

Repository Management with Nexus

Ed. 4.0

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Preface

Introduction

This book covers the concepts of repository management, software supply chain management and component management in general and specifically the usage of Nexus Repository Manager and Nexus Repository Manager OSS. It details all aspects of set-up and running the repository manager. Specifically this documentation of the covers version 3.0.0-M6.

This documentation was last updated and published on 2015-11-30.

How to Use this Documentation

Formats This Nexus Repository Manager documentation is available online in HTML format, so you can read it in web browser, while using the repository manager or referring other users to specific content.

The navigation bar on the left-hand side of the documentation allows you to access documentation for different versions of Nexus Repository Manager as well as a number of other resources.

The top right-hand side of the documentation features a search input box that accesses all content to provide you with the relevant information for your search term.

In addition to this online version the documentation can be downloaded in Portable Document Format (PDF) and Electronic Publication (EPUB) format for offline access.

Nexus Repository Manager Editions The documentation covers all editions of the repository manager - Nexus Repository Manager OSS and Nexus Repository Manager. Each chapter or smaller section title in the documentation is followed by a text, showing in which edition the specific features are available e.g.:

Available in Nexus Repository Manager OSS and Nexus Repository Manager

If you can not find any specific mentions of a specific edition, it is safe to assume that the feature can be found in all editions. Keep in mind that Nexus Repository Manager is an extension of Nexus Repository Manager OSS.

Conventions Used in the Documentation A number of conventions are used through out the documentation to simplify following the instructions and content.

A user interface label or button is highlighted. E.g. use the *Applications* button to access the list of applications.

A code segment or command line like `mvn clean install` input in a paragraph uses monospace fonts just like they would be used in a command line window.

Larger code segments use the same monospace fonts and are encapsulated in a block:

```
$ mvn --version
Apache Maven 3.3.3 (79941207757...; 2015-04-22T06:57:37-05:00)
Maven home: /opt/apache-maven-3.3.3
Java version: 1.8.0_60, vendor: Oracle Corporation
Java home: /Library/Java/JavaVirtualMachines/jdk1.8.0_60.jdk/Contents/Home ↩
/jre
Default locale: en_US, platform encoding: UTF-8
OS name: "mac os x", version: "10.10.5", arch: "x86_64", family: "mac"
```

The documentation uses specific blocks for notes, tips and important messages:

Note

You can download Java from the Oracle website.

Tip

The repository manager should be set up to run as a service.

**Important**

Nexus Repository Manager requires Java 8.

In addition there are blocks for warnings and cautioning alerts:

**Warning**

Mounting the storage directory via NFS can have negative performance and stability effects.

**Caution**

Ensure to complete a backup, before upgrading the repository manager.

Application screenshots and other images are typically included as numbered figures and referenced from the flowing text.

Next Steps With all this in mind you can learn more about the [concepts](#) used or learn more about [installing](#), [configuring](#) or [using](#) the repository manager or choose to read a section about your specific use case or question.

Chapter 1

Concepts

1.1 Introduction

Using the Nexus Repository Manager and Nexus Repository Manager OSS as well as the tools for software supply chain automation using the Nexus IQ Server and associated tools of the Nexus platform requires an understanding of a few concepts and terms like *Component*, *Repository*, *Repository Format* and others. This chapter provides you with all the necessary background and knowledge as well as an idea of a progression in your usage of the tools from the Nexus platform.

1.2 The Basics - Components, Repositories and Repository Formats

The Nexus platform with Nexus Repository Manager, Nexus Repository Manager OSS and Nexus IQ Server is all about working with components and repositories.

So what are components? A component is a resource like a library or a framework that is used as part of your software application at runtime, integration or unit test execution time or required as part of your build process. It can also be an entire application or a static resource like an image without any dynamic behaviour.

Typically these components are archives of a large variety of files including

- Java byte code in class files
- C object files
- text files e.g. properties files, XML files, JavaScript code, HTML, CSS
- binary files such as images, PDF files, sound and music files
- and many others

The archives are using numerous formats such as

- Java JAR, WAR, EAR formats
- plain ZIP or .tar.gz files
- Other package formats such as NuGet packages, Ruby gems, NPM packages
- Executable formats such as .exe or .sh files, Android APK files, various installer formats, . . .

Components can be composed of multiple, nested components themselves. E.g., consider a Java web application packaged as a WAR component. It contains a number of JAR components and a number of JavaScript libraries. All of these are standalone components in other contexts and happen to be included as part of the WAR component.

Components provide all the building blocks and features that allow a development team to create powerful applications by assembling them and adding their own business related components to create a full-fledged, powerful application.

In different toolchains components are called *artifact*, *package*, *bundle*, *archive* and other terms. The concept and idea remains the same and *component* is used as the independent, generic term.

Components in Repositories A wide variety of components exists and more are continuously created by the open source community as well as proprietary vendors. There are libraries and frameworks written in various languages on different platforms that are used for application development every day. It has become a default pattern to build applications by combining the features of multiple components with your own custom components containing your application code to create an application for a specific domain.

In order to ease the consumption and usage of components, they are aggregated into collections of components. These are called a *repository* and are typically available on the internet as a service. On different platforms terms such as *registry* and others are used for the same concept.

Example for such repositories are

- the Central Repository, also known as Maven Central
- the NuGet Gallery
- RubyGems.org
- npmjs.org

and a number of others. Components in these repositories are accessed by numerous tools including

- package managers like npm, nuget or gem,
- build tools such as Maven, Gradle, rake, grunt. . .
- IDE's such as Eclipse, IntelliJ, . . .

and many, many others.

Repositories have Formats The different repositories use different technologies to store and expose the components in them to client tools. This defines a *repository format* and as such is closely related to the tools interacting with the repository.

E.g. the Maven repository format relies on a specific directory structure defined by the identifiers of the components and a number of XML formatted files for metadata. Component interaction is performed via plain HTTP commands and some additional custom interaction with the XML files.

Other repository formats use databases for storage and REST API interactions, or different directory structures with format specific files for the metadata.

1.3 An Example - Maven Repository Format

Maven developers are familiar with the concept of a repository, since repositories are used by default. The primary type of a binary component in a Maven format repository is a JAR file containing Java byte-code. This is due to the Java background of Maven and the fact that the default component type is a JAR. Practically however, there is no limit to what type of component can be stored in a Maven repository. For example, you can easily deploy WAR or EAR files, source archives, Flash libraries and applications, Android archives or applications or Ruby libraries to a Maven repository.

Every software component is described by an XML document called a *Project Object Model (POM)*. This POM contains information that describes a project and lists a project's dependencies — the binary software components, which a given component depends upon for successful compilation or execution.

When Maven downloads a component like a dependency or a plugin from a repository, it also downloads that component's POM. Given a component's POM, Maven can then download any other components that are required by that component.

Maven and other tools, such as Ivy or Gradle, which interact with a Maven repository to search for binary software components, model the projects they manage and retrieve software components on-demand from a repository.

The Central Repository When you download and install Maven without any customization, it retrieves components from the Central Repository. It serves millions of Maven users every single day. It is the default, built-in repository using the Maven repository format and is managed by Sonatype. Statistics about the size of the Central Repository are available at <http://search.maven.org/#stats>.

The Central Repository is the largest repository for Java-based components. It can be easily used from other build tools as well. You can look at the Central Repository as an example of how Maven repositories operate and how they are assembled. Here are some of the properties of release repositories such as the Central Repository:

Component Metadata

All software components added to the Central Repository require proper metadata, including a Project Object Model (POM) for each component that describes the component itself and any dependencies that software component might have.

Release Stability

Once published to the Central Repository, a component and the metadata describing that component never change. This property of a *release repository* like the Central Repository guarantees that projects that depend on releases will be repeatable and stable over time. While new software

components are being published every day, once a component is assigned a release number on the Central Repository, there is a strict policy against modifying the contents of a software component after a release.

Component Security

The Central Repository contains cryptographic hashes and PGP signatures that can be used to verify the authenticity and integrity of software components served and supports connections in a secure manner via HTTPS.

Performance

The Central Repository is exposed to the users globally via a high performance content delivery network of servers.

In addition to the Central Repository, there are a number of major organizations, such as Red Hat, Oracle or the Apache Software foundation, which maintain separate, additional repositories. Best practice to facilitate these available repositories is to install Nexus Repository Manager OSS or Nexus Repository Manager and use it to proxy and cache the contents on your own network.

Component Coordinates and the Repository Format Component coordinates create a unique identifier for a component. Maven coordinates use the following values: *groupId*, *artifactId*, *version*, and *packaging*. This set of coordinates is often referred to as a *GAV* coordinate, which is short for *Group*, *Artifact*, *Version coordinate*. The GAV coordinate standard is the foundation for Maven's ability to manage dependencies. Four elements of this coordinate system are described below:

groupId

A group identifier groups a set of components into a logical group. Groups are often designed to reflect the organization under which a particular software component is being produced. For example, software components being produced by the Maven project at the Apache Software Foundation are available under the groupId `org.apache.maven`.

artifactId

An *artifactId* is an identifier for a software component and should be a descriptive name. The combination of *groupId* and *artifactId* must be unique for a specific project.

version

The version of a project ideally follows the established convention of **semantic versioning**. For example, if your simple-library component has a major release version of 1, a minor release version of 2, and point release version of 3, your version would be 1.2.3. Versions can also have alphanumeric qualifiers which are often used to denote release status. An example of such a qualifier would be a version like "1.2.3-BETA" where BETA signals a stage of testing meaningful to consumers of a software component.

packaging

Maven was initially created to handle JAR files, but a Maven repository is completely agnostic

about the type of component it is managing. Packaging can be anything that describes any binary software format including zip, nar, war, ear, sar, aar and others.

Tools designed to interact Maven repositories translate component coordinates into a URL which corresponds to a location in a Maven repository. If a tool such as Maven is looking for version 1.2.0 of the commons-lang JAR in the group org.apache.commons, this request is translated into:

```
<repoURL>/org/apache/commons/commons-lang/1.2.0/commons-lang-1.2.0.jar
```

Maven also downloads the corresponding POM for commons-lang 1.2.0 from:

```
<repoURL>/org/apache/commons/commons-lang/1.2.0/commons-lang-1.2.0.pom
```

This POM may contain references to other components, which are then retrieved from the same repository using the same URL patterns.

Release and Snapshot Repositories A Maven repository stores two types of components: releases and snapshots. Release repositories are for stable, static release components. Snapshot repositories are frequently updated repositories that store binary software components from projects under constant development.

While it is possible to create a repository which serves both release and snapshot components, repositories are usually segmented into release or snapshot repositories serving different consumers and maintaining different standards and procedures for deploying components. Much like the difference between a production network and a staging network, a release repository is considered a production network and a snapshot repository is more like a development or a testing network. While there is a higher level of procedure and ceremony associated with deploying to a release repository, snapshot components can be deployed and changed frequently without regard for stability and repeatability concerns.

The two types of components managed by a repository manager are:

Release

A release component is a component which was created by a specific, versioned release. For example, consider the 1.2.0 release of the commons-lang library stored in the Central Repository. This release component, commons-lang-1.2.0.jar, and the associated POM, commons-lang-1.2.0.pom, are static objects which will never change in the Central Repository. Released components are considered to be solid, stable, and perpetual in order to guarantee that builds which depend upon them are repeatable over time. The released JAR component is associated with a PGP signature, an MD5 and SHA checksum which can be used to verify both the authenticity and integrity of the binary software component.

Snapshot

Snapshot components are components generated during the development of a software project. A Snapshot component has both a version number such as 1.3.0 or 1.3 and a timestamp in its name. For example, a snapshot component for `commons-lang 1.3.0` might have the name `commons-lang-1.3.0-20090314.182342-1.jar` the associated POM, MD5 and SHA hashes would also have a similar name. To facilitate collaboration during the development of software components, Maven and other clients that know how to consume snapshot components from a repository also know how to interrogate the metadata associated with a Snapshot component to retrieve the latest version of a Snapshot dependency from a repository.

A project under active development produces snapshot components that change over time. A release is comprised of components which will remain unchanged over time.

Looking at the Maven repository format and associated concepts and ideas allowed you grasp some of the details and intricacies involved with different tools and repository formats, that will help you appreciate the need for [repository management](#).

1.4 Repository Management

The proliferation of different repository formats and tools accessing them as well as the emergence of more publicly available repositories has triggered the need to manage access and usage of these repositories and the components they contain.

In addition, hosting your own private repositories for internal components has proven to be a very efficient methodology to exchange components during all phases of the software development life cycle. It is considered a best practice at this stage.

The task of managing all the repositories your development teams interact with can be supported by the use of a dedicated server application - a repository manager.

Put simply, a repository manager provides two core features:

- the ability to proxy a remote repository and cache components saving both bandwidth and time required to retrieve a software component from a remote repository repeatedly, and
 - the ability to host a repository providing an organization with a deployment target for internal software components.
-

Just as Source Code Management (SCM) tools are designed to manage source code, repository managers have been designed to manage and track external dependencies and components generated by your build.

Repository managers are an essential part of any enterprise or open-source software development effort, and they enable greater collaboration between developers and wider distribution of software, by facilitating the exchange and usage of binary components.

Once you start to rely on repositories, you realize how easy it is to add a dependency on an open source software library available in a public repository, and you might start to wonder how you can provide a similar level of convenience for your own developers. When you install a repository manager, you are bringing the power of a repository like the Central Repository into your organization. You can use it to proxy the Central Repositories and other repositories, and host your own repositories for internal and external use.

Capabilities of a Repository Manager In addition to these two core features, a repository manager can support the following use cases:

- allows you to manage binary software components through the software development lifecycle,
- search and catalogue software components,
- control component releases with rules and add automated notifications
- integrate with external security systems, such as LDAP or Atlassian Crowd
- manage component metadata
- host external components, not available in external repositories
- control access to components and repositories
- display component dependencies
- browse component archive contents

Advantages of Using a Repository Manager Using a repository manager provides a number of benefits including:

- improved software build performance due to faster component download off the local repository manager
 - reduced bandwidth usage due to component caching
-

- higher predictability and scalability due to limited dependency on external repositories
- increased understanding of component usage due to centralized storage of all used components
- simplified developer configuration due to central access configuration to remote repositories and components on the repository manager
- unified method to provide components to consumers reducing complexity overheads
- improved collaboration due the simplified exchange of binary components

1.5 Software Supply Chain Automation

Once you adopting a repository manager as a central point of of storage and exchange for all component usage, the next step is expand its use in your efforts to automate and manage the software supply chain throughout your software development lifecycle.

Modern software development practices have shifted dramatically from large efforts of writing new code to the usage of components to assemble applications. This approach limits the amount of code authorship to the business-specific aspects of your software.

A large number of open source components in the form of libraries, reusable widgets or whole applications, application servers and others are now available featuring very high levels of quality and feature sets that could not be implemented as a side effect of your business application development. For example creating a new web application framework and business workflow system just to create a website with a publishing workflow would be extremely inefficient.

Development starts with the selection of suitable components for your projects based on comprehensive information about the components and their characteristics e.g., in terms of licenses used or known security vulnerabilities available in Nexus Repository Manager. Besides focusing on being a repository manager it includes features, such as the display of security vulnerabilities as well as license analysis results within search results and the Repository Health Check reports for a proxy repository.

Software supply chain automation progresses through your daily development efforts, your continuous integration builds and your release processes all the way to your applications deployed in production environments at your clients or your own infrastructure.

Nexus IQ Server provides a number of tools to improve your component usage in your software supply chain allowing you to automate your processes to ensure high quality output, while increasing your development speed towards continuous deployment procedures. These include:

- integration with common development environments like the Eclipse IDE
- plugins for continuous integration servers such as Jenkins, Hudson or Eclipse
- visualizations in quality assurance tools like SonarQube
- command line tools for custom integrations
- notifications to monitor component flows

Nexus IQ Server enables you to ensure the integrity of the modern software supply chain, amplifying the benefits of modern development facilitating component usage, while reducing associated risks.

Chapter 2

Installation and Running

2.1 Introduction

Nexus Repository Manager is a Java application that requires a Java Runtime Environment. When you run Nexus Repository Manager or Nexus Repository Manager OSS, you are running a server application with a web-based user interface. The application itself runs with the Eclipse Jetty servlet container and Apache Karaf OSGi-container.

Installation is a simple process. This chapter provides further details to get started and keep the repository manager running successfully in production deployments.

**Warning**

Currently Nexus Repository Manager 3.0 is a pre-release application and running it for production usage is not recommended.

2.2 Downloading

Nexus Repository Manager OSS can be downloaded from [Sonatype](#). Bundles are available for the 64-bit versions for Apple OSX, Microsoft Windows and Unix/Linux. They contain all necessary resources to install and run the repository manager. You can download a plain archive file or an installer for your operating system of a specific release version.

The plain archive files are Gzip TAR (TGZ) or ZIP files and are suitable for installation without a graphical user interface purely using command line-based interaction. The file names include operating system qualifiers and are similar to similar to:

```
nexus-3.0.0-b2015110601-mac.tgz
nexus-3.0.0-b2015110601-unix.tar.gz
nexus-3.0.0-b2015110601-win64.zip
```

The operating system-specific installer applications can be used for installation in a graphical user interface. The file naming includes operating system qualifiers and uses the native extensions for applications:

```
nexus-3.0.0-b2015110601-mac.dmg
nexus-3.0.0-b2015110601-unix.sh
nexus-3.0.0-b2015110601-win64.exe
```

Next steps, after a successful download, depend on the bundle you downloaded and the operating system and are documented in [Section 2.4](#) and [Section 2.5](#).

2.3 Java Runtime Environment

Nexus Repository Manager requires a Java 8 Runtime Environment (JRE) from Oracle. The install bundles for OSX and Windows include suitable runtime environments for the specific operating system.

If you prefer to use an external runtime or use a Unix operating system, we recommend to use the latest version of Java 8 available from the [Oracle website](#).

You can confirm the installed Java version with the `java` command:

```
$ java -version
java version "1.8.0_60"
Java(TM) SE Runtime Environment (build 1.8.0_60-b27)
```



```
Java HotSpot(TM) 64-Bit Server VM (build 25.60-b23, mixed mode)
```

When multiple JDK or JRE versions are installed, you need to ensure the correct version is configured by running the above command as the operating system user, that is used to run the repository manager. Potentially you need to update the configuration to specify a specific JRE installation path.

Tip

OpenJDK or other Java distributions or older Java versions are not supported.

