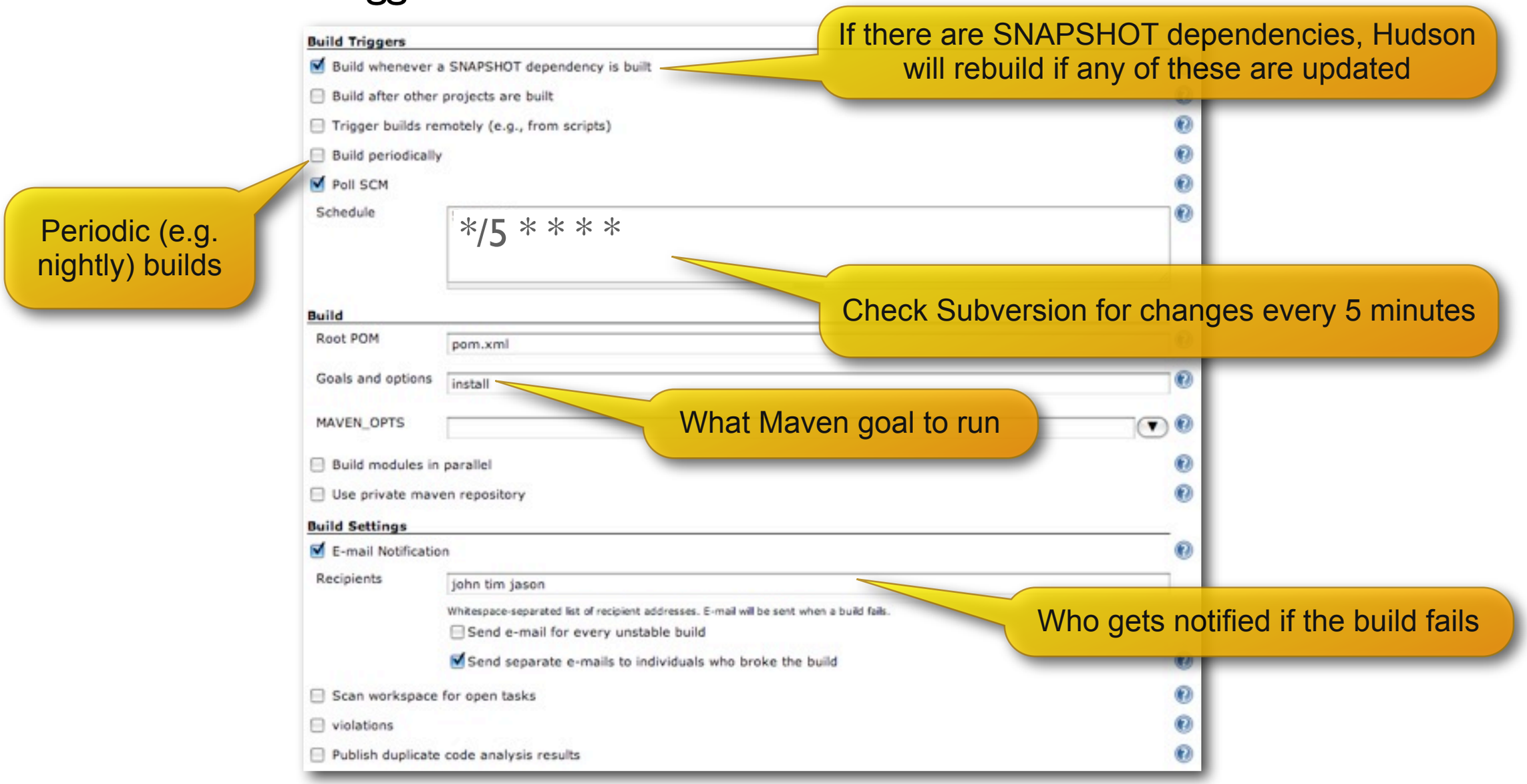
Various SCM options available

For Subversion, provide a URL

Untick for a clean checkout each time

