

# **Repository Management and Sonatype Nexus**

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## 1 Objectives

- Understand the benefits of using a repository manager
- Know how to start using Nexus
- Learn about Component Lifecycle Management

## 2 Development Today

Uses components. Lots of them.

→ more than 80% of a common enterprise software

- Facilitate the power of open source
- Don't reinvent the wheel

## 3 But What Is A Component?

- i. any artifact or library that your software needs in order to be built, released and to run

**Contains** code, class files, object files, binary resources like images, property files, xml files...

**In** jar, war, ear, swf, so, bin, apk, apklib, zip, tar.gz, rpm, deb files and so on

### Examples

- Google Guice jar file needed during runtime
- JUnit jar file needed for unit test execution
- JDBC driver for your database needed at runtime

## 4 Manual Dependency Management

- Painful
- Unreliable
- Overloads SCM
- Hard to maintain and document

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### Note

Unbelievably lots of developers still do this today!

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## 5 Declarative Dependency Management

- Automatic
  - Including transitive dependencies
  - Declarative - so easy to read and understand
  - Support from tools
-

## 6 "Problems" With Declarative Approach

- Common complaint "Maven is downloading the internet, again!"
- In fact everything is cached locally (~/.m2/repository)
- Components are used from local repo in **all** your projects built with Maven
- Other tools also need to download components, and all use
  - Central Repository
  - Maven repository format

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### Tip

This is where Sonatype Nexus can help!

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## 7 Adoption Stages and Advantages

Proxy external repositories

- Starting with Central Repository
- Reduced downloads, faster builds, increased stability
- Adding more proxy repositories
  - only needs to be done on the server
  - developers get access to more components without any work

## 8 Adoption Stages and Advantages

Host external and internal artifacts

- Deploy once for everybody
- Share binary components like open source projects
- Improve cooperation between multiple, different teams (dev, qa, ops...)

## 9 Adoption Stages and Advantages

Lifecycle Integration

- Addition of CI server
  - Controlling component usage - Procurement
  - Improving release process - Staging
  - Gaining license and security understanding of the components
-

## 10 Sonatype Nexus as Center Hub

images/nexus-tool-suite-integration.png

→ Nexus will be a key component of your enterprise development infrastructure

## 11 Installing Nexus

1. Install Java 7
2. Get the bundle with the embedded Jetty server from [the download page](#)
3. Extract archive, create symbolic link and run

```
sudo cp nexus-professional-x.y.z-bundle.tar.gz /usr/local
cd /usr/local
sudo tar xvf nexus-professional-x.y.z-bundle.tar.gz
ln -s nexus-professional-x.y.z nexus
cd nexus
./bin/nexus console
```

4. Go to <http://localhost:8081/nexus> and log in with admin/admin123

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### Note

Nexus Professional has enterprise benefits, but open source edition is perfect for getting started.

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## 12 Relationship Apache Maven and Nexus

Apache Maven introduced repository concept:

- storage for plugins
- and dependencies

All are retrieved from repositories on the internet, by the default the [Central Repository](#)

- Nexus runs Open Source Repository Hosting OSSRH as input for the Central Repository
- Nexus can run as proxy on site for you
- Best of breed Maven Repository Manager MRM (and beyond)

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### Tip

Read more about the scale needed to run OSSRH [on the blog](#).

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## 13 Connecting Maven to Nexus

Establish system/user wide setting for Maven to use Nexus:

- modify/create ~/.m2/settings.xml to point to Nexus (see labs/settings/)
- build a few Maven projects
- see how it starts proxying

```
<settings>
  <mirrors>
    <mirror>
      <id>nexus</id>
      <mirrorOf>*</mirrorOf>
      <url>http://localhost:8081/nexus/content/groups/public</url>
    </mirror>
  </mirrors>
  <profiles>
    <profile>
      <id>nexus</id>
      <repositories>
        <repository>
          <id>central</id>
          <url>http://central</url>
          <releases><enabled>true</enabled></releases>
          <snapshots><enabled>true</enabled></snapshots>
        </repository>
      </repositories>
      <pluginRepositories>
        <pluginRepository>
          <id>central</id>
          <url>http://central</url>
          <releases><enabled>true</enabled></releases>
          <snapshots><enabled>true</enabled></snapshots>
        </pluginRepository>
      </pluginRepositories>
    </profile>
  </profiles>
  <activeProfiles>
    <activeProfile>nexus</activeProfile>
  </activeProfiles>
</settings>
```

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**Tip**

For other build tools this will be different.