2.4 Installing and Running with the Bundle Archive

The bundle archives combine the application and all required resources in an archive file. Installing and running Nexus Repository Manager is straightforward. Simply unpack the bundle archive in a directory, to which you have full access.

If you are installing the repository manager on a local workstation to give it a test run, you can install it in your home directory or wherever you like. Nexus Repository Manager doesn't have any hard-coded directories and will run from any directory.

You can extract the archive ZIP for Windows with any archiving tool like [7zip](#) or on the command line with e.g.

```
$ 7za.exe e nexus-3.0.0-b2015110601-win64.zip
```

On Windows you should install the repository manager outside Program Files to avoid problems with Windows file registry virtualization. If you plan to run the repository manager as a specific user you can install it into the AppData\Local directory of that users home directory. Otherwise simply use e.g., C:\nexus or something similar, ensuring that the user running the application has full access.

On OSX or Linux the downloaded GZip'd TAR archive can be extracted with:

```
$ tar xvzf nexus-3.0.0-b2015110601-mac.tar.gz
$ tar xvzf nexus-3.0.0-b2015110601-unix.tar.gz
```

You install the repository manager in a directory other than your users home directory. On a Unix machine common practice is to use /opt.

The extraction process creates a directory with a number of directories inside. This directory is referred to as the *installation directory*. It contains the application and related resources as well as the *data directory* for component and repository storage. Further details about these folders can be found in [Section 2.7](#)

The `bin` folder contains the generic startup scripts for Unix-like platforms called `nexus`. The Windows platform equivalent is called `nexus.exe`. To start the repository manager from the `bin` folder on a Unix-like platform like Linux use

```
./nexus run
```

The equivalent invocation on Windows requires a `/` in front of the `run` and any other commands.

```
nexus.exe /run
```

Starting the repository manager with the `run` command will leave it running in the current shell and display the log output.

The repository manager is fully started once you see a message like the following in the log:

```
Started Nexus Repository Manager 3.0.0-b2015110601
```

In order to shut down the repository manager running via the `run` command, you have to press `CTRL-C`.

The `nexus` script can be used to manage the repository manager as a background application on OSX and Unix with the `start`, `stop`, `restart`, `force-reload` and `status` commands. The Windows `nexus.exe` command supports similar commands with a prefix of `/` e.g., `/run`.

Once the repository manager is started you can access the user interface as details in [Section 2.6](#).

2.5 Installing and Running with the Installer Application

The installer applications can be used as an alternative to the bundle archive installation process documented in [Section 2.4](#).

You can start the installer application following these operating system-specific steps:

Windows

Start the `.exe` by double-clicking on it.

OSX

Extract the `.dmg` file by double-clicking on the file icon and then start the installer by double-clicking on the `.app`.

Unix

Run the `.sh` file in a command line window or double-clicking on it. This starts the installer application user interface. Passing the `-c` option allows you to run the installer purely in the command line window.

The installer application guides you through multiple steps to get the repository manager installed:

Welcome

Press *Next* after reading the instructions to proceed.

Installation Type

Select the edition you want to install.

Destination Directory

Configure the directory into which the application will be installed. The user running the installer and the user that will run the application have to have full access to the specified directory. Further details about this *installation directory* can be found in Section [2.7](#).

Data Directory

Configure the directory for all the data stored by the repository manager including configuration, repository and component data. Further details about this *data directory* can be found in Section [2.7](#).

Options

Configure *HTTP*, *JVM* and *Service*-related aspects. The *HTTP* configuration allows you to configure the *HTTP Port*, the *HTTP Host* and the *Context Path*.

The port defaults to 8081 and can be set to any available port in your organization. The host defaults to 0.0.0.0, which means that the repository manager will be available via any IP number assigned to the server. The context path defaults to the root context, but can be configured to other paths such as `/nexus`.

The *JVM* configuration includes *Initial Heap* and *Maximum Heap* parameters. The *Select JVM* checkbox allows you to activate an additional setup step, that will allow you to use a specific JVM installation instead of the bundled JVM.

The *Service* configuration allows you to start the repository manager as part of the installation process.

License Agreement

Read and accept the license agreement with the checkbox and press *Install* to proceed.

After the extraction of all required assets into the configured directories a last step allows you to create a desktop icon and open the application. Press *Finish* to complete the installation.

The two directories created and populated are referred to as the *installation directory* and the *data directory*. More details can be found in Section 2.7.

If you selected to start the application, your web-browser will be started and the user interface detailed in Section 2.6 will be accessible.

2.6 Accessing the User Interface

Once the repository manager is started, the application is listening on the configured IP address range and port. By default any IP address and port 8081 are used. To access the web application user interface, fire up a web browser and type in the URL <http://serveripaddress:port> e.g. <http://localhost:8081/>. If the repository manager started up successfully and network settings allow you to connect to the server, the user interface looks similar to Figure 2.1.

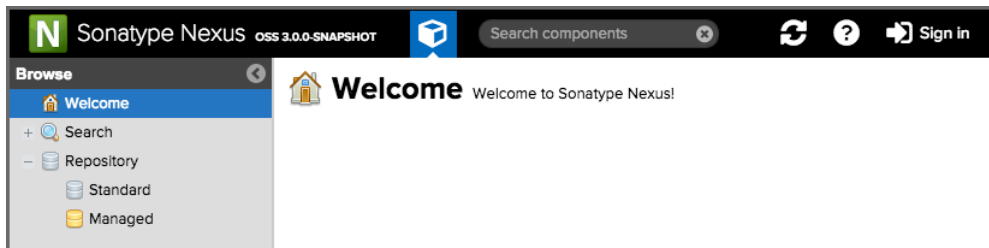


Figure 2.1: Initial User Interface

While we use `localhost` throughout this documentation, you may need to use the IP Loopback Address of `127.0.0.1`, the IP address or the DNS hostname assigned to the machine running the repository manager.

Next steps after successfully accessing the user interface are detailed in Chapter 3, Chapter 4 and following chapters.

2.7 Directories

There are two main directories created and used by the repository manager.

Installation directory

This directory contains the Nexus Repository Manager application and all the required additional components such as Java libraries and configuration file. The name of the directory by default uses `nexus-` and is appended with the version name. In this documentation it is referred to as `$install-dir` in any code segments.

Data Directory

This directory contains all the repositories, components and other data that is being stored and managed by the repository manager. It is located within the installation directory by default for archive-based installs and called `data`. The installer application allows you to configure the location of this directory. In this documentation it is referred to as `$data-dir` in any code segments.

2.7.1 Installation Directory

The installation directory includes a number of nested directories:

```
$ ls -l nexus-3.0.0-b2015110601
LICENSE.txt
NOTICE.txt
bin
data
deploy
etc
lib
public
system
```

LICENSE.txt and NOTICE.txt

contain legal details about the license and copyright notices.

bin

contains the `nexus` startup script itself as well as startup-related configuration files.

data

This *data directory* contains all of the repository and configuration data. By default, from an archive bundle install, this directory is nested within the installation directory. More details can be found Section [2.7.2](#).

etc

contains configuration files.

lib

contains binary libraries related to Apache Karaf.

public

contains public resources of the application.

system

contains all components and plugins that constitute the application.

2.7.2 Data Directory

The data directory contains subdirectories such as `blobs`, `db`, `elasticsearch` and others. These contain all the components, repository, configuration and other data presented by the repository manager.

If you desire to separate the application files from the actual data, you can customize the location of the *data directory*. This can be achieved by updating the paths in the properties `karaf.data`, `karaf.instance`, and `java.io.tmpdir` in `$install-dir/bin/nexus.vmoptions`.

2.8 Configuring the Runtime Environment

Configuring the specifics of the repository manager runtime involves configuration for all components in various configuration files and startup scripts. This section details these and provides recipes for specific tasks.

The startup of the JVM running the repository manager is managed via files in the `$install-dir/bin` directory within the installation. The application startup is performed with the JVM configured via the `JAVA_HOME` environment variable and the configuration in the file `$install-dir/bin/nexus.vmoptions`:

```
-Xms256M
-Xmx768M
-XX:+UnlockDiagnosticVMOptions
-XX:+UnsyncloadClass
-Djava.net.preferIPv4Stack=true
-Dkaraf.home=.
-Dkaraf.base=.
-Dkaraf.etc=etc
```

```
-Djava.util.logging.config.file=etc/java.util.logging.properties
-Dkaraf.data=data
-Dkaraf.instances=data/instances
-Djava.io.tmpdir=data/tmp
-Dkaraf.startLocalConsole=false
```

The main location for further configuration files is the `etc` directory within the installation. It contains numerous files including specifically:

config.properties

The main configuration for the Apache Karaf runtime. This file should *not* be modified.

custom.properties

Customizable configuration used by Apache Karaf. This file can be used to pass additional parameters to the Apache Karaf container.

jetty-*.xml

A number of configuration files for Eclipse Jetty

org.apache.* and org.ops4j.*

Various Karaf and OSGi related configuration files.

org.sonatype.nexus.cfg

Main configuration file for the application allowing you to configure aspects such as ports used for HTTP and HTTPS access, location of the data and configuration storage as well as the context path and host.

system.properties

Configuration parameters used for the JVM and application start up.

Chapter 3

Using the User Interface

3.1 Introduction

This chapter covers the basic aspects of the user interface of Nexus Repository Manager and Nexus Repository Manager OSS applicable for read-only access including an overview of the user interface features, searching components and browsing repositories and other features that are, by default, available to anonymous users and similar read-only roles.

Administrative tasks like configuring repositories, task, security and many other aspects are documented in [Chapter 4](#).

3.2 User Interface Overview

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The user interface is used with a web browser and works best with modern browsers. Older versions such as Microsoft Internet Explorer 8 or earlier are not supported and actively blocked from using the repository manager user interface to avoid an unsatisfactory user experience.

The repository manager provides anonymous access for users who only need to search for components, browse the repositories and access components via client tools such as Maven or NuGet. This anonymous access level is a configurable, read-only mode that includes the main user interface elements as shown in Figure 3.1.

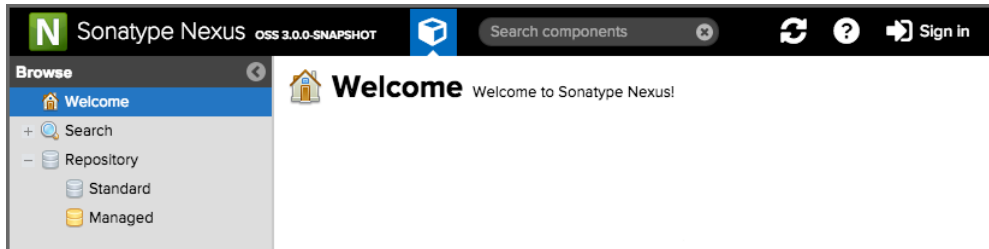


Figure 3.1: User Interface for Anonymous Users

Once a user is logged in further features become available depending on the user's privileges. An example for the *admin* user including the *Administration* menu icon is visible in Figure 3.2.

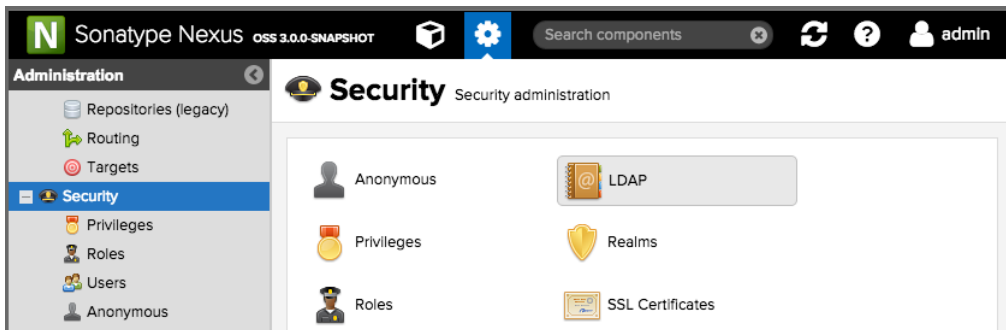


Figure 3.2: User Interface for Logged In *admin* User

The user interface is separated into a number of different sections.

Main toolbar

The top of the page contains the header with a number of elements starting on the left with the logo:

Logo and version label

The logo and the version label differ for Nexus Repository Manager OSS and Nexus Reposi-

tory Manager and allows you to know what version of the repository manager you are accessing at a glance.

Browse button

The browse button allows you to switch to the *Browse* menu items in the main menu section on the left of the user interface. The contents of the menu will depend on your assigned user privileges.

Administration button

The administration button allows to switch to the *Administration* menu items in the main menu section on the left of the user interface as visible in Figure 3.2. The contents of the menu will depend on your assigned user privileges.

Search input box



The search input box can be used to start a keyword search. The results are displayed in the feature view panel.

Refresh button

The refresh button is a global refresh button that affects all views in the user interface including the feature view panel. E.g., it refreshes the search results view, the user list or the staging repository list, if they are currently the active feature view.

Help button

Clicking the help button opens up the help menu. It contains a link to specific help about the currently active feature view. The *About* item displays a dialog with details about the version as well as license and copyright information. The *Documentation*, *Knowledge base*, *Community*, *Issue tracker* and *Support* items link to the respective pages on the Sonatype websites.

Sign In  and user account/signout buttons ; The *Sign In* button allows you to sign into the user interface as a specific user. Doing so gives you access to the privileges assigned to the user and toggles the button to display the user name work as access button to the *Account* feature view as part of the *User* menu in the main menu on the left. In addition the sign out button will be displayed.

Main Menu

The main menu on the left contains either the *Browse*, the *Administration* or the *User* menu items. The exact list of available menu items depends on the current user's assigned privileges. E.g., the *Administration* menu as visible in Figure 3.2 includes the *Security* section, which is not available to anonymous users by default. The panel itself can be horizontally collapsed and expanded with the button in the top right-hand corner of the panel. Each submenu can be vertically collapsed and expanded with the button beside the title for each submenu. Selecting a menu item triggers the display of the respective feature view in the feature view panel.

Feature View Panel

The feature view panel in the center of the user interface right of the main menu initially displays the *Welcome* feature view. It changes display based on your selected item in the main menu.

Figure 3.3 shows a typical user interface appearance of the repository manager with the *Users* feature view in the feature view panel. It shows a list of users.

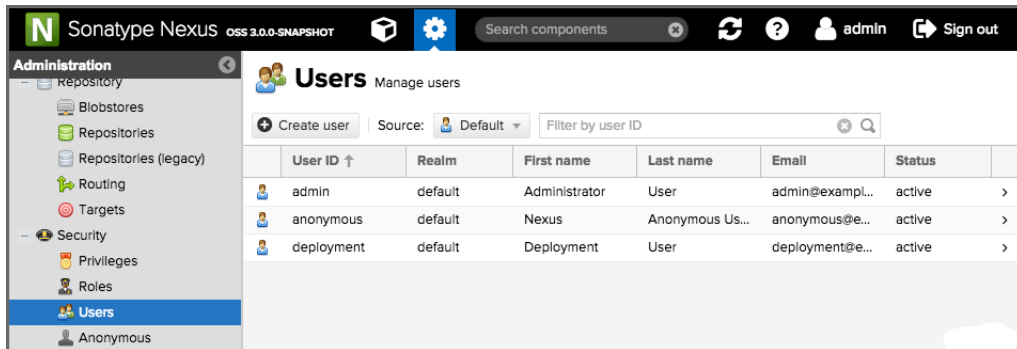


Figure 3.3: Typical Example Interface with a List

Clicking on a row in the list, switches the feature view to a specific display for the item in the row as visible in Figure 3.4. The top level navigation allows you get back to the list by clicking on the *Users* label. The form below has a number of sections that can be accessed via buttons as well as specific functionality like deletion and their associated buttons.

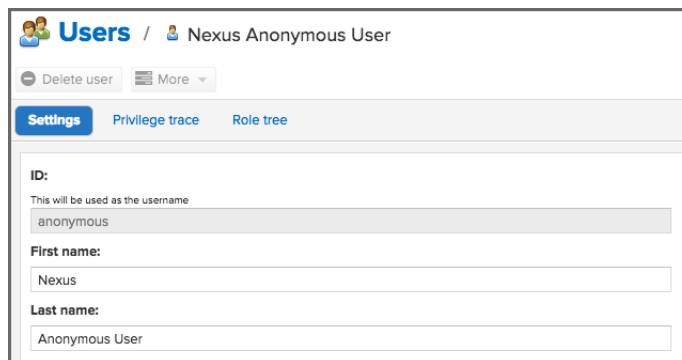
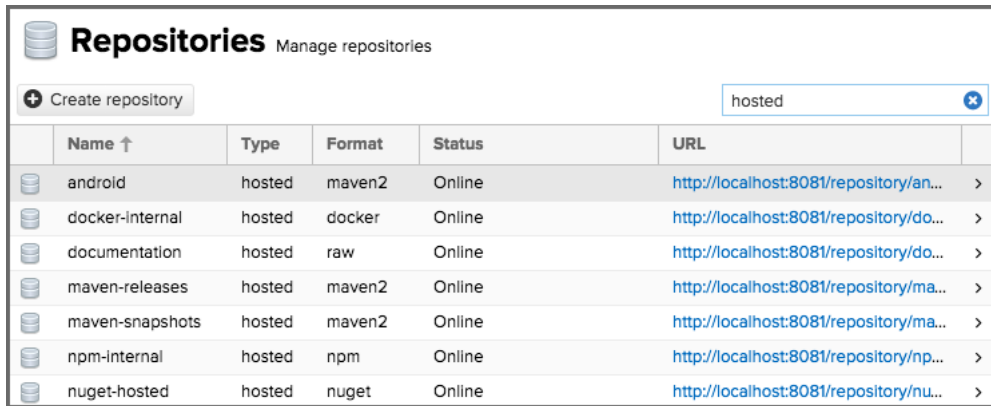


Figure 3.4: Typical Example Interface for Editing and Viewing

The list header features buttons for various operations that differ per list as well as an input box that allows you to filter the list by any terms used in any column. Figure 3.5 shows an example use case where a user typed "Hosted" in the filter box and the list of repositories only shows hosted repositories. This filtering works for all columns in a list and can be used in most list displays in the repository manager. For example you can use it to filter the users list to find disabled users, filter the routing list, the roles list and many more.