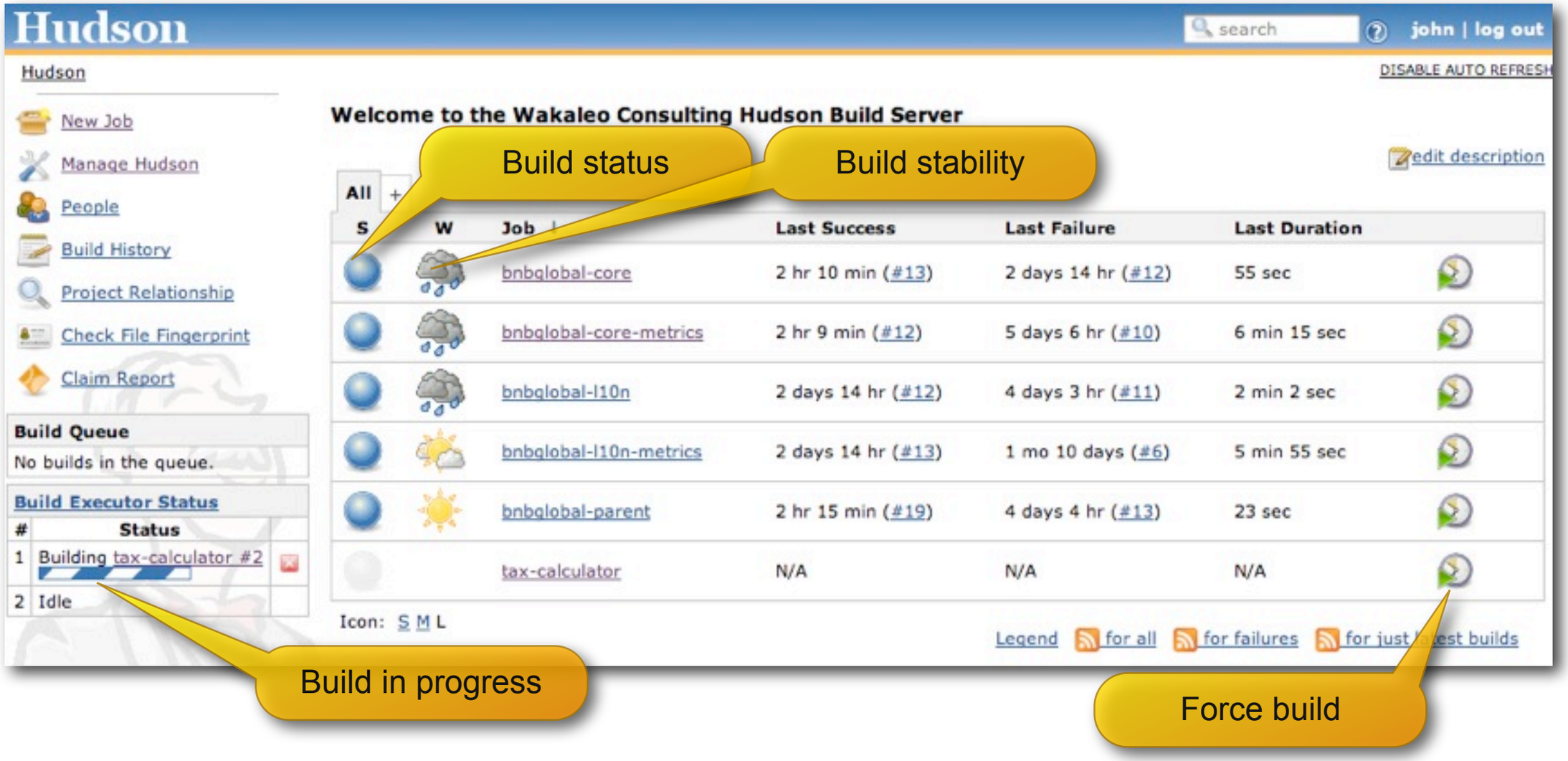
Continuous Integration

- Setting up a Maven build job in Hudson
  - Enter build triggers - when does the build kick off?