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## 14 Component Coordinates

Structure storage for components using unique "GAV" coordinates:

- **g** roupId, **a** rtifactId, **v** ersion - GAV
  - optionally classifier and packaging
-

```
<dependency>
  <groupId>org.testng</groupId>
  <artifactId>testng</artifactId>
  <version>6.1.1</version>
</dependency>

<dependency>
  <groupId>com.google.inject</groupId>
  <artifactId>guice</artifactId>
  <version>3.0</version>
  <classifier>no_aop</classifier>
</dependency>

<dependency>
  <groupId>org.glassfish.admingui</groupId>
  <artifactId>war</artifactId>
  <version>10.0-b28</version>
  <type>war</type>
</dependency>
```

## 15 Maven Repository Format

Uses the GAV component coordinates. Coordinates map to specific locations in a Maven repository.

```
<dependency>
  <groupId>org.apache.camel</groupId>
  <artifactId>camel-core</artifactId>
  <version>3.4.1</version>
</dependency>
```

Maps to:

```
org/apache/camel/
    camel-core/
        3.4.1/
            camel-core-3.4.1.pom
            camel-core-3.4.1.jar
```

File names are created using

```
artifactId-version-classifier.packaging
```

Classifiers javadoc and sources are appended to file name:

```
camel-core-3.4.1-javadoc.jar
camel-core-3.4.1-sources.jar
```

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### Tip

Other repository formats use a different structure, but the Maven structure is understood and used by many tools.

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## 16 What is a Repository?

- Organized storage and access container for artifacts
- Uses artifact coordinates for structure

→ A Repository Manager helps with administration and usage

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## 17 Repository Manager Tasks

- Proxy and managing access to public repositories
- Storing components that are not in public repositories
- Managing releases and snapshots
- Controlling available and allowed dependencies
- Facilitate internal collaboration across components and teams

## 18 Repository Manager Advantages

- Increased speed
- Reduced bandwidth usage
- Predictability
- Ability to control and audit - all components under your control
- Improved management of 3rd party artifacts
- Internal collaboration enabled
- Distribution of components made possible

## 19 Nexus User Interface Tour

- Search for components, including advanced search
- View component details including security and license details
- Repositories
- Server administration
- Security

## 20 Proxying

Public Group is exposed to users →

- can be changed on server for all users
- takes security access rights into account

Examples:

- add an additional external proxy repository
- add an internal hosted repository
- manually deploy component into 3rd party hosted repository

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**Tip**

Demo time!

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## 21 Release vs Snapshot Repositories

### Release Repositories

- Store "point-in-time" Releases
- Releases never change
- Publish a Release → Both the artifact and meta-data "live forever"

### Snapshot Repositories

- Used for development-only
- Transient
- No promise SNAPSHOT artifacts will remain the same

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**Tip**

Repository Groups merge them and expose the all under one URL.

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## 22 Deploying Internal Components

is when the benefits step up to the next level:

- Sharing of binary components and not specification documents
- No more building each others components
- End of large multi-module builds
- Choice of build system

## 23 Deployments with Maven...

```
mvn clean deploy
```

- pom.xml → distributionManagement
  - snapshotRepository
  - releaseRepository
- settings.xml → server

## 24 pom.xml - distributionManagement

```
<distributionManagement>
  <repository>
    <id>nexus-releases</id>
    <url>http://localhost:8081/nexus/content/repositories/releases</url>
  </repository>
  <snapshotRepository>
    <id>nexus-snapshots</id>
    <url>http://localhost:8081/nexus/content/repositories/snapshots</url>
  </snapshotRepository>
</distributionManagement>
```

## 25 settings.xml - server

```
<servers>
  <server>
    <id>nexus</id>
    <username>admin</username>
    <password>admin123</password>
  </server>
</servers>
```

## 26 Maven Deploy Plugin

Use the example project in labs/maven-deploy-example

```
mvn clean deploy
mvn versions:set -DnewVersion=1.0.0
mvn clean deploy
```

- Snapshot versions can be deployed multiple times.
- Releases only once.

Now components are available for everybody via the public group.

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### Tip

Your continuous integration server could do the deployment.

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## 27 Advanced Features

### Procurement

Control availability of components

### Staging

multi-step, controlled release process including reruns

### Maven Settings Distribution

via Nexus Maven Plugin

### Security

Enhanced LDAP, Atlassian Crowd

### Other repository formats

NuGet, Site, P2, OBR, YUM

## 28 Distributed Deployments

Scale your organization, while maintaining performance for everybody!

images/nexus-smart-proxy.png

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Various scenarios and setups are common, including:

- integration with component providers
- cooperation with external development teams
- component distribution to clients

## 29 Component Lifecycle Management

Component lifecycle management can be defined as the **practice of**

- **analyzing**,
- **controlling**, and
- **monitoring**

**the components used in your software development lifecycle.**

Sonatype CLM integration in

- Hudson/Jenkins
- Eclipse
- Nexus
- ...

## 30 Integrating with Nexus

- Lots of build tools can integrate with Maven repositories
  - Ant/Ivy, Gradle, SBT, Grails, ...
- All functionality is available in REST API
- Java Client for REST API available
- Plugin architecture with examples to create your own

## 31 Want to learn more?

- [Nexus Opens Source OSS website](#)
  - [Nexus Professional website](#)
  - [Screen cast recordings](#)
  - [Repository Management with Nexus](#) - free book
  - [Nexus Professional Trial Bundle and Guide](#) - some examples can be used with Nexus OSS as well
  - [Mailing lists](#)
  - [Talk to the developers/support](#) - HipChat
  - [Training classes](#)
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