	Name ↑	Type	Format	Status	URL	
	android	hosted	maven2	Online	http://localhost:8081/repository/an...	>
	docker-internal	hosted	docker	Online	http://localhost:8081/repository/do...	>
	documentation	hosted	raw	Online	http://localhost:8081/repository/do...	>
	maven-releases	hosted	maven2	Online	http://localhost:8081/repository/ma...	>
	maven-snapshots	hosted	maven2	Online	http://localhost:8081/repository/ma...	>
	npm-internal	hosted	npm	Online	http://localhost:8081/repository/np...	>
	nuget-hosted	hosted	nuget	Online	http://localhost:8081/repository/nu...	>

Figure 3.5: Filtering the Repository List to Display Only Hosted Repositories

The column headers in most lists can be clicked to invoke a sorting of the list by the respective column as well as activate and deactivate specific columns.

3.3 Searching for Components

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Searching components in the repository manager is an important use case for being able to access information about specific components including different versions that are available, security and license data and other information as well as for build tool migrations, download of deployment packages and other component related development, QA and operations activities.

The different search modes can be accessed with the *Browse* button in the main toolbar and selecting *Search* or one of the nested options like *Custom*, *Maven* and others. The common feature view with the criteria drop-down selector for the search without results is displayed in Figure 3.6.

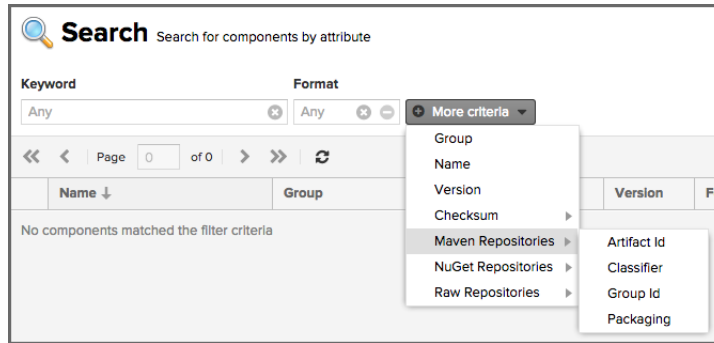


Figure 3.6: Keyword Search with *Format* and *More criteria* Input

Beneath the search title is the search criteria input area that displays the current criteria input e.g., *Keyword*. Beside the current criteria is a *More Criteria* button that allows you to add further criteria to your search. Each criteria can be removed by clicking on the minus/dash icon within the criteria input box. The cross/x in the input box resets the value. In Figure 3.6 you can see the *Format* criteria added to the search.

Each criteria can be used with a search term and supports the * character (star, asterisk) for pattern matching. E.g., you could search with the *Group* search criteria and search for `org.sonatype.nexus.*`. This would return components with the group of `org.sonatype.nexus`, but also `org.sonatype.nexus.plugins` and many others.

3.3.1 Search Criteria and Component Attributes

A number of criteria can be used with any repository format and returns results from all components in all repositories:

Keyword

A keyword is a string used for a search, where matches in *Format*, *Group*, *Name*, *Version* and all other component metadata values are returned.

Format

The format of the repository in which to look for a component. E.g. Nexus Repository Manager OSS supports `maven2`, `docker`, `nuget` and `raw`.

Group

An identifier that groups components in some way, such as by organization. It can also be used

to simply to create a specific namespace for a project. Not all repository formats use the notion of a group. Some tools simply use a different name for the concept e.g., `org` for Apache Ivy or `groupId` for Apache Maven and the *maven2* repository format. In the case of a maven2 repository, `group` is a required attribute. Other formats, like the *nuget* repository format, do not use `group` at all.

Name

The name of a component constitutes its main identifier. Different repository formats use a different name for the concept such as `artifactId` for Apache Maven and the *maven2* repository format.

Version

The version of a component allows you to have different points in time of a component released. Various tools such as Maven or NuGet use the term version. Other build systems call this differently e.g. `rev`, short for revision, in the case of Apache Ivy. In most repository formats version numbers are not enforced to follow a specific standard and are simply a string. This affects the sort order and can produce unexpected results.

Checksum - MD5, SHA-1 or SHA-512

A checksum value of a component file generated by an MD5, SHA-1 or SHA-512 algorithm.

In addition there are criteria that can be used to search for components in repositories with specific formats only:

Maven Repositories**Group Id**

The Maven `groupId` for a component. Other build systems supporting the Maven repository format call this differently e.g. `org` for Apache Ivy and `group` for Gradle and Groovy Grape. *Group Id* is equivalent to *Group*.

Artifact Id

The Maven `artifactId` for a component. Other build systems call this differently e.g. `name` for Apache Ivy and Gradle, and `module` for Groovy Grape. *Artifact Id* is equivalent to *Name*.

Classifier

The Maven *classifier* for a component. Common values are `javadoc`, `sources` or `tests`.

Packaging

The Maven `packaging` for a component, which is `jar` by default. Other values as used in Maven and other build tools are `ear`, `war`, `maven-plugin`, `pom`, `ejb`, `zip`, `tar.gz`, `aar` and many others.

Base Version

The base version of the component/asset. Typically this is the same value as the version for release components. `SNAPSHOT` development components use a time-stamped version but the base version uses the `SNAPSHOT` version e.g. version of `1.0.0-20151001.193253-1` and base version of `1.0.0-SNAPSHOT`.

Extension

The extension used for a specific asset of a component.

npm Repositories

Additional criteria for component searches in *npm Repositories* are:

Scope

tbd

Name

The npm *Name* is equivalent to the component version.

Version

The npm *Version* is equivalent to the component version.

NuGet Repositories**ID**

The NuGet component identifier is known as *Package ID* to NuGet users.

Tags

Additional information about a component formatted as space-delimited keywords, chosen by the package author.

Docker Repositories**Image Name**

The name for the Docker image. It is equivalent to the *Name* of the component in the repository manager that represents the Docker image.

Image Tag

The tag for the Docker image. It is equivalent to the *Version* of the component in the repository manager that represents the Docker image.

Layer Id

The unique identifier for a Docker image layer. It is equivalent to the *layerId* attribute of the component in the repository manager that represents the Docker image.

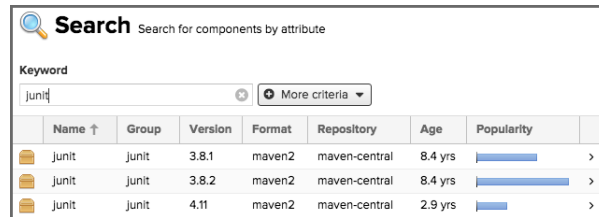
Raw Repositories

Searches in *Raw Repositories* can be narrowed down with the *Path* criteria. It allows you to specify a file path to the components in the raw repository. The search can return all components or files with the respective path pattern.

3.3.2 Search Results

Once you have provided your search terms in one or multiple criteria input fields, like the *Keywords* criteria in the *Search* feature view, the results become visible in the component list, with an example

displayed in Figure 3.7. The components are listed with their *Name*, *Group*, *Version*, *Format*, *Repository*, *Age* and *Popularity* information and are sorted alphabetically by *Name*. Columns and sort order can be adjusted like in all other lists.



The screenshot shows a search interface with a search bar containing 'junit' and a 'More criteria' dropdown. Below the search bar is a table with the following data:

	Name ↑	Group	Version	Format	Repository	Age	Popularity	
	junit	junit	3.8.1	maven2	maven-central	8.4 yrs	<div><div></div></div>	>
	junit	junit	3.8.2	maven2	maven-central	8.4 yrs	<div><div></div></div>	>
	junit	junit	4.11	maven2	maven-central	2.9 yrs	<div><div></div></div>	>

Figure 3.7: Results of an Component Search for `junit`

The *Age* column displays the age of the component. The age of a component is typically calculated from the initial release to a repository — typically a public repository such as the Central Repository. Since most Java components are published to the Central Repository when released, this age gives you a good indication of the actual time since the release of the component. For other repository formats and related upstream public repositories the availability of data may differ.

The *Popularity* column shows a relative popularity as compared to the other component versions. This can give you a good idea on the adoption rate of a new release. For example if a newer version has a high age value, but a low popularity compared to an older version, you might want to check the upstream project and see if there is any issues stopping other users from upgrading that might affect you as well. Another reason could be that the new version does not provide significant improvements to warrant an upgrade for most users.

Selecting a component in the list changes to a display of the component information documented in Section 3.5.

3.3.3 Preconfigured Searches

Keyword Search

The main toolbar includes a *Search components* text input field. Type your search term and press *enter* and the repository manager performs a search by *Keyword*.

The same search can be accessed by selecting the *Search* item in the *Browse* main menu. The search term can be provided in the *Keyword* input field in the *Search* feature view.

Custom Search

A configurable search using the criteria you select is available via the *Custom* menu item in the *Search* section of the *Browse* main menu. Initially it has no criteria and it allows you to create a search with criteria you add with the *More Criteria* button.

Docker Search

The *Docker* search is a predefined search available via the *Docker* menu item in the *Search* section of the *Browse* main menu. It defaults to inputs for *Image Name*, *Image Tag* and *Layer Id* and supports adding further criteria. The format is configured to *docker*.

Maven Search

The *Maven* search is a predefined search available via the *Maven* menu item in the *Search* section of the *Browse* main menu. It defaults to inputs for *Group Id*, *Artifact Id*, *Version*, *Base Version*, *Classifier* and *Extension* and supports adding further criteria. The format is configured to *maven2*.

NuGet Search

The *NuGet* search is a predefined search available via the *NuGet* menu item in the *Search* section of the *Browse* main menu. It defaults to inputs for *ID* and *Tags* and supports adding further criteria. The format is configured to *nuget*.

npm Search

The *npm* search is a predefined search available via the *npm* menu item in the *Search* section of the *Browse* main menu. It defaults to inputs for *Scope*, *Name* and *Version* and supports adding further criteria.

Raw Search

The *Raw* search is a predefined search available via the *Raw* menu item in the *Search* section of the *Browse* main menu. It defaults to an input for *Path* and supports adding further criteria. The format is configured to *raw*.

3.3.4 Example Use Case - SHA-1 Search

Sometimes it is necessary to determine the version of a component, where you only have access to the binary file without any detailed component information. When attempting this identification and neither the filename nor the contents of the file contain any useful information about the exact version of the component, you can use *SHA-1* search to identify the component.

Create a sha1 checksum, e.g., with the `shasum` command available on Linux or OSX or `fciv` on Windows, and use the created string in a *Custom* search by adding the *SHA-1* criteria from the *Checksum* section of the *More criteria* control.

The search will return a result, which will provide you with the detailed information about the file allowing you to replace the file with a dependency declaration. E.g. you can derive the Maven coordinates of a jar file and use them in a dependency declaration.


Tip

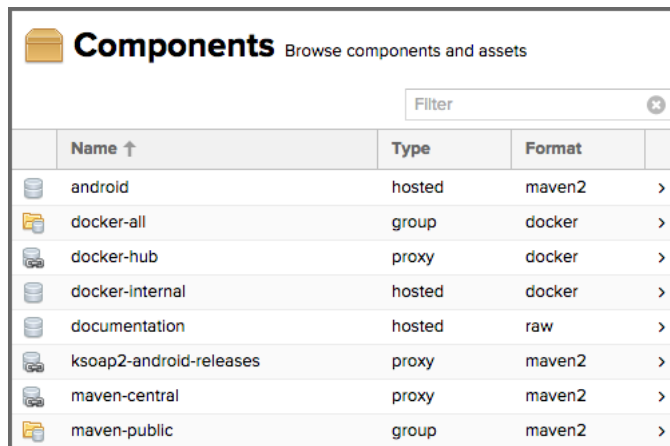
A SHA-1 or similar checksum search can be a huge timesaver when migrating from a legacy build system, where the used libraries are checked into the version control system as binary components with no version information available.

3.4 Browsing Repositories and Repository Groups

Available in Nexus Repository Manager OSS and Nexus Repository Manager

One of the most straightforward uses of the repository manager is to browse the contents of a repository or a repository group. Browsing allows you to inspect the contents of any repository or repository group for all the supported repository formats.

Click on the Browse button  in the main toolbar to access the *Browse* menu and the *Components* and *Assets* menu items. The *Component* as well as the *Assets* feature views allowing you to select a repository or repository group to browse from the list of all repositories as displayed in Figure 3.8.











Name ↑	Type	Format	
 android	hosted	maven2	>
 docker-all	group	docker	>
 docker-hub	proxy	docker	>
 docker-internal	hosted	docker	>
 documentation	hosted	raw	>
 ksoap2-android-releases	proxy	maven2	>
 maven-central	proxy	maven2	>
 maven-public	group	maven2	>

Figure 3.8: List of Repositories to Access for Component Browsing

Once you clicked on the row for a specific repository a list of components in the repository is displayed. It uses the same columns as the search results displayed in Figure 3.7. You can filter the list content, change

the rows and select ordering.

3.5 Viewing Component Information

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Once you located a component by browsing a repository or via a search and selected it in the list, you see the component information and a list of associated assets. An example is displayed in Figure 3.9.

The information displayed includes the name and format of the repository that contains the component as well as the component identifiers *Group*, *Name* and *Version*. The *Most popular version* contains the version number of the same component that is most popular in its usage. This popularity data is provided by the Sonatype Data Services based on requests from the Central Repository and other data and not available for all components.

A list of one or more assets associated with the component is shown below the component information. Click on the row with the *Name* of the asset you want to inspect to view the asset information documented in Section 3.6.

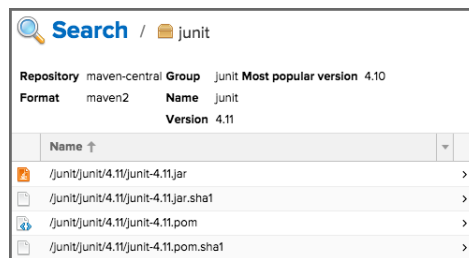


Figure 3.9: Example for Component Information and List of Associated Assets

3.6 Viewing Asset Information

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Asset information can be accessed by browsing assets directly or from a component information view.

The *Delete* button allows you to remove an asset. The *Info* section for each assets contains a number of attributes about the specific asset.

Path

the path to the asset in the repository

Content type

the MIME type of the asset

File size

the size of the file in KB

Last updated

the date and time when the asset was last updated

Last accessed

the date and time when the asset was last accessed

Locally cached

set to *true* if the asset can be found in the repository manager storage, *false* indicates that the metadata about the asset is available, while the asset itself has not been downloaded

Blob reference

a unique identifier pointing at the the binary blob representing the asset in the repository manager storage

The *Attributes* section contains further metadata about the asset related to *Cache*, *Checksum* and *Content_attributes*

Assets can include format specific attributes displayed in additional sections. For example an asset in a Maven2 repository has a *Maven2* section with attributes for *path*, *extension*, *baseVersion*, *groupId*, *artifactId* and *version*.

Search / junit / /junit/junit/4.11/junit-4.11.jar

Delete asset

Info

Path [/junit/junit/4.11/junit-4.11.jar](#)

Content Type application/java-archive

File size 239.3 KB

Last updated Fri Sep 25 2015 11:10:18 GMT-0700 (PDT)

Last accessed Fri Sep 25 2015 11:10:18 GMT-0700 (PDT)

Locally cached true

Blob Reference default@5DCBFAB3-CBDC058B-C930CE5C-24278FE2-28C58EDF-00000000000000521

Attributes

- Cache**

last_verified	2015-09-25T11:10:17.701-07:00
---------------	-------------------------------
- Checksum**

sha1	4e031bb61cf09069aeb2bfb4019e7a5034a4ee0
md5	3c42be5ea7cbf3635716abb429cb90d
- Content_attributes**

etag	50a3ef30-3bd2f
last_modified	2012-11-14T11:21:20.000-08:00
- Maven2**

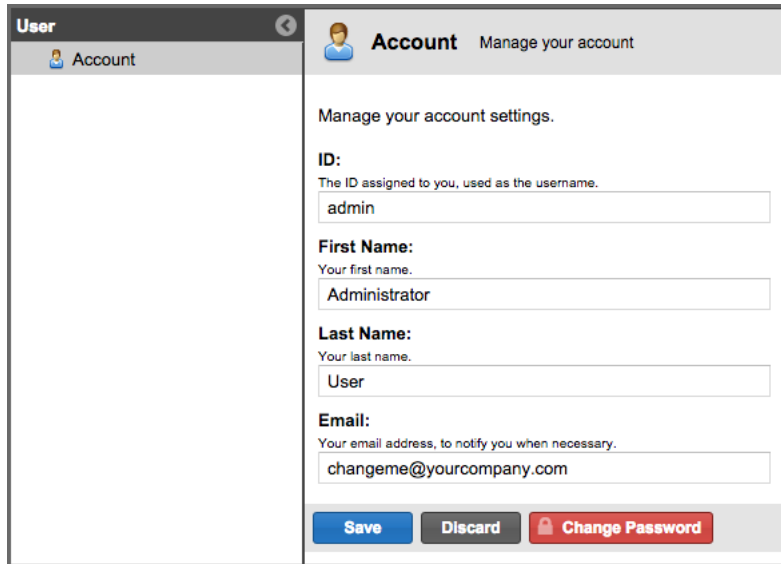
path	/junit/junit/4.11/junit-4.11.jar
extension	jar
baseVersion	4.11
groupId	junit
artifactId	junit
version	4.11

Figure 3.10: Asset Information Example

3.7 Working with Your User Profile

Available in Nexus Repository Manager OSS and Nexus Repository Manager

As a logged-in user, you can click on your user name on the right-hand side of the main toolbar to switch the main menu to contain the *User* menu. Pressing on the *Account* menu item displays the *Account* feature in the main feature panel as displayed in Figure 3.11.



The screenshot shows a web interface for managing a user account. On the left is a sidebar with a 'User' header and an 'Account' link. The main panel is titled 'Account' with a subtitle 'Manage your account'. Below this is the instruction 'Manage your account settings.' followed by four form fields: 'ID' (with a description 'The ID assigned to you, used as the username.' and the value 'admin'), 'First Name' (with a description 'Your first name.' and the value 'Administrator'), 'Last Name' (with a description 'Your last name.' and the value 'User'), and 'Email' (with a description 'Your email address, to notify you when necessary.' and the value 'changeme@yourcompany.com'). At the bottom are three buttons: 'Save' (blue), 'Discard' (grey), and 'Change Password' (red with a lock icon).

Figure 3.11: Editing User Details in the Account Feature Panel

The *Account* feature allows you to edit your *First Name*, *Last Name*, and *Email* directly in the form.