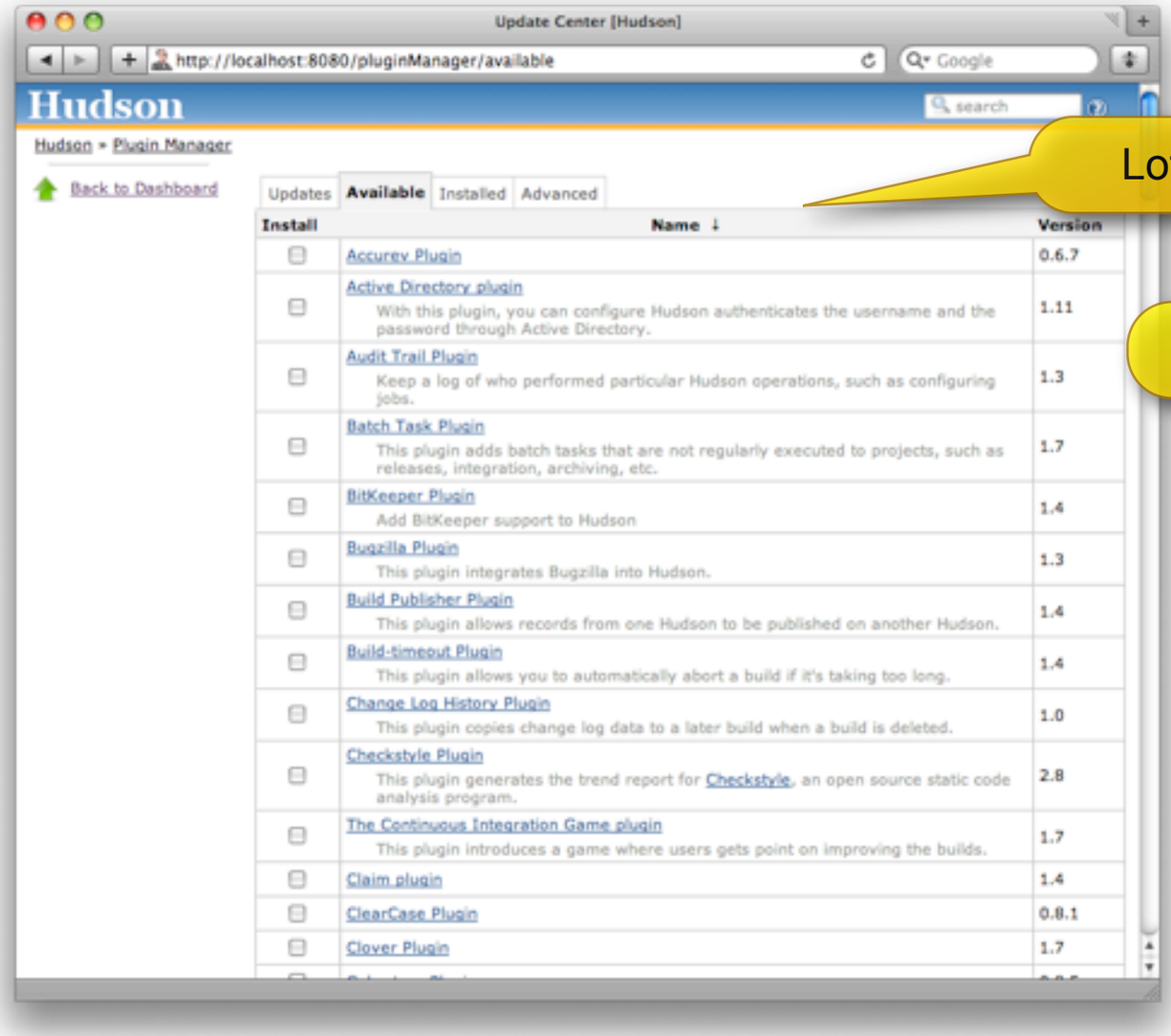
Continuous Integration

- Monitoring your builds
  - The Hudson dashboard



Continuous Integration

- Extending Hudson
  - Hudson plugins



Lots of plugins available

Version Control

Build tools

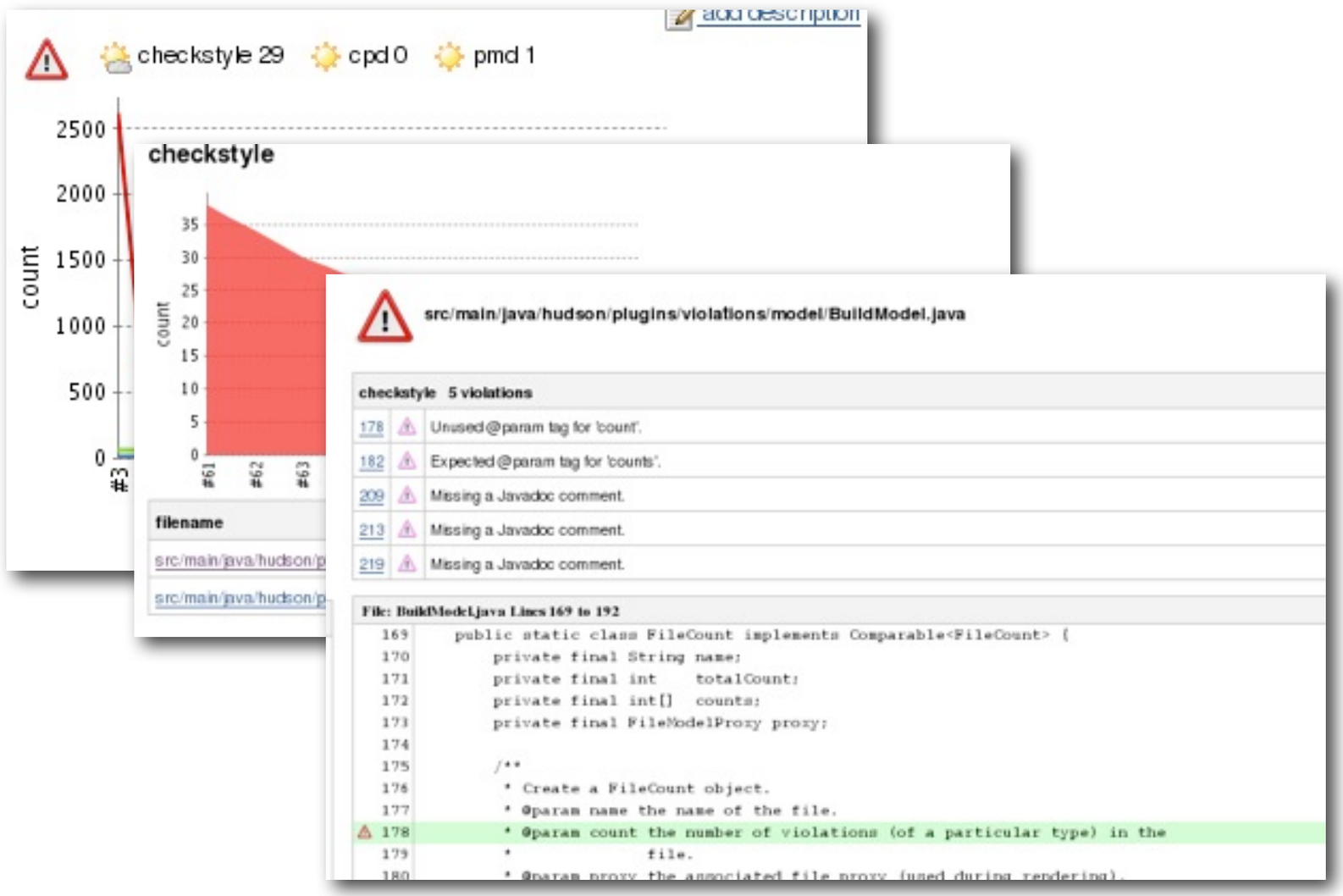
Issue tracking integration

Reporting

...

Continuous Integration

- Reporting with Hudson
  - Many reporting plugins for Hudson
    - Violations (checkstyle, PMD, Findbugs)
    - Cobertura
    - Clover
    - Emma
    - ...
  - Easy to integrate
  - Nice graphs



Demo

- A Quick Demonstration of Hudson
  - http://grid.sonatype.org/ci
  - Builds the Entire Maven Ecosystem
    - Maven
    - Nexus
    - m2eclipse
    - Maven Plugins
    - Development Builds (Maven 3)

labs

- Lab 16 - Using Hudson


Bamboo &
Maven

Bamboo

- Commercial CI server from Atlassian
- Strong Maven integration
- Simple for multi-module builds
- Strong support for multi-branch builds

Build Resources
- Agents
- Agent Matrix
- Builders
- JDKs
- Server Capabilities
- Global Variables

Elastic Bamboo
- Configuration

Plans
- Import With Maven
- Build Expiry
- Bulk Action
- Build Monitoring
- Remove Plans
- Move Plans
- Bulk Edit Plan Permissions

Security
- Users
- Groups
- Security Settings
- Global Permissions

Communication
- Mail Server
- IM Server
- JIRA Server

Gadgets

Import With Maven

You can import a plan from a specified pom.xml using Maven.