3.7.1 Changing Your Password

In addition to changing your name and email, the user profile allows you to change your password by clicking on the *Change Password* button. You will be prompted to authenticate with your current password and subsequently supply your new password in pop up dialogs.


Tip

The password change feature only works with the built-in security realm. If you are using a different security realm like LDAP or Crowd, this option will not be visible.

Chapter 4

Configuration

4.1 Introduction

This chapter covers all aspects of configuring Nexus Repository Manager and Nexus Repository Manager OSS. Specifically the sections and menu items of the *Administration* main menu are covered. It can be accessed by authorized users by pressing the *Administration* button  in the main toolbar.

Many of the features shown in this section are only available to administrative users and are available in Nexus Repository Manager OSS. Some features are only available in Nexus Repository Manager. The *Administration* menu contains the following sections:

Repository

The *Repository* section allows you to manage all *Repositories* and related configurations such as *Routing* and *Targets*.

Security

This section provides access to all the configuration features related to authentication and authorization of users including *Privileges*, *Roles*, *Users*, but also *LDAP*, *Atlassian Crowd*, *SSL Certificates* and *User Token*.

Support

Access a number of features that allow you to administer and monitor your repository manager successfully like *Logging* and *System Information*.

System

The [general configuration](#) for getting started and running the repository manager with e.g., [HTTP](#) or [Email Server](#) settings, but also [Capabilities](#) and [Tasks](#) to run regularly and other configurations.

4.2 System Configuration

The *System* section of the *Administration* menu gives you access to a number of configuration features that you typically need to configure, after successful installation. The following sections detail:

- Access information about used [Bundles](#)
- Advanced configuration with [Capabilities](#)
- [Email/SMTP server configuration](#)
- [HTTP/HTTPS proxy server configuration](#)
- Configuration and management of automated maintenance [Tasks](#)

4.2.1 Bundles

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The Nexus Repository Manager application runs on the OSGi container [Apache Felix](#). All features and plugins are managed by the container and are implemented as OSGi bundles.

The *Bundles* feature view is available in the *System* section of the *Administration* main menu. It allows you to inspect a list of all the OSGi bundles that are deployed as part of the application and access detailed information about each bundle.

Tip

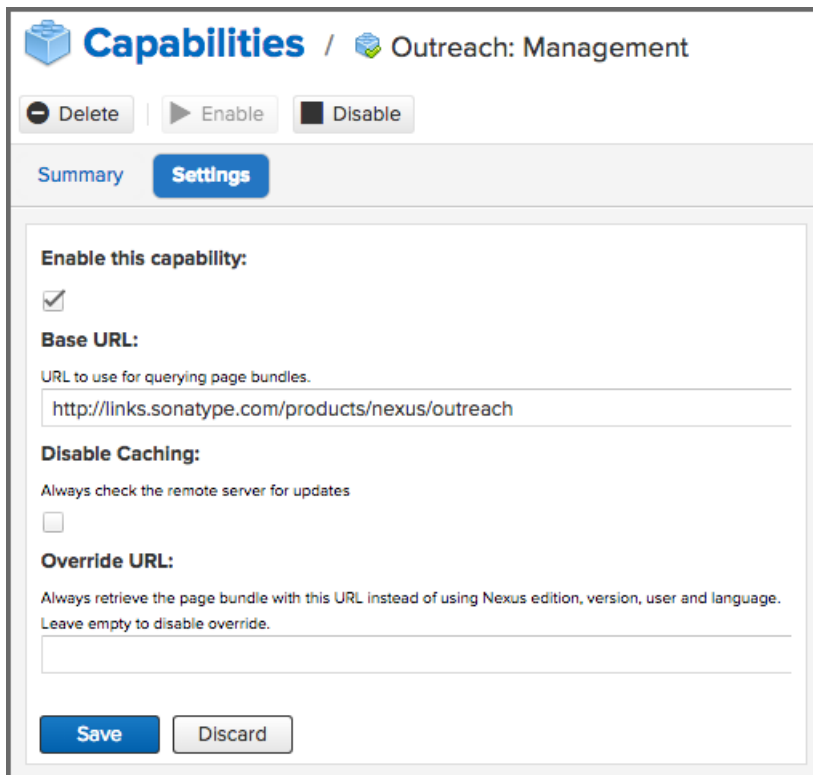
Find out more about OSGi and OSGi bundles on the [website of the OSGi Alliance](#).

4.2.2 Accessing and Configuring Capabilities

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Capabilities are features of the repository manager and plugins that can be configured by a user in a generic administration feature view accessible in the *System* section of the *Administration* main menu via *Capabilities*.

capability is *Outreach: Management* displayed in Figure 4.1.



The screenshot shows the 'Capabilities' management interface for 'Outreach: Management'. At the top, there are three buttons: 'Delete' (with a trash icon), 'Enable' (with a play icon), and 'Disable' (with a square icon). Below these are two tabs: 'Summary' and 'Settings' (which is active). The 'Settings' tab contains the following configuration options:

- Enable this capability:** A checkbox that is checked.
- Base URL:** A text input field with the value 'http://links.sonatype.com/products/nexus/outreach'. Below the field is a small description: 'URL to use for querying page bundles.'
- Disable Caching:** A section with a checkbox that is unchecked. Below it is a description: 'Always check the remote server for updates'.
- Override URL:** A text input field that is empty. Below it is a description: 'Always retrieve the page bundle with this URL instead of using Nexus edition, version, user and language. Leave empty to disable override.'

At the bottom of the settings panel are two buttons: 'Save' (in blue) and 'Discard' (in grey).

Figure 4.1: Outreach: Management Capability Settings

The list of capabilities can be filtered with the search input box in the header of the list and sorted by the different columns by pressing a column header. The list uses the following columns:

State

The state column does not have a title. Enabled capabilities have a green checkmark added on top of a blue icon. Disabled capabilities use a greyed out icon.

Type

The *Type* column provides the specific type of a capability in the list.

Category

The *Category* is optional and details the wider context the capability belongs to.

Description

The *Description* column contains further descriptive information about the capability.

Notes

The *Notes* column can contain user created text about the capability.

Every capability can be inspected and configured by selecting it in the list. The resulting view display the *Summary* view of the specific capability. This view includes the display of *Type*, *State* and optionally *Category* and *Description* in the *Summary* section as well as further information in the *Status*, *About* and *Notes* sections. The *Status* section displays a text message that details the status of the capability and any potential problems with the configuration. Depending on the capability, the reasons can vary widely. The *About* section displays a descriptive text about the purpose of the capability. The *Notes* field can be used to provide a descriptive text about the capability or any other notes related to it and can be persisted by pressing the *Save* button.

The *Delete* button below the title allows you to remove a capability and it's configuration entirely. The *Enable* and *Disable* buttons on the other hand can be used to switch the state of the capability.

The *Settings* view allows you to activate or deactivate the capability with the *Enable this capability* checkbox. Below this checkbox, each capability type has specific additional configuration parameters available. Once you have completed the configuration, press the *Save* button.

The capabilities management feature view supports adding new capabilities by pressing the *Create capability* button above the list and selecting the desired capability *Type* from the list. The next view allows you to perform any capability-specific configuration and finish the process by pressing the *Create capability* button below the parameters.

Many of the built-in capabilities and plugins can be configured in the *Capabilities* administration section but also in other more user friendly, targeted user interface sections, e.g., the user token feature of Nexus Repository Manager can be administrated by using the interface available via the *User Token* menu item in the *Security* section of the *Administration* menu as well as by editing the user token capability. Other capabilities are internal functionality and sometimes managed automatically by the responsible plugin. Some optional configuration like the branding plugin or advanced features of the smart proxy configuration are only done in the capabilities administration.

Usage of specific capabilities to achieve a variety of tasks is detailed in parts of the documentation.

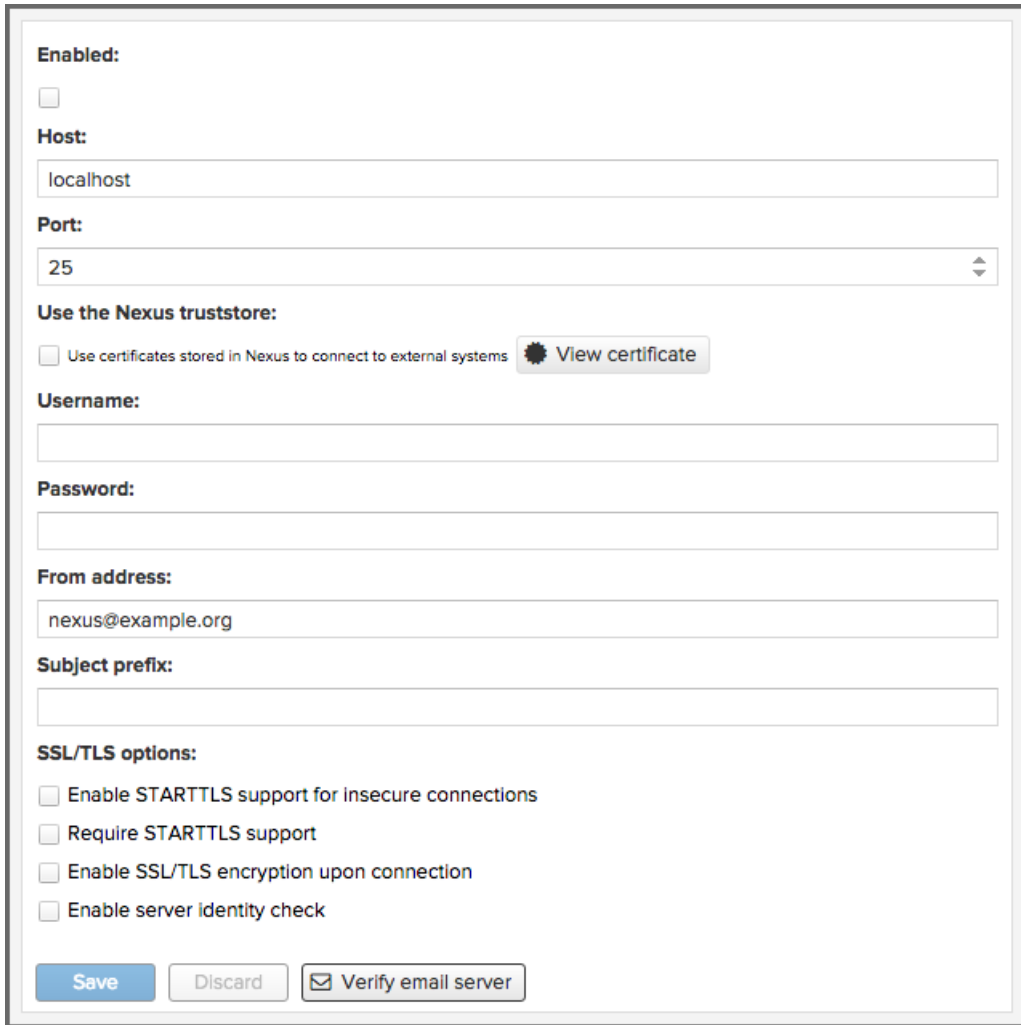
**Warning**

In many cases you will not need to configure anything in *Capabilities* unless explicitly instructed to do so by the support team. Execute any capability changes with caution, potentially backing up your configuration before proceeding.

4.2.3 Email Server

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager can send emails to users who need to recover usernames and passwords, as notifications for staging and a number of other uses. In order for these notifications to work, you need to configure the connection to the SMTP server that sends the email and some other aspects of the email messages themselves. This configuration is available via the *Email Server* menu item in the *System* section of the *Administration* menu and displayed in Figure [4.2](#).



The form is titled "Email Server Configuration" and contains the following fields and options:

- Enabled:** A checkbox that is currently unchecked.
- Host:** A text input field containing "localhost".
- Port:** A dropdown menu showing "25".
- Use the Nexus truststore:** A checkbox that is unchecked, followed by a button labeled "View certificate" with a gear icon.
- Username:** An empty text input field.
- Password:** An empty text input field.
- From address:** A text input field containing "nexus@example.org".
- Subject prefix:** An empty text input field.
- SSL/TLS options:** A section containing four checkboxes:
 - Enable STARTTLS support for insecure connections
 - Require STARTTLS support
 - Enable SSL/TLS encryption upon connection
 - Enable server identity check
- Buttons:** At the bottom, there are three buttons: "Save" (blue), "Discard" (grey), and "Verify email server" (grey with an envelope icon).

Figure 4.2: Email Server Configuration

The following configuration options are available:

Enabled

Determines whether email sending is activated or not, independent of a server being configured.

Host and Port

The name of the host and the port to use to connect to the SMTP server.

Use the Nexus truststore

This checkbox allows you to configure the repository manager to use its certificate truststore. You can also view and import the certificate from the email server. Further details are documented in Section 5.8.

Username and Password

The credentials of the user of the SMTP server to use for authentication.

From address

This parameter defines the email address used in the `From:` header of any email sent by the repository manager. Typically, this is configured as a "Do-Not-Reply" email address or a mailbox or mailing list monitored by the administrators of the repository manager.

Subject prefix

This parameter allows you to define a prefix used in the subject line of all emails sent by the repository manager. This allows the recipients to set up automatic filtering and sorting easily. An example is `[Nexus Notification]`.

SSL/TLS options

These options can be used to configure usage of Transport Layer Security (TLS) and Secure Sockets Layer (SSL) when emails are sent by the repository manager using SMTP. These options include the ability to use STARTTLS, which upgrades the initially established, plain connection to be encrypted when sending emails. The following options are available to you:

Enable STARTTLS support for insecure connections

This checkbox allows you to enable support for upgrading insecure connections using STARTTLS.

Require STARTTLS support

This checkbox requires that insecure connections are upgraded using STARTTLS. If this is not supported by the SMTP server, no emails are sent.

Enable SSL/TLS encryption upon connection

This checkbox enables SSL/TLS encryption for the transport on connection using SMTP-S/POPS.

Enable server identity check

This option verifies the server certificate when using TLS or SSL, following the RFC 2595 specification.

Once you have configured the parameters you can use the *Verify email server* button to confirm the configured parameters and the successful connection to the server. You are asked to provide an email address that should receive a test email message. Successful sending is confirmed in a message.

4.2.4 HTTP and HTTPS Request and Proxy Settings

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager uses HTTP requests to fetch content from remote servers. In some cases a customization of these requests is required. Many organizations use proxy servers for any outbound HTTP network traffic. The connection to these proxy servers from the repository manager needs to be configured to allow it to reach remote repositories. All this can be configured in the *HTTP* configuration available via the *System* section of the *Administration* menu and displayed in Figure 4.3.

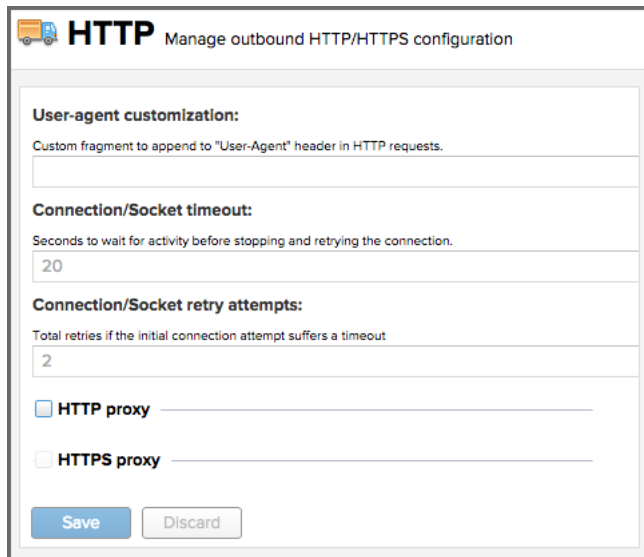


Figure 4.3: Configuring HTTP Request Settings

User-agent customization

The HTTP configuration in *User-agent customization* allows you to append a string to the User-Agent HTTP header field. This can be a required customization by your proxy servers.

Connection/Socket timeout and attempts

The amount of time in seconds the repository manager waits for a request to succeed when interacting with an external, remote repository as well as the number of retry attempts to make when requests fail can be configured with these settings.

If your repository manager instance needs to reach public repositories like the Central Repository via a

proxy server, you can configure the connection to a proxy server. Typically such an internal proxy server proxies HTTP as well as HTTPS connections to external repositories. In this case you configure a HTTP proxy. Select the checkbox beside *HTTP Proxy* and configure the parameters in the sections displayed in Figure 4.4. If your organization uses a separate, additional proxy server for HTTPS connections, you have to configure it in the *HTTPS Proxy* section.

Tip

This is a critical initial step for many Enterprise deployments of Nexus Repository Manager and Nexus Repository Manager OSS, since these environments are typically secured via an HTTP/HTTPS proxy server for all outgoing internet traffic.

The screenshot shows the 'HTTP proxy' configuration section in the Nexus interface. It is a form with several fields and sections. At the top, there is a checkbox labeled 'HTTP proxy' which is checked. Below it, the 'HTTP proxy host:' label is followed by a text input field. A red error message 'This field is required' is displayed below the field. Below the host field is the 'HTTP proxy port:' label followed by a port selection dropdown menu, also with a red 'This field is required' error message. Below these is a checkbox labeled 'Authentication' which is also checked. Under the 'Authentication' section, there are four fields: 'Username:' with a text input and a red 'This field is required' error message; 'Password:' with a password input field; 'Windows NTLM hostname:' with a text input field; and 'Windows NTLM domain:' with a text input field. Below the authentication section, there is a checkbox labeled 'HTTPS proxy' which is unchecked. At the bottom, there is a section titled 'Hosts to exclude from HTTP/HTTPS proxy:' with a text input field and a '+' button. Below the input field, the text '*example.com' is shown, and a red 'X' icon is visible to the right of the input field.

Figure 4.4: Configuring HTTP Proxy Settings

You can specify the *HTTP proxy host* and the *HTTP proxy port* of the HTTP or HTTPS proxy server and, optionally, the *Authentication* details for *Username* and *Password*. If a Windows NT LAN Manager is used to authenticate with the proxy server you can configure the needed connection details in *Windows NTLM hostname* and *Windows NTLM domain*.