Enter pom.xml Details

SVN URL: *

The location of your pom.xml in your subversion repository (e.g. http://svn.collab.net/repos/svn/trunk/pom.xml)

Username:

(Optional) The subversion username (if any) required to access the Repository

Authentication Type: Password

Password:

(Optional) The password required by the subversion username

Import

Commons Collections - Commons Collections 3.3: Live Activity Logs

Build Number: COMCOL-COMMONSCOLLECTIONS33-1 (currently building)
Building Started: 21 Mar 2010, 1:17:09 PM
Building on Agent: Default Agent

Changes

This build was manually triggered by Matthew McCullough.

Currently Building

Commons Collections - Commons Collections 3.3 — **Building for 7 seconds.**

```
21-Mar-2010 13:17:09 Executing build COMCOL-COMMONSCOLLECTIONS33-1
21-Mar-2010 13:17:09 Running pre-build action: VCS Version Collector
21-Mar-2010 13:17:09 Running pre-build action: Build Number Stamper
21-Mar-2010 13:17:09 Building started with Maven2Builder
21-Mar-2010 13:17:09
    Starting to build 'Commons Collections - Commons Collections 3.3'
     ... running command line: /Applications/Dev/apache-maven/bin/mvn -f pom.xml clean test
     ... in : /Applications/Dev/bamboo-home/xml-data/build-dir/COMCOL-COMMONSCOLLECTIONS33
     ... using java.home: /System/Library/Frameworks/JavaVM.framework/Versions/1.6.0/Home
21-Mar-2010 13:17:09 Using Java version: 1.6
21-Mar-2010 13:17:12 [INFO] Scanning for projects...
21-Mar-2010 13:17:12 Downloading: http://localhost:8081/nexus/content/groups/public/org/apache/commons/commons-parent/14/commons-parent-14.pom
```

This page shows 100 activity log entries for the Commons Collections - Commons Collections 3.3 build. Refresh: every second

Project: Commons Collections Plan: Commons Collections 3.3 Build: 1

Latest Status: COMCOL-COMMONSCOLLECTIONS33-1 was successful

Build Result COMCOL-COMMONSCOLLECTIONS33-1

Labels: NONE Add

1

Summary Tests Changes Artifacts Logs Comments Metadata Actions

Build COMCOL-COMMONSCOLLECTIONS33-1 was successful.

Build completed on **21 Mar 2010, 1:19:59 PM** - 42 minutes ago

Build took **2 minutes**

Built on agent **Default Agent**

Revision is 925866

Code Changes

This build was manually triggered by Matthew McCullough.

Tests

Collapse

4338 tests in total

Summary

Summary

- Properties
- Filters
- Profiles
- Dependency Management
- Maven Project Sites
- Metrics
- Web Projects
- Repository Managers
- Continuous Integration

Multiple Artifacts per POM

- Producing multiple artifacts from a Maven build
- Not a recommended practice
- Still feasible
- Sonatype blog post
  - http://www.sonatype.com/people/2010/01/how-to-create-two-jars-from-one-project-and-why-you-shouldnt/

Encrypted Passwords

Encrypting Passwords

- Symmetric encryption
- Master Password
  - mvn -emp <masterpassword>
  - Stored on local disk
  - Or on removable USB stick
- Encrypting connectivity passwords
  - mvn -ep <connectionpassword>
  - Copy and paste into settings.xml
  - Wrapped with curly braces


Terminal — bash — bash
[~]> mvn -ep mysecretpasswordplaintext
Using Java version: 1.6
{6H5YZrmaTP4HE3s1Hq7jdFhsAttIm2HfzTJtwhtOgWDjrBfo0gud/9ANV2s1lxY9}
[~]>

War Overlays

War Overlays

- Normally all artifact dependencies are collected in WEB-INF/lib except for war artifacts.
- Instead, war artifacts are overlayed on the war source.
- No configuration is necessary.
- http://maven.apache.org/plugins/maven-war-plugin/examples/war-overlay.html