In addition, you can configure a number of hosts that the repository manager reaches directly, ignoring the proxy settings. Requests to them should not go through the configured HTTP/HTTPS proxy. These hosts can be configured in the *Hosts to exclude from HTTP/HTTPS proxy* setting. You can add a hostname in the input box and add it with the + button. The * character can be used for wildcard matching for numerous

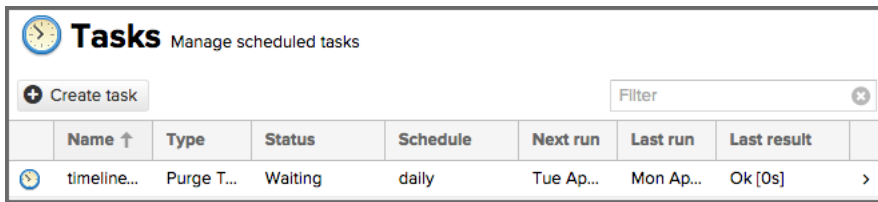
host names allowing a setting such as `*.example.com`. Entries can be removed with the `x` button.

Figure 4.4 shows the *HTTP Proxy* administration interface. The *HTTPS* configuration interface looks the same and is found below the *HTTP* configuration.

4.2.5 Configuring and Executing Tasks

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager allows you to schedule the execution of maintenance tasks. The tasks can carry out regular maintenance steps that will be applied to all repositories or to specific repositories on a configurable schedule or simply perform other system maintenance. Use the *Tasks* menu item in the *System* section of the *Administration* menu to access the feature view, shown in Figure 4.5, that allows you to manage your *Tasks*.



Name ↑	Type	Status	Schedule	Next run	Last run	Last result
timeline...	Purge T...	Waiting	daily	Tue Ap...	Mon Ap...	Ok [0s]

Figure 4.5: Managing Tasks

The list interface allows you to add new tasks with the *Create task* button as well as inspect and work with the configured tasks. The list shows the following columns:

Name

A user-defined name for the task to identify it in the user interface and log files.

Type

The type of action the scheduled task executes. The list of available task types is documented in more detail below.

Status

Tasks can either be *Waiting* for their next run, currently *Running* or *Disabled*.

Schedule

The *Schedule* column shows the *Task frequency* e.g., *Daily*, *Monthly*, *Manual* and others.

Next run

This column displays date and time of the next execution of the task based on the configured schedule.

Last run and Last result

These columns display the date and time as well as the result and duration of the last execution of the specific task.

When creating or updating a scheduled task, you can configure the following additional properties:

Task enabled

Enable or disable a specific task with the checkbox.

Notification Email

Configure a notification email for task execution failures. If a scheduled task fails a notification email containing the task identifier and name as well as the stack trace of the failure will be sent to the configured email recipient.

Task frequency

Selecting the task frequency allows you to configure the schedule for the task executions. Available choices are *Manual*, *Once*, *Hourly*, *Daily*, *Weekly*, *Monthly* and *Advanced (provide a CRON expression)*. Apart from *Manual*, all choices trigger display of a custom user interface for scheduling the specific recurrence. Weekly scheduling requires at least one day of the week to be selected. The advanced setting allows you to provide a CRON expression to configure more complex schedules.

The *Start date* and *Start time* allow you to configure a specific date and time from when the schedule should be activated. The *Time to run this task* settings is used to configure the actual time of the task execution.

Task-type specific configuration is displayed below the notification email input and differs for each scheduled task.

The following task types are available to perform specific maintenance:

Purge Incomplete Docker Uploads

Docker uploads to a repository can be hundreds of MB in size. It is possible to have incomplete uploads or orphaned files remain in temporary storage as a result of incomplete or interrupted uploads. The temporary storage consumed by these incomplete or orphaned uploads can be cleaned up with this task. You can configure the minimum age of incomplete uploads to be purged and have them deleted by the task execution. In addition, any incomplete Docker uploads that have been orphaned by a Nexus restart will be cleaned up whenever the task executes.

Purge Unused Components and Assets

This task can be used to remove components and assets in proxy repositories. Any component that has not been requested in the configured number of days will be purged.

Purge Unused Maven Snapshots

This task can be used to remove unused snapshots from Maven repositories. Any snapshot that has not been requested in the configured number of days will be purged.

Rebuild Maven Repository Metadata

This task rebuilds the `maven-metadata.xml` files with the correct information and will also validate the checksums (`.md5/sha1`) for all files in the specified maven2, hosted repository. The *Group Id*, *Artifact Id* and *Base Version* parameters allow you to narrow down the section of the repository that will be repaired. Typically this task is run manually to repair a corrupted repository.

Rebuild Repository Index

With support for hosted and proxy repositories, this task can rebuild the index. It inspects actual components and assets found in the repository and rebuilds the index to reflect the true content for supporting search and browse actions.

Beyond these tasks any plugin can provide additional scheduled tasks, which will appear once you have installed the plugin.

Setting up tasks execution adapted to your usage of the repository manager is an important first step when setting up a Nexus Repository Manager or Nexus Repository Manager OSS instance. Go through the list of task types and consider your usage patterns. In addition update your tasks when changing your usage. E.g., if you start to regularly deploy snapshots by introducing continuous integration server builds with deployment.

4.3 Repository Management

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Repositories are the containers for the components provided to your users as explained in more detail in Chapter 1. Creating and managing repositories is an essential part of your Nexus Repository Manager and Nexus Repository Manager OSS configuration, since it allows you to expose more components to your users.

It supports proxy repositories, hosted repositories and repository groups using a number of different repository formats.

The binary parts of a repository are stored in blob stores, which can be configured by selecting *Blob stores* from the *Repository* sub menu of the *Administration* menu.

To manage repositories select the *Repositories* item in the *Repository* sub menu of the *Administration* menu.

4.3.1 Blob Stores

A blob store is a storage mechanism for the binary parts of the components and their assets. Each blob store can be used by one or multiple repositories and repository groups. A *default* blob store that is based on a file system storage within the `data` directory configured during the installation is automatically configured.

The *Blob stores* feature view available via the *Blob stores* item in the *Repository* sub menu of the *Administration* menu displays a list of all configured blob stores. The columns provide some detail about each blob store:

Name

the name of the blob store as displayed in the repository administration

Type

the type of the blob store backend, currently only *File* is available representing a file system-based storage

Blob count

the number of blobs currently stored

Total size

the size of the blob store in MB

Available space

the overall space available for the blob store

Click on a specific row to inspect further details of the selected blob store. The details view displays *Type* and *Name* and the absolute *Path* to the file system storage.

The *Create blob store* button allows you to add further blob stores. You can configure the *Type* and *Name* for the blob store. The *Path* parameter should be an absolute path to the desired file system location. It has to be fully accessible by the operating system user account running the Nexus repository manager.

Once a blob store has been created it can no longer be modified and any blob store used by a repository or repository group can not be deleted.

4.3.2 Proxy Repository

A repository with the type *proxy*, also known as a proxy repository, is a repository that is linked to a remote repository. Any request for a component is verified against the local content of the proxy repository. If no local component is found, the request is forwarded to the remote repository. The component is then retrieved and stored locally in the repository manager, which acts as a cache. Subsequent requests for the same component are then fulfilled from the local storage, therefore eliminating the network bandwidth and time overhead of retrieving the component from the remote repository again.

By default, the repository manager ships with the following configured proxy repositories:

maven-central

This proxy repository accesses the **Central Repository**, formerly known as Maven Central. It is the default component repository built into Apache Maven and is well-supported by other build tools like Gradle, SBT or Ant/Ivy.

nuget.org-proxy

This proxy repository accesses the **NuGet Gallery**. It is the default component repository used by the `nuget` package management tool used for .Net development.

4.3.3 Hosted Repository

A repository with the type *hosted*, also known as a hosted repository, is a repository that stores components in the repository manager as the authoritative location for these components.

By default, the repository manager ships with the following configured hosted repositories:

maven-releases

This hosted repository uses the *maven2* repository format with a release version policy. It is intended to be the repository where your organization publishes internal releases. You can also use this repository for third-party components that are not available in external repositories and can therefore not be retrieved via a configured proxy repository. Examples of these components could be commercial, proprietary libraries such as an Oracle JDBC driver that may be referenced by your organization.

maven-snapshots

This hosted repository uses the *maven2* repository format with a snapshot version policy. It is intended to be the repository where your organization publishes internal development versions, also known as snapshots.

nuget-hosted

This hosted repository is where your organization can publish internal releases in repository using the NuGet repository format. You can also use this repository for third-party components that are not available in external repositories, that could potentially be proxied to gain access to the components.

4.3.4 Repository Group

A repository with the type *group*, also known as repository group, represents a powerful feature of Nexus Repository Manager and Nexus Repository Manager OSS. They allow you to combine multiple repositories and other repository groups in a single repository. This in turn means that your users can rely on a single URL for their configuration needs, while the administrators can add more repositories and therefore components to the repository group.

The repository manager ships with the following groups:

maven-public

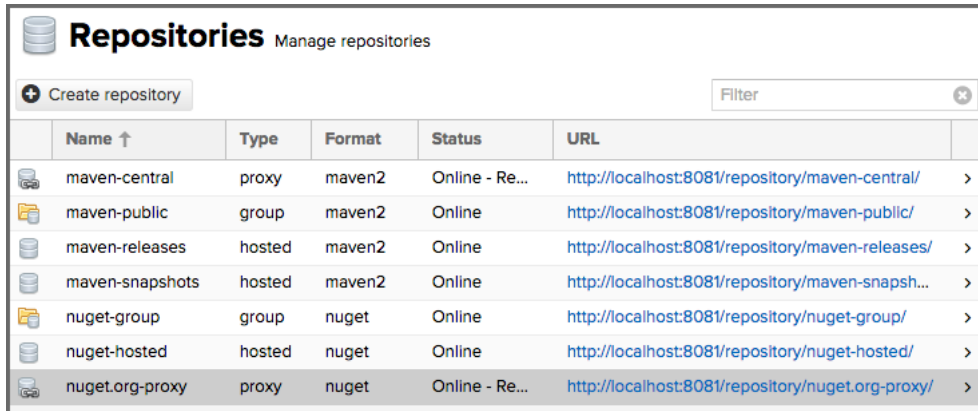
The *maven-public* group is a repository group of *maven2* formatted repositories and combines the important external proxy repository for the Central Repository with the hosted repositories *maven-releases* and *maven-snapshots*. This allows you to expose the components of the Central Repository as well as your internal components in one single, simple-to-use repository and therefore URL.

nuget-group

This group combines the nuget formatted repositories *nuget-hosted* and *nuget.org-proxy* into a single repository for your .Net development with NuGet.

4.3.5 Managing Repositories and Repository Groups

The administration user interface for repositories and repository groups is available via the *Repositories* item in the *Repository* sub menu of the *Administration* menu. It allows you to create and configure repositories as well as delete them and perform various maintenance operations. The initial view displayed in Figure 4.6 features a list of all configured repositories and repository groups.



The screenshot shows the 'Repositories' page in Nexus. At the top, there is a 'Create repository' button and a 'Filter' input field. Below this is a table with the following columns: Name (with an upward arrow), Type, Format, Status, and URL. Each row represents a repository and includes a small icon on the left and a right-pointing chevron on the right. The repositories listed are:

Name ↑	Type	Format	Status	URL
maven-central	proxy	maven2	Online - Re...	http://localhost:8081/repository/maven-central/
maven-public	group	maven2	Online	http://localhost:8081/repository/maven-public/
maven-releases	hosted	maven2	Online	http://localhost:8081/repository/maven-releases/
maven-snapshots	hosted	maven2	Online	http://localhost:8081/repository/maven-snapsh...
nuget-group	group	nuget	Online	http://localhost:8081/repository/nuget-group/
nuget-hosted	hosted	nuget	Online	http://localhost:8081/repository/nuget-hosted/
nuget.org-proxy	proxy	nuget	Online - Re...	http://localhost:8081/repository/nuget.org-proxy/

Figure 4.6: List of Repositories

The list of repositories displays some information for each repository in the following columns

Name

the unique name of the repository or repository group

Type

the type of the repository with values of *proxy* or *hosted* for repositories or *group* for a repository group

Format

the repository format used for the storage in the repository with values such as *maven2*, *nuget* or others

Status

the status of the repository as well as further information about the status. A functioning repository would show the status to be *Online*. Additional information can e.g., be about SSL certification problems or the status of the remote repository for a currently disabled proxy repository

URL

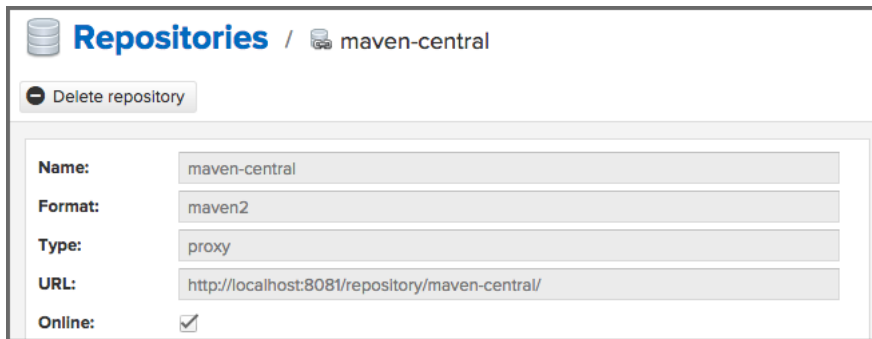
the direct URL path that exposes the repository via HTTP access and potentially, depending on the repository format, allows access and directory browsing

The *Create repository* button above the repository list triggers a dialog to select the *Recipe* for the new repository. The recipe combines the format and the type of repository into a single selection. Depending on your repository manager version and installed plugins, the list of available choices differs.

For example to create another release repository in *maven2* format, you would click on the row with the recipe *maven2 (hosted)* in the dialog. If you wanted to proxy a *maven2* repository, choose *maven 2 (proxy)*. On the other hand if you want to proxy a nuget repository, choose *nuget (proxy)*. With *maven2 (group)* you can create a repository group for *maven2* repositories.

After this selection, you are presented with the configuration view, that allows you to fill in the required parameters and some further configuration. The exact details on the view depend on the selected repository provider and are identical to the administration for updating the configuration of a repository documented in the following sections.

Once you have created a repository or repository group, it is available in the list for further configuration and management. Clicking on a specific row allows you to navigate to this repository specific administration section. An example for the *maven-central* repository is partially displayed in Figure 4.7.



The screenshot shows the 'Repositories' administration page in Nexus. The breadcrumb navigation is 'Repositories / maven-central'. There is a 'Delete repository' button with a trash icon. Below this is a configuration form with the following fields:

Name:	maven-central
Format:	maven2
Type:	proxy
URL:	http://localhost:8081/repository/maven-central/
Online:	<input checked="" type="checkbox"/>

Figure 4.7: Partial Repository Configuration for a Proxy Repository

The repository administration feature view has buttons to perform various actions on a repository. The buttons displayed depend on the repository format and type. The following buttons can be found:

Delete repository

The *Delete repository* button allows you to delete the repository and all related configuration and components, after confirming the operation in a dialog.

Invalidate cache

The *Invalidate cache* button invalidates the caches for this repository. The exact behavior depends on the repository type:

Proxy repositories

Invalidating the cache on a proxy repository clears the proxy cache such that any items cached as available will be checked again for any changes the next time they are requested. This also

clears the negative cache for the proxy repository such that any items that were not found within the defined cache period will be checked again the next time they are requested.

Repository groups

Invalidating the cache of a repository group, clears the group cache such that any items fetched and held in the group cache, such as Maven metadata, will be cleared. This action also invalidates the caches of any proxy and group repositories that are members of this group.

Rebuild Index

The *Rebuild Index* button allows you to drop and recreate the search index for the proxy repository, synchronizing the contents with search index. This button is only available for proxy repositories.

The following properties can be viewed for all repositories and can not be edited after the initial creation of the repository.

Name

The *Name* is the identifier that will be used in the URL for access to the repository. For example, the proxy repository for the Central Repository has a name of `maven-central`. The *Name* must be unique in a given repository manager installation and is required.

Format

Format defines in what format the repository manager exposes the repository to external tools. Supported formats depend on the edition of the repository manager and the installed plugins. Examples are *maven2*, *nuget*, *raw*, *docker*, *npm* and others.

Type

The type of repository - *proxy*, *hosted* or *group*.

URL

It shows the user facing URL this means that Maven and other tools can access the repository directly at e.g., `http://localhost:8081/repository/maven-central`.

Online

The checkbox allows you set whether this repository is available to client side tools or not.

Beyond the generic fields used for any repository, a number of different fields are used and vary depending on the repository format and type. They are grouped under a number of specific headers that include configuration for the related aspects and include:

- Storage
- Hosted
- Proxy

- Negative Cache
- HTTP
- Maven 2
- NuGet
- and others

4.3.5.1 Storage

Every repository needs to have a *Blob store* configured to determine where components are stored. The drop-down allows you to select from all the configured blob stores. Documentation about creating blob stores can be found in [Section 4.3.1](#).

The *Strict Content Type Validation* allows you to activate a validation that checks the MIME type of all files published into a repository to conform to the allowed types for the specific repository format.

4.3.5.2 Hosted

A hosted repository includes configuration of a *Deployment policy* in the *Hosted* configuration section. Its setting controls how a hosted repository allows or disallows component deployment.

If the policy is set to *Read-only*, no deployment is allowed.

If this policy is set to *Disable redeploy*, a client can only deploy a particular component once and any attempt to deploy a component again will result in an error. The disabled redeploy is the default value, since most client tools assume components to be immutable and will not check a repository for changed components that have already been retrieved and cached locally.

If the policy is set to *Allow redeploy*, clients can deploy components to this repository and overwrite the same component in subsequent deployments.

4.3.5.3 Proxy

The configuration for proxy repositories in the *Proxy* section also contains the following parameters:

Remote Storage

A proxy repository on the other hand requires the configuration of the *Remote Storage*. It needs to be configured with the URL of the remote repository, that should to be proxied. When selecting the URL to proxy it is beneficial to avoid proxying remote repository groups. Proxying repository groups prevents some performance optimization in terms of accessing and retrieving the content of the remote repository. If you require components from the group that are found in different hosted repositories on the remote repository server it is better to create multiple proxy repositories that proxy the different hosted repositories from the remote server on your repository manager instead of simply proxying the group.

Use the Nexus truststore

This checkbox allows you to elect for the repository manager to manage the SSL certificate of the remote repository. It is only displayed - if the remote storage uses a HTTPS URL. The *View certificate* button triggers the display of the SSL certificate details in a dialog. The dialog allows you to add or remove the certificate from the certificate truststore maintained by the repository manager. Further details are documented in Section [5.8.1](#).

Blocked

Setting a repository to blocked causes the repository manager to no longer send outbound requests to the remote repository.

Auto blocking enabled

If *Auto blocking enabled* is set to true, the repository manager automatically blocks a proxy repository if the remote repository becomes unavailable. While a proxy repository is blocked, components will still be served to clients from a local cache, but the repository manager will not attempt to locate an component in a remote repository. The repository manager periodically retests the remote repository and unblocks it once it becomes available.

Maximum component age

When the proxy receives a request for a component, it does not request a new version from the remote repository until the existing component is older than *Maximum component age*.

Maximum metadata age

The repository manager retrieves metadata from the remote repository. It will only retrieve updates to metadata after the *Maximum metadata age* has been exceeded. If the metadata is component metadata, it uses the longer of this value and *Maximum component age* before rechecking.

4.3.5.4 Negative Cache

Not found cache enabled/Not found cache TTL

If the repository manager fails to locate a component, it will cache this result for a given number of

minutes. In other words, if the repository manager can't find a component in a remote repository, it will not perform repeated attempts to resolve this component until the *Not found cache TTL* time has been exceeded. The default for this setting is 1440 minutes (or 24 hours) and this cache is enabled by default.

4.3.5.5 HTTP

The *HTTP* configuration section allows you to configure the necessary details to access the remote repository, even if you have to provide authentication details in order to access it successfully or if you have to connect to it via a proxy server.

Note

This configuration is only necessary, if it is specific to this repository. Global HTTP proxy and authentication is documented in Section [4.2.4](#).

Authentication

This section allows you to select *Username* or *Windows NTLM* as *authentication type*. Subsequently you can provide the required *Username* and *Password* for plain authentication or *Username*, *Password*, *Windows NTLM hostname* and *Windows NTLM domain* for *Windows NTLM*-based authentication.

HTTP request settings

In the *HTTP Request Settings* you can change the properties of the HTTP requests to the remote repository. You can append a string to the user-agent HTTP header in the *User-agent customization* of the request and add parameters to the requests in *URL parameters*. Additionally you can set the timeout value for requests in seconds in *Connection timeout* and configure a number of *Connection retries*. The HTTP requests configured are applied to all requests made from the repository manager to the remote repository being proxied.

4.3.5.6 Configuration for Maven2 Format

Version policy

A Maven repository can either host release components or development components. The *Version policy* allows you to set *Snapshot* for development components that end up with *-SNAPSHOT* in the version string. This allows repeated uploads where the actual number used is composed of a

date/timestamp and an enumerator and the retrieval can still use the *-SNAPSHOT* version string. The version policy can only be set, when the repository is created and can not be changed at a later stage. Repository groups can be used to expose a combination of release and development versions from multiple repositories.

Strict Content Type Validation

Maven repositories can be configured to validate any new components to see if the MIME-type corresponds to the content of the file by enabling this setting. Any files with a mismatch are rejected.

4.3.5.7 Configuration for NuGet Format

The NuGet repository format uses **OData** queries for communication between the client and the repository. These queries include metadata information about available packages and other data.

When the repository manager receives queries from the `nuget` client, it passes these queries on to the remote repositories, configured as proxy repository, if necessary.

To avoid sending identical queries to the remote repository, the repository manager caches the queries and will rely on previously stored metadata if the same query is received again before the cache expires.

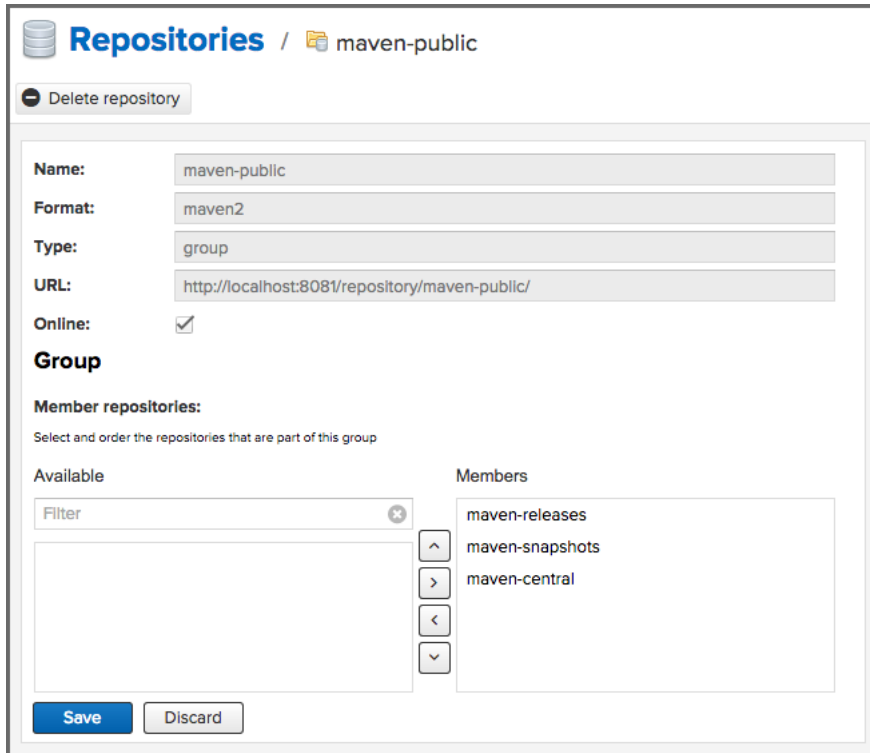
The parameters *Query cache size* and *Query cache age* can be used to configure the size of this cache in terms of how many queries are cached as well as the rate at which queries expire and are subsequently re-run.

4.3.5.8 Configuration for Docker Format

The Docker repository format adds configuration for *Docker Connectors* and *Docker Registry API Support*. More details can be found in [Chapter 8](#).

4.3.5.9 Repository Groups

The creation and configuration for a repository group differs a little from pure repositories. It allows you to manage the member repositories of a repository group. An example for a repository group using the *maven2* format is visible in [Figure 4.8](#). In this figure you can see the contents of the *maven-public* group that is pre-configured in Nexus Repository Manager.



The screenshot shows the Nexus Repositories configuration page for the 'maven-public' repository group. The page has a header with the Nexus logo and the breadcrumb 'maven-public'. A 'Delete repository' button is at the top left. The configuration fields are as follows:

Field	Value
Name	maven-public
Format	maven2
Type	group
URL	http://localhost:8081/repository/maven-public/
Online	<input checked="" type="checkbox"/>

Below the fields is the 'Group' section. It includes a 'Member repositories' section with the instruction 'Select and order the repositories that are part of this group'. There are two main areas: 'Available' and 'Members'.

Available: A list with a 'Filter' input field and a search icon. The list is currently empty.

Members: A list containing three repositories: 'maven-releases', 'maven-snapshots', and 'maven-central'. Between the 'Available' and 'Members' lists are four arrow buttons (up, right, left, down) for reordering.

At the bottom of the configuration area are 'Save' and 'Discard' buttons.

Figure 4.8: Repository Group Configuration

The *Format* and *Type* are determined by the selection of the provider in the creation dialog e.g., *maven2* (*group*) for the *maven-public* as a *maven2* format repository group.

The *Name* is set during the creation and is fixed once the repository group is created.

The *Online* checkbox allows you set whether this repository group is available to client side tools or not.

The *Member repositories* selector allows you to add repositories to the repository group as well as remove them. The *Members* column includes all the repositories that constitute the group. The *Available* column includes all the repositories and repository groups that can potentially be added to the group.

Note that the order of the repositories listed in the *Member* section is important. When the repository manager searches for a component in a repository group, it will return the first match. To reorder a repository in this list, click and drag the repositories and groups in the *Members* list or use the arrow

buttons between the *Available* and *Members* list. These arrows can be used to add and remove repositories as well.

The order of repositories or other groups in a group can be used to influence the effective metadata that will be retrieved by Maven or other tools from a repository group. We recommend placing hosted repositories higher in the list than proxy repositories. For proxy repositories, the repository manager needs to check the remote repository which will incur more overhead than a hosted repository lookup.

We also recommend placing repositories with a higher probability of matching the majority of components higher in this list. If most of your components are going to be retrieved from the Central Repository, putting *maven-central* higher in this list than a smaller, more focused repository is going to be better for performance, as the repository manager is not going to interrogate the smaller remote repository for as many missing components. These best practices are implemented in the default configuration.

4.3.6 Repository Management Example

The following sections detail some common steps of your repository management efforts on the example of a *maven2* repository.

4.3.6.1 Adding Repositories for Missing Dependencies

If you've configured your Maven `settings.xml` or other build tool configuration to use the *maven-public* repository group as a mirror for all repositories, you might encounter projects that are unable to retrieve components from your local repository manager installation.

TIP

More details about client tool configuration for Maven repositories can be found in [Chapter 6](#).

This usually happens because you are trying to build a project that has defined a custom set of repositories and snapshot repositories or relies on the content of other publicly available repositories in its configuration. When you encounter such a project all you have to do is

- add this repository as a new *maven2* format, proxy repository
- and then add the new proxy repository to the *maven-public* group.

The advantage of this approach is that no configuration change on the build tool side is necessary at all.

4.3.6.2 Adding a New Repository

Once you have established the URL and format of the remote repository you are ready to configure the repository. E.g. the JBoss.org releases repository contains your missing component. Click on the *Create repository* button in the *Repositories* feature view and click on *maven2 (proxy)* from the list in the dialog.

In the configuration dialog:

- Set *Name* to `jboss-releases`
- Set *Remote storage* to `https://repository.jboss.org/nexus/content/repositories/releases/`
- For a *maven2* format repository, confirm that the *Version policy* is set correctly to *Release*.
- Click on the *Create repository* button at the end of the form

The repository manager is now configured to proxy the repository. If the remote repository contains snapshots as well as release components, you will need to repeat the process creating a second proxy repository with the same URL setting version policy to *Snapshot*.

4.3.6.3 Adding a Repository to a Group

Next you will need to add the new repository *jboss-releases* to the *maven-public* repository group. To do this, click on the row of the *maven-public* group in the *Repositories* feature view.

To add the new repository to the public group, find the repository in the *Available* list on the left, click on the repository you want to add and drag it to the right to the *Members* list. Once the repository is in that list, you can click and drag the repository within that list to alter the order in which the group will be searched for a matching component. Press the *Save* button to complete this configuration.

In the last few sections, you learned how to add new repositories to a build in order to download components that are not available in the Central Repository.

If you were not using a repository manager, you would have added these repositories to the repository element of your project's POM, or you would have asked all of your developers to modify `~/ .m2/ settings.xml` to reference two new repositories. Instead, you used the repository manager to add the two repositories to the public group. If all of the developers are configured to point to the public group, you can freely swap in new repositories without asking your developers to change local configuration, and you've gained a certain amount of control over which repositories are made available to your development team. In addition the performance of the component resolving across multiple repositories will be handled by the repository manager and therefore be much faster than client side resolution done by Maven each time.

4.4 Support Features

Nexus Repository Manager and Nexus Repository Manager OSS provides a number of features that allow you to ensure your server is configured correctly and provides you with tools to investigate details about the configuration. This information can be useful for troubleshooting and support activities.

All support features are available in the *Support* group of the *Administration* menu in the main menu section and include:

- [Analytics](#)
- [Logging and Log Viewer](#)
- [Metrics](#)
- [Support ZIP](#)
- [System Information](#)

4.4.1 Analytics

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The analytics integration allows Sonatype to gather data about of your repository manager usage, since it enables the collection of event data. It collects non-sensitive information about how you are using the repository manager and allows Sonatype to achieve a better understanding of usage overall and therefore drive product innovation following your needs.

The collected information is limited the primary interaction points between your environment and the repository manager. None of the request specific data (e.g., credentials or otherwise sensitive information) is ever captured.

Tip

The data is can be useful to you from a compatibility perspective, since it gathers answers to questions such as what features are most important, where are users having difficulties, and what integrations/APIs are actively in use.

You can enable the event logging in the *Analytics* feature view available via *Analytics* menu item in the *Support* section of the *Administration* menu. Select the checkbox beside *Collect analytics events* and press the *Save* button.

You can choose to provide this data automatically to Sonatype by selecting the checkbox beside *Enable anonymized analytics submission to Sonatype*. It enables Sonatype to tailor the ongoing development of the product. Alternatively, you can submit the data manually or just use the gathered data for your own analysis only.

Once enabled, all events logged can be inspected in the *Events* feature view available via the *Analytics* section of the *Administration* menu displayed in Figure 4.9.

	Event type	Timestamp...	Sequence	Duration (...)	User	Attributes
-	Ext.Direct	142963717...	249	4954000	admin	name=rapture_State_get, action=rapture_Sta...
	name	rapture_State_get				
	action	rapture_State				
	type	POLL				
	success	true				
+	Ext.Direct	142963716...	248	5182000	admin	name=rapture_State_get, action=rapture_Sta...
+	Ext.Direct	142963716...	247	4290000	admin	name=rapture_State_get, action=rapture_Sta...
+	Ext.Direct	142963715...	246	5064000	admin	name=rapture_State_get, action=rapture_Sta...

Figure 4.9: List of Analytics Events

The list of events shows the *Event type*, the *Timestamp*, the *Sequence* number and the *Duration* of the

event as well as the *User* that triggered it and any *Attributes*. Each row has a + symbol in the first column that allows you to expand the row vertically. Each attribute will be expanded into a separate line allowing you to inspect all the information that is potentially submitted to Sonatype.

The *User* value is replaced by a salted hash so that no username information is transmitted. The *Anonymization Salt* is automatically randomly generated and can optionally be configured in the *Analytics: Collection* capability manually. This administration area can additionally be used to change the random identifier for the repository manager instance.

Tip

More information about capabilities can be found in Section [4.2.2](#).

If you desire to further inspect the data that is potentially submitted, you can select to download the file containing the JSON files in a zip archive by clicking the *Export* button above the events list and downloading the file. The *Submit* button can be used to manually submit the events to Sonatype.

**Important**

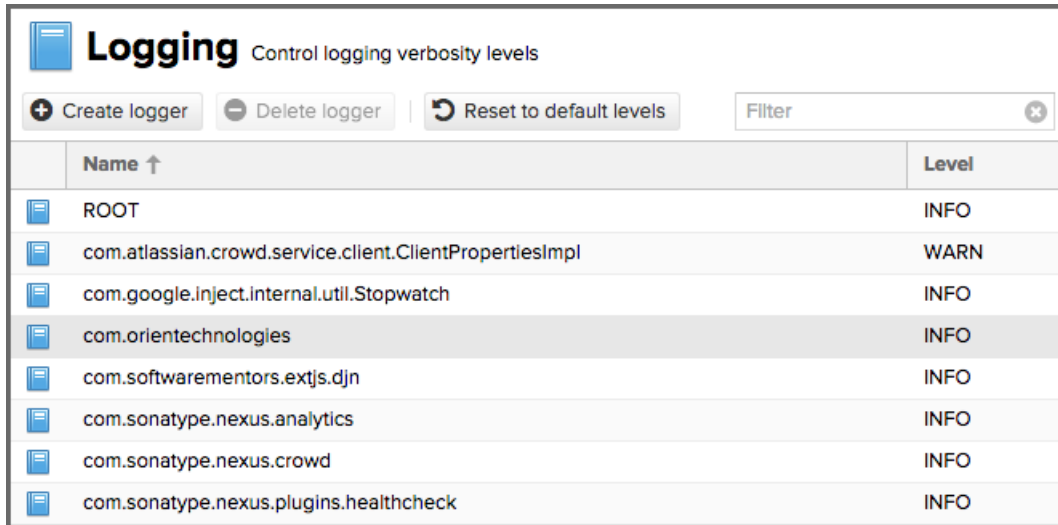
Sonatype values your input greatly and hopes you will activate the analytics feature and the automatic submission to allow us to ensure ongoing development is well aligned with your needs. In addition, we appreciate any further direct contact and feedback in person and look forward to hearing from you.

4.4.2 Logging and Log Viewer

Available in Nexus Repository Manager OSS and Nexus Repository Manager

You can configure the level of logging for the repository manager and all plugins as well as inspect the current log using the user interface with the *Logging* and the *Log Viewer* feature views.

Access the *Logging* feature view displayed in Figure [4.10](#) with the *Logging* menu item in the *Support* section in the *Administration* main menu.



Name ↑	Level
ROOT	INFO
com.atlassian.crowd.service.client.ClientPropertiesImpl	WARN
com.google.inject.internal.util.Stopwatch	INFO
com.orienttechnologies	INFO
com.softwarementors.extjs.djn	INFO
com.sonatype.nexus.analytics	INFO
com.sonatype.nexus.crowd	INFO
com.sonatype.nexus.plugins.healthcheck	INFO

Figure 4.10: The Logging Feature View for Configuring Loggers

The *Logging* feature view allows you to configure the preconfigured loggers as well as add and remove loggers. You can modify the log level for a configured logger by clicking on the *Level* value e.g., `INFO`. It will change into a drop-down of the valid levels including `OFF`, `DEFAULT`, `INFO` and others. Press the *Update* button to apply the change.

The *Create logger* button can be used to create new loggers. You will need to know the *Logger name* you want to configure. Typically this corresponds to the Java package name used in the source code. Depending on your needs you can inspect the source of Nexus Repository Manager OSS and the plugins as well as the source of your own plugins to determine the related loggers or contact Sonatype support for detailed help.

If you select a row in the list of loggers, you can delete the highlighted logger by pressing the *Delete logger* button above the list. This only applies to previously created custom loggers. To disable a default configured logger, set it to `OFF`.



Important

When upgrading the repository manager, keep in mind that some loggers change between versions, so if you rely on specific loggers, you might have to reconfigure them.

The *Reset to default levels* button allows you to remove all your custom loggers and get back to the setup shipped with a fresh install of the repository manager.

The loggers configured in the user interface are persisted into `$data-dir/etc/logback-overrides.xml` and override any logging levels configured in the main log file `logback-nexus.xml` as well as the other `logback-*` files. If you need to edit a logging level in those files, we suggest to edit the overrides file. This will give you access to edit the configuration in the user interface at a later stage and also ensure that the values you configure take precedence.

The *ROOT* logger level controls how verbose the logging is in general. If set to `DEBUG`, logging will be very verbose, printing all log messages including debugging statements. If set to `ERROR`, logging will be far less verbose, only printing out a log statement if the repository manager encounters an error. `INFO` represents an intermediate amount of logging.

Tip

When configuring logging, keep in mind that heavy logging can have a significant performance impact on an application and any changes trigger the change to the logging immediately.

Once logging is configured as desired, you can inspect the impact of your configuration in the *Log Viewer* feature view. It allows you to copy the log from the server to your machine by pressing the *Download* button. The *Create mark* button allows you to add a custom text string into the log, so that you can create a reference point in the log file for an analysis of the file. It will insert the text you entered surrounded by `*` symbols as visible in Figure 4.11.

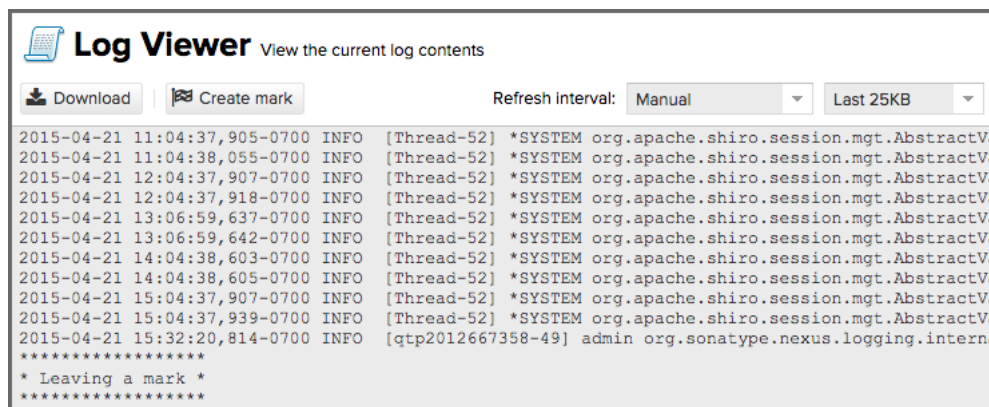


Figure 4.11: Viewing the Log with an Inserted Mark

The *Refresh interval* configuration on the right on the top of the view allows you to configure the timing for the refresh as well as the size of the log displayed. A manual refresh can be triggered with the general refresh button in the main toolbar.

4.4.3 Metrics

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The *Metrics* feature view is available in the *Support* section of the *Administration* main menu. It provides insight to characteristics of the Java virtual machine JVM running the repository manager and is displayed in Figure 4.12.

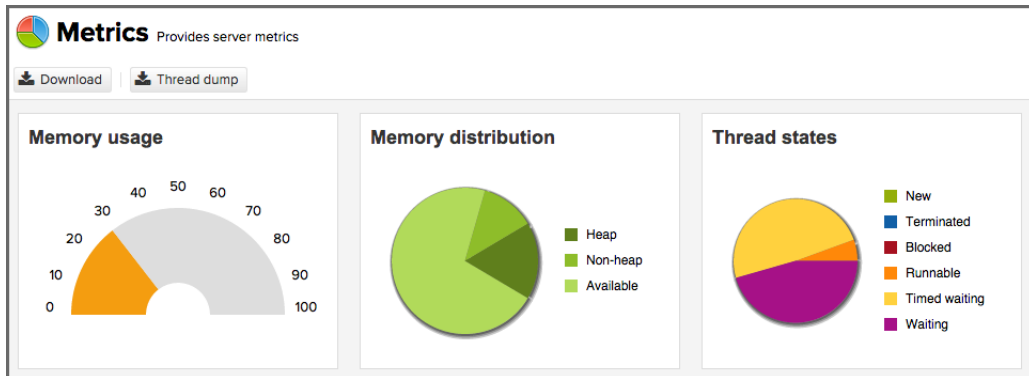


Figure 4.12: JVM Metrics

The *Memory usage*, *Memory distribution* and *Thread states* charts provide some simple visualizations. The *Download* button allows you to retrieve a large number of properties from the JVM and download them in a JSON-formatted text file. Pressing the *Thread dump* button triggers the creation of a thread dump of the JVM and a download of the resulting text file.

4.4.4 Support ZIP

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The *Support ZIP* feature view allows you to create a ZIP archive file that you can submit to Sonatype support via email or a support ticket. The checkboxes in *Contents* and *Options* allow you to control the content of the archive.

You can include the *System information report* as available in the *System Information* tab, a *JVM thread-dump* of the JVM currently running the repository, your general *Configuration files* as well as your *Security configuration files*, the *Log files* and *System and component metrics* with network and request-related information and *JMX information*.

The *Options* allow you to limit the size of the included files as well as the overall ZIP archive file size. Pressing the *Create support ZIP* button gathers all files, creates the archive in `$data-dir/downloads` and opens a dialog to download the file to your workstation. This dialog shows the *Name*, *Size* and exact *Path* of the support ZIP file.

4.4.5 System Information

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The *System Information* feature view displays a large number of configuration details related to

Nexus

details about the versions of the repository manager and the installed plugins, install and work directory location, application host and port and a number of other properties.

Java Virtual Machine

all system properties like `java.runtime.name`, `os.name` and many more as known by the JVM running the repository manager

Operating System

including environment variables like `JAVA_HOME` or `PATH` as well as details about the runtime in terms of processor, memory and threads, network connectors and storage file stores.

You can copy a subsection of the text from the panel or use the *Download* button to retrieve a JSON-formatted text file.

Chapter 5

Security

Available in Nexus Repository Manager OSS and Nexus Repository Manager

5.1 Introduction

Nexus Repository Manager and Nexus Repository Manager OSS uses role-based access control that gives administrators very fine-grained control over user rights to

- read from a repository or a subset of repositories,
- administer the repository manager or specific parts of the configuration,
- access specific parts of the user interface,
- deploy to repositories or even just specific sections of a repository.

The default configuration ships with roles and users with a standard set of permissions. As your security requirements evolve, you will likely need to customize security settings to create protected repositories for multiple departments or development groups. Nexus Repository Manager and Nexus Repository Manager OSS provides a security model that can adapt to any scenario.

This chapter covers all aspects of security of the repository manager including

- user account and access right management related to user interface as well as to component access documented in [Section 5.3](#), [Section 5.4](#) and [Section 5.5](#),
- selection of security backend systems documented [Section 5.2](#) including the built-in system as well as LDAP,
- management of SSL certificates from remote repositories, SMTP and LDAP servers documented in [Section 5.8](#).

Security-related configuration can be performed with the feature views available via the *Security* section of the *Administration* main menu. Many of the features shown in this section are only available to users with the necessary privileges to access them.

The role-based access control system is backed by different authentication and authorizations systems as documented in [Section 5.2](#) and designed around the following security concepts:

Privileges

[Privileges](#) are rights to read, update, create, or manage resources and perform operations related to the user interface as well as the components managed by the repository manager in the various repositories. The repository manager ships with a set of core privileges that cannot be modified.

Roles

Privileges can be grouped into collections called [roles](#) to make it easier to define privileges common to certain classes of users. For example, administrative users will all have similar sets of permissions. Instead of assigning individual privileges to individual users, you use roles to make it easier to manage users with similar sets of privileges. A role has one or more privileges and/or one or more roles.

Users

[Users](#) can be assigned one or more roles, and model the individuals who will be logging into the user interface and read, deploy, or manage repositories as well as connect from client tools such as Apache Maven.

5.2 Realms

The feature view for security realms administration displayed in Figure 5.1 allows you to activate and prioritize security realms used for authentication and authorization by adding them to the *Active* list on the right and placing them higher or lower on the list.

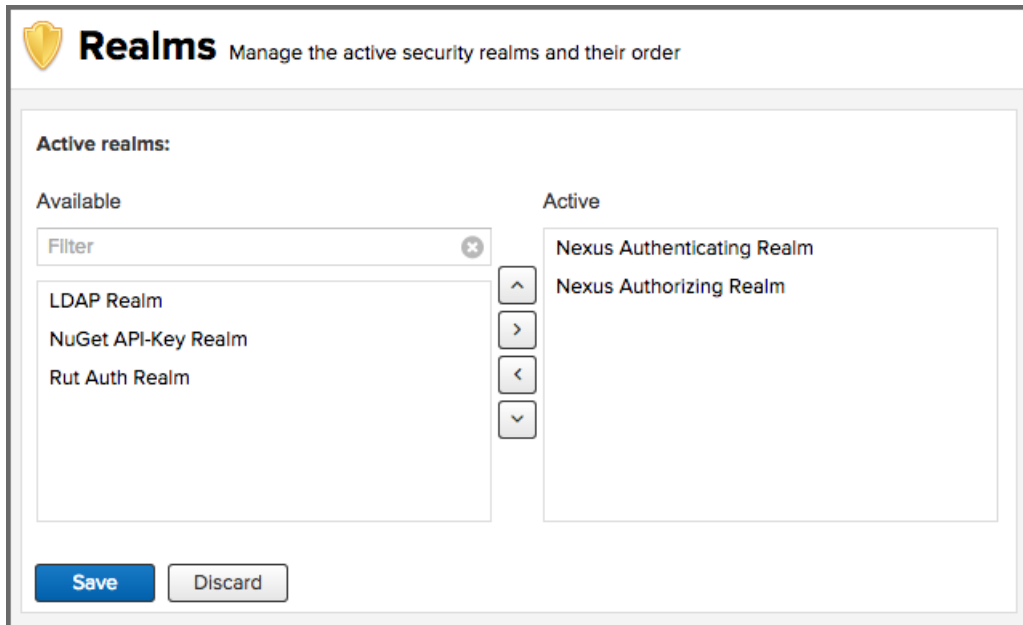


Figure 5.1: Security Realms Administration

Effectively, this configuration determines what authentication realm is used to grant a user access and the order the realms are used.

Nexus Authenticating Realm and Nexus Authorizing Realm

These are the built-in realms used by default. They allow the repository manager to manage security setup without additional external systems.

LDAP Realm

This realm identifies external storage in an LDAP system including e.g., Microsoft ActiveDirectory, ApacheDS, OpenLDAP and many others.

Rut Auth Realm

This realm uses an external authentication in any system with the user authorization passed to the repository manager in a HTTP header field with details documented in Section 5.7.

NuGet API-Key Realm

This realm is required for deployments to nuget-format repositories as documented in [Chapter 7](#).

**Warning**

Removing all realms from the *Active* section prevents access to the repository manager for any user including any administrative access and has to be avoided.

5.3 Privileges

Available in Nexus Repository Manager OSS and Nexus Repository Manager

You can access the configuration of privileges via the *Privileges* menu item in the *Security* submenu in the *Administration* main menu.

The repository manager use a number of types of privileges:

application

privileges related to the user interface and related functionality.

repository-admin

privileges related to the administration and configuration of a specific repository separated into access to * (all), *add*, *browse*, *delete*, *edit* and *read*.

repository-view

privileges controlling access to the content of a specific repository separate into access to * (all), *add*, *browse*, *delete*, *edit* and *read*.

Both *repository-admin* as well as *repository-view* privileges are automatically created and deleted by the repository manager, when repositories are created or deleted.

The list of privileges displayed in [Figure 5.2](#) displays an icon for the privilege *type* as the first column and then adds:

Name

the internal identifier for the privilege

Description

a human readable description of the purpose of the privilege

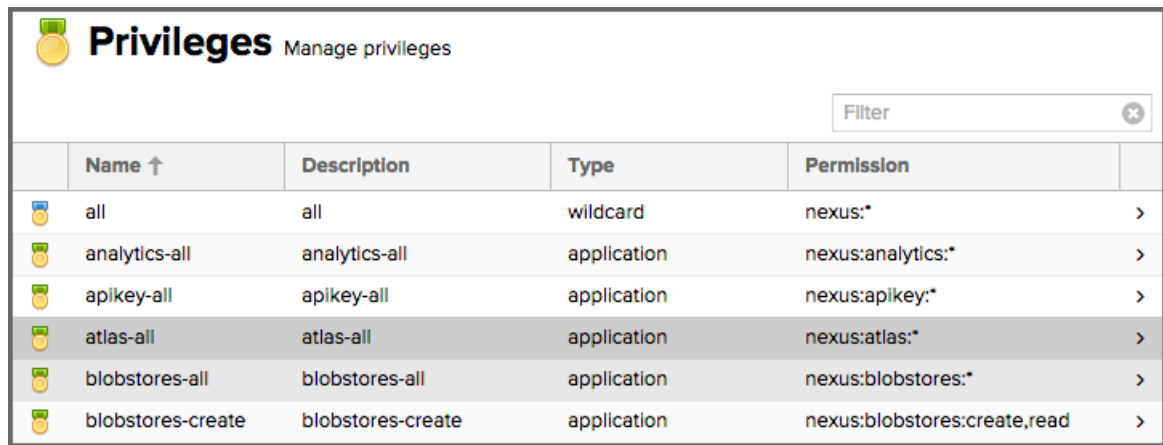
Type

the aspect of the repository manager to which this privilege applies

Permission

the internal permission definition as used by the embedded security framework

Further details are available after pressing on a specific row in the detail view.









Privileges Manage privileges				
Filter				
	Name ↑	Description	Type	Permission
	all	all	wildcard	nexus:*
	analytics-all	analytics-all	application	nexus:analytics:*
	apikey-all	apikey-all	application	nexus:apikey:*
	atlas-all	atlas-all	application	nexus:atlas:*
	blobstores-all	blobstores-all	application	nexus:blobstores:*
	blobstores-create	blobstores-create	application	nexus:blobstores:create,read

Figure 5.2: List of Security Privileges

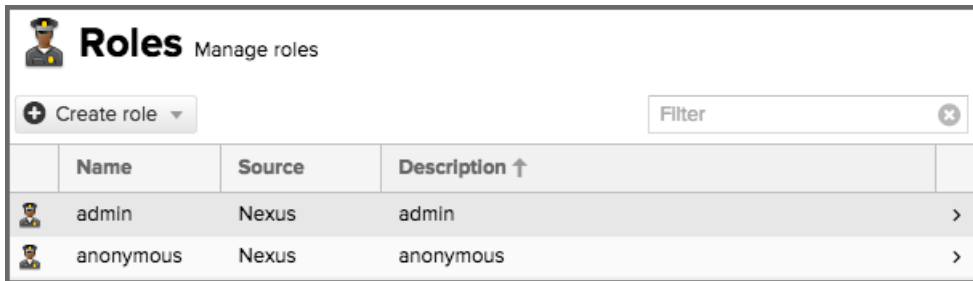
5.4 Roles

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Roles aggregate privileges into a related context and can, in turn, be grouped to create more complex roles.

The repository manager ships with a predefined *admin* as well as an *anonymous* role. These can be inspected in the *Roles* feature view accessible via the *Roles* item in the *Security* section of the *Administration* main menu. A simple example is shown in Figure 5.3. The list displays the *Name* and *Description* of the

role as well as the *Source*, which displays whether the role is internal (*Nexus*) or a mapping to an external source like LDAP.







Roles Manage roles			
+ Create role ▾		Filter ✕	
	Name	Source	Description ↑
	admin	Nexus	admin >
	anonymous	Nexus	anonymous >

Figure 5.3: Viewing the List of Defined Roles

To create a new role, click on the *Create role* button, select *Nexus Role* and fill out the Role creation feature view shown in Figure 5.4.

 **Roles** /  Create Role


Role ID:

Role name:

Role description:

Privileges:

Available



- all
- analytics-all
- apikey-all
- atlas-all
- blobstores-all
- blobstores-create


>

<

Given

Roles:

Available



- admin

>

<

Contained

- anonymous

Create role

Cancel

Figure 5.4: Creating a New Role

When creating a new role, you will need to supply a *Role ID* and a *Name* and optionally a *Description*. Roles are comprised of other roles and individual privileges. To assign a role or privilege to a role, drag and drop the desired privileges from the *Available* list to the *Given* list under the *Privileges* header. You can use the *Filter* input to narrow down the list of displayed privileges and the arrow buttons to add or remove privileges.

The same functionality is available under the *Roles* header to select among the *Available* roles and add them to the list of *Contained* roles.

Finally press the *Create Role* button to get the role created.

An existing role can be inspected and edited by clicking on the row in the list. This role-specific view allows you to delete the role with the *Delete role* button. The built-in roles are managed by the repository manager and cannot be edited or deleted. The *Settings* section displays the same section as the creation view as displayed in Figure 5.4. .

In addition to creating an internal role, the *Create role* button allows you to create an *External role mapping* to an external authorization system configured in the repository manager such as *LDAP*. This is something you would do, if you want to grant every member of an externally managed group (such as an *LDAP* group) a number of privileges and roles in the repository manager.

For example, assume that you have a group in *LDAP* named `scm` and you want to make sure that everyone in the `scm` group has administrative privileges.

Select *External Role Mapping* and *LDAP* to see a list of roles managed by that external realm in a dialog. Pick the desired `scm` group and confirm by pressing *Create mapping*.

Once the external role has been selected, creates a linked role. You can then assign other roles and privileges to this new externally mapped role like you would do for any other role.

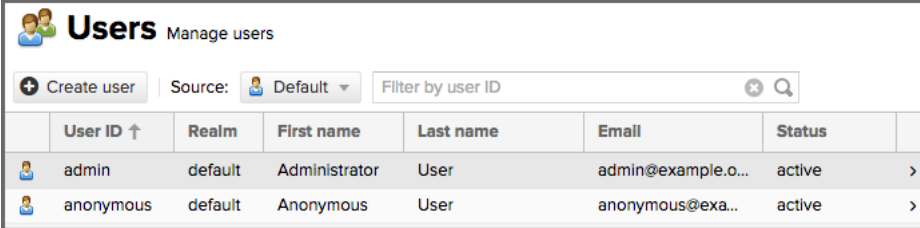
Any user that is part of the `scm` group in *LDAP*, receives all the privileges defined in the created role allowing you to adapt your generic role in *LDAP* to the repository manager-specific use cases you want these users to be allowed to perform.

5.5 Users

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager ships with two users: *admin* and *anonymous*. The *admin* user has all privileges and the *anonymous* user has read-only privileges.

The *Users* feature view displayed in Figure 5.5 can be accessed via the *Users* item in the *Security* section of the *Administration* menu. The list shows the users *User ID*, *First Name*, *Last Name* and *Email* as well as what security *Realm* is used and if the accounts *Status* is *active* or *disabled*.

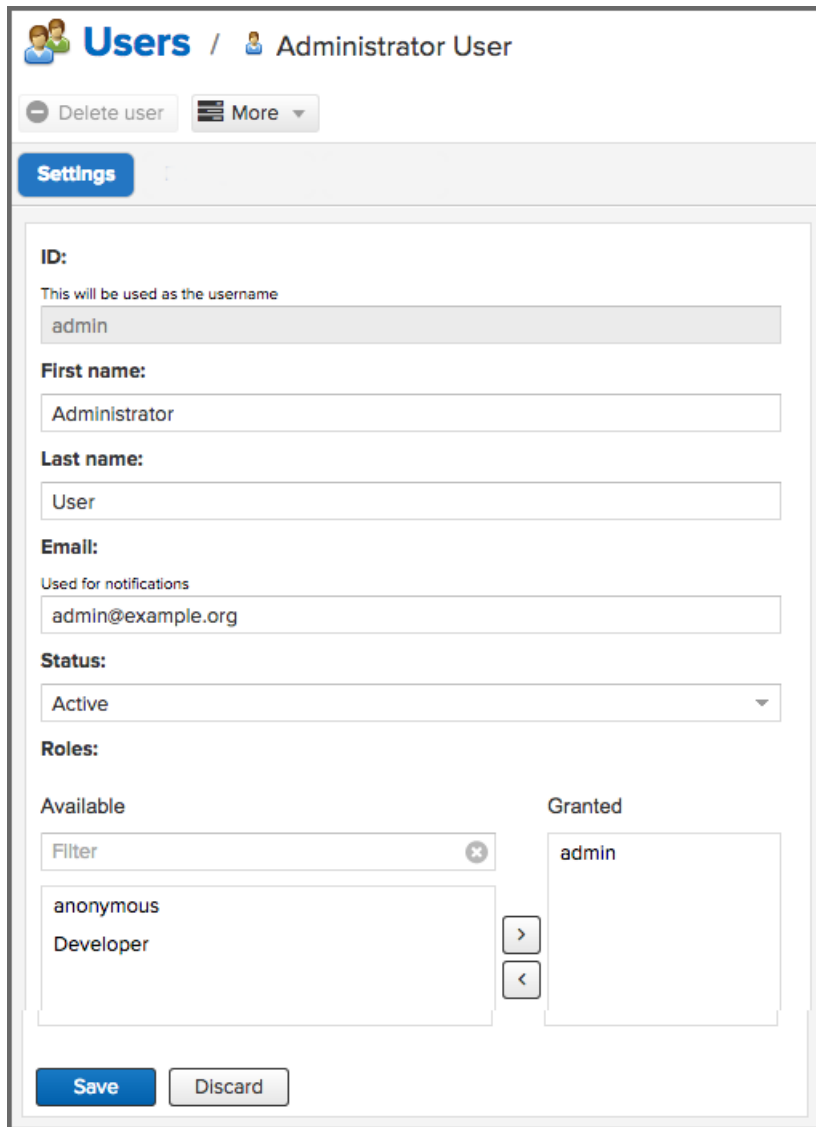


User ID ↑	Realm	First name	Last name	Email	Status	
admin	default	Administrator	User	admin@example.o...	active	>
anonymous	default	Anonymous	User	anonymous@exa...	active	>

Figure 5.5: Feature View with List of Users

Clicking on a user in the list or clicking on the *Create user* button displays the details view to edit or create the account shown in Figure 5.6. The *ID* can be defined upon initial creation and remains fixed thereafter. In addition you can specify the users *First Name*, *Last Name* and *Email* address. The *Status* allows you to set an account to be *Disabled* or *Active*.

The *Roles* control allows you to add and remove defined [roles](#) to the user and therefore control the [privileges](#) assigned to the user. A user can be assigned one or more roles that in turn can include references to other roles or to individual privileges.



The screenshot shows the 'Users' management interface in Nexus. At the top, there's a header with 'Users' and a breadcrumb 'Administrator User'. Below this, there are buttons for 'Delete user' and a 'More' dropdown menu. A 'Settings' button is also visible. The main form contains fields for 'ID' (admin), 'First name' (Administrator), 'Last name' (User), 'Email' (admin@example.org), and 'Status' (Active). The 'Roles' section shows a list of available roles (anonymous, Developer) and a list of granted roles (admin), with arrows indicating the ability to move roles between the two lists. At the bottom, there are 'Save' and 'Discard' buttons.

Users / Administrator User

Delete user More ▾

Settings

ID:
This will be used as the username
admin

First name:
Administrator

Last name:
User

Email:
Used for notifications
admin@example.org

Status:
Active ▾

Roles:

Available

Filter ✕

anonymous
Developer

Granted

admin

>
<

Save Discard

Figure 5.6: Creating or Editing a User

The *More* button in the allows you to select the *Change Password* item in the drop down. The password can be changed in a dialog, provided the user is managed by the built-in security realm.

5.6 Anonymous Access

Available in Nexus Repository Manager OSS and Nexus Repository Manager

By default, the user interface as well as the repositories and the contained components are available to unauthenticated users for read access. The *Anonymous* feature view is available via the *Anonymous* item in the *Security* section of the *Administration* main menu and shown in Figure 5.7.

The privileges available to these users are controlled by the roles assigned to the *anonymous* user from the *NexusAuthorizingRole*. By changing the privileges assigned to this user in the [Users feature view](#).

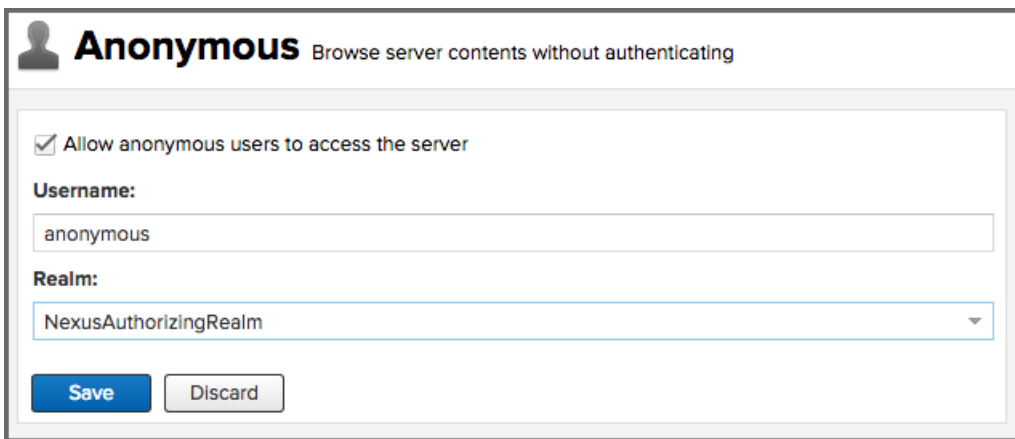
The screenshot shows the 'Anonymous' configuration page in Nexus. At the top, there is a user icon and the title 'Anonymous' followed by the subtitle 'Browse server contents without authenticating'. Below this, there is a checkbox labeled 'Allow anonymous users to access the server' which is checked. Underneath the checkbox, there are two input fields: 'Username:' with the value 'anonymous' and 'Realm:' with a dropdown menu showing 'NexusAuthorizingRealm'. At the bottom of the form, there are two buttons: 'Save' (in blue) and 'Discard' (in grey).

Figure 5.7: Configuring Anonymous Access

If you want to disable unauthenticated access to the repository manager entirely, you can uncheck the *Allow anonymous users to access the server* checkbox. The *Username* and *Realm* controls allow you to change the details for the anonymous user. E.g. you might have a *guest* account defined in your LDAP system and desire to use that user for anonymous access.

5.7 Authentication via Remote User Token

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager allows integration with external security systems that can pass along authentication of a user via the `Remote_User` HTTP header field for all requests - Remote User Token *Rut* authentication. This typically affects all web application usage in a web browser.

These are either web-based container or server-level authentication systems like [Shibboleth](#). In many cases, this is achieved via a server like [Apache HTTPD](#) or [nginx](#) proxying the repository manager. These servers can in turn defer to other authentication storage systems e.g., via the [Kerberos](#) network authentication protocol. These systems and setups can be described as Central Authentication Systems CAS or Single Sign On SSO.

From the users perspective, he/she is required to login into the environment in a central login page that then propagates the login status via HTTP headers. the repository manager simply receives the fact that a specific user is logged in by receiving the username in a HTTP header field.

The HTTP header integration can be activated by adding and enabling the *Rut Auth* capability as documented in Section [4.2.2](#) and setting the *HTTP Header name* to the header populated by your security system. Typically, this value is `REMOTE_USER`, but any arbitrary value can be set. An enabled capability automatically causes the *Rut Auth Realm* to be added to the *Active* realms in the *Realms* configuration described in Section [5.2](#).

When an external system passes a value through the header, authentication will be granted and the value will be used as the user name for configured authorization scheme. For example, on a default installation with the internal authorization scheme enabled, a value of *admin* would grant the user the access rights in the user interface as the *admin* user.

A seamless integration can be set up for users if the external security system is exposed via LDAP and configured in the repository manager as LDAP authorization realm combined with external role mappings and in parallel the sign-on is integrated with the operating system sign-on for the user.

5.8 Configuring SSL

Using Secure Socket Layer (SSL) communication with the repository manager is an important security feature and a recommended best practice. Secure communication can be inbound or outbound.

Outbound client communication may include integration with

- a remote proxy repository over HTTPS - documented in Section [4.3](#))

- SSL/TLS secured servers - e.g. for SMTP/email integration documented in Section [4.2.3](#)
- LDAP servers configured to use LDAPS,
- specialized authentication realms such as the Crowd realm.

Inbound client communication includes

- web browser HTTPS access to the user interface,
- tool access to repository content,
- and manual or scripted usage of the REST APIs.

5.8.1 Outbound SSL - Trusting SSL Certificates of Remote Repositories

Available in Nexus Repository Manager OSS and Nexus Repository Manager

When the SSL certificate of a remote proxy repository is not trusted, the repository may be automatically blocked or outbound requests fail with a message similar to *PKIX path building failed*.

The *Proxy* configuration for each proxy repository documented in Section [4.3.5](#) includes a section titled *Use the Nexus truststore*. It allows you to manage the SSL certificate of the remote repository and solves these problems. It is only displayed, if the remote storage uses a HTTPS URL.

The *View certificate* button triggers the display of the *SSL Certificate Details* dialog. An example is shown in Figure [5.8](#).

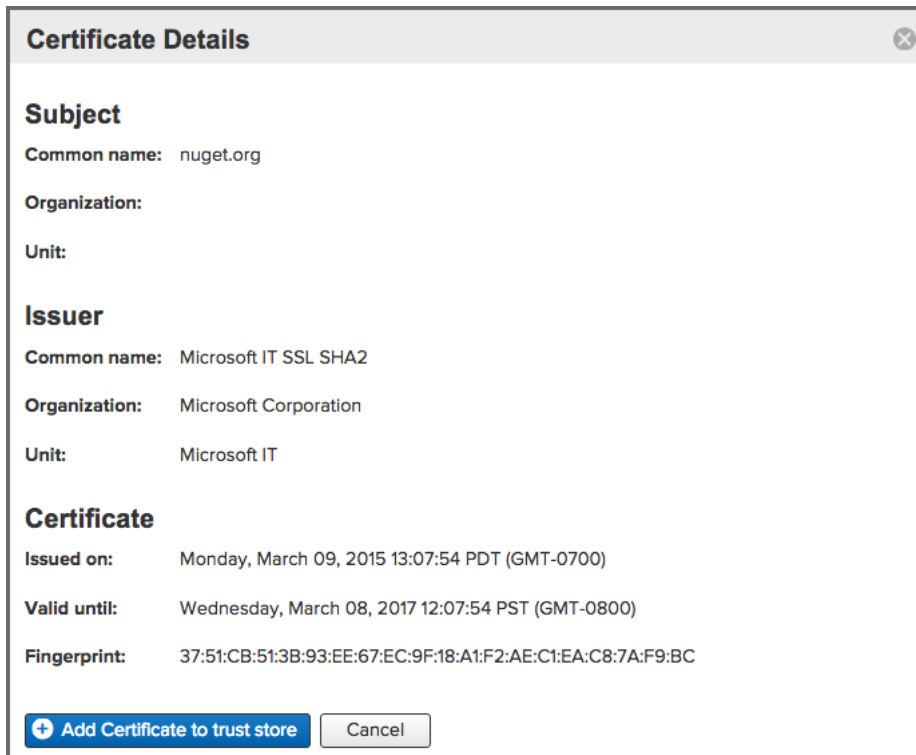


Figure 5.8: Certificate Details Dialog to Add an SSL to the Nexus Truststore

Use the *Certificate Details* dialog when the remote certificate is not issued by a well-known public certificate authority included in the default Java trust store. This specifically also includes usage of self-signed certificates used in your organization. To confirm trust of the remote certificate, click the *Add certificate to truststore* button in the dialog. This feature is analogous to going to the [SSL Certificates](#) user interface and using the *Load certificate* button found there as described in Section 5.8.2. If the certificate is already added, the button can undo this operation and will read *Remove certificate from trust store*.

The checkbox labelled *Use certificates stored in Nexus to connect to external systems* is used to confirm that the repository manager should consult the internal truststore as well as the JVM truststore when confirming trust of the remote repository certificate. Without adding the certificate to the private truststore and enabling the checkbox, the repository will not trust the remote.

The default JVM truststore of the JVM installation used to run the repository manager and the private truststores are merged. The result of this merge is used to decide about the trust of the remote server. The default Java truststore already contains public certificate authority trust certificates. If the remote

certificate is signed by one of these authorities, then explicitly trusting the remote certificate will not be needed.

**Warning**

When removing a remote trusted certificate from the truststore, a repository manager restart is required before a repository may become untrusted.

5.8.2 Outbound SSL - Trusting SSL Certificates Globally

Available in Nexus Repository Manager OSS and Nexus Repository Manager

The repository manager allows you to manage trust of all remote SSL certificates in a centralized user interface. Use this interface when you wish to examine all the currently trusted certificates for remote repositories, or manage certificates from secure remotes that are not repositories.

Access [the feature view for SSL Certificates administration](#) by selecting the *SSL Certificates* menu items in the *Security* submenu in the *Administration* main menu.

	Name ↑	Issued to	Issued by	Fingerprint	
	nuget.org		Microsoft Corporation	37:51:CB:51:3B:93:EE:6...	>
	repo1.maven.org	Sonatype, Inc	DigiCert Inc	3D:C0:41:69:E1:0D:15:B...	>

Figure 5.9: SSL Certificates Administration

The list shows any certificates that are already trusted. Clicking on an individual row allows you to inspect the certificate. This detail view shows further information about the certificate including *Subject*, *Issuer* and *Certificate* details. The *Delete certificate* button allows you to remove a certificate from the truststore.

The button *Load certificate* above the list of certificates can be used to add a new certificate to the truststore by loading it directly from a server or using a PEM file representing the certificate.

The common approach is to choose *Load from server* and enter the full `https://` URL of the remote site, e.g, `https://repo1.maven.org`. The repository manager will connect using HTTPS and use the HTTP proxy server settings if applicable. When the remote is not accessible using `https://`, only enter the host name or IP address, optionally followed by colon and the port number. For example: `example.com:8443`. In this case the repository manager will attempt a direct SSL socket connection to the remote host at the specified port. This allows you to load certificates from SMTP or LDAP servers, if you use the correct port.

Alternatively you can choose the *Paste PEM* option to configure trust of a remote certificate. Copy and paste the Base64 encoded X.509 DER certificate to trust. This text must be enclosed between lines containing `-----BEGIN CERTIFICATE-----` and `-----END CERTIFICATE-----`.

Typically this file is supplied to you by the certificate owner. An example method to get the encoded X.509 certificate into a file on the command line using `keytool` is:

```
keytool -printcert -rfc -sslserver repo1.maven.org > repo1.pem
```

The resulting `repo1.pem` file contains the encoded certificate text that you can cut and paste into the dialog in the user interface. An example of inserting such a certificate is shown in Figure 5.10.



Figure 5.10: Providing a Certificate in PEM Format

If the repository manager can successfully retrieve the remote certificate or decode the pasted certificate, the details will be shown allowing you to confirm details as shown in Figure 5.11. Please review the

displayed information carefully before clicking *Add Certificate* to establish the truststore addition.

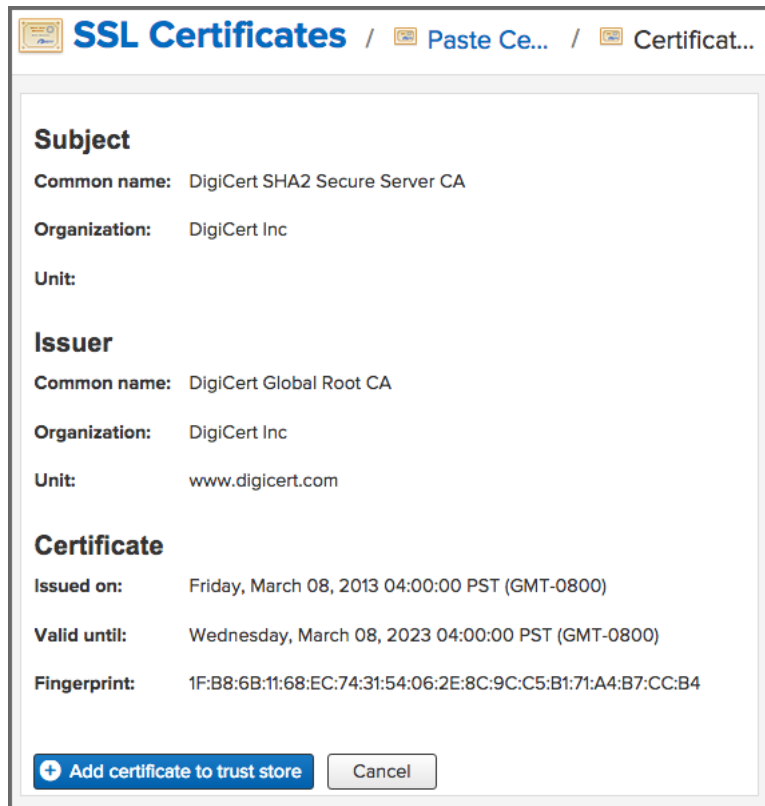


Figure 5.11: Certificate Details Displayed after Successful Retrieval or Parsing

In some organizations, all of the remote sites are accessed through a globally configured proxy server which rewrites every SSL certificate. This single proxy server is acting as a private certificate authority. In this case, you can **follow special instructions for trusting the proxy server root certificate**, which can greatly simplify your certificate management duties.

5.8.3 Outbound SSL - Trusting SSL Certificates Using Keytool

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Managing trusted SSL certificates from the command line using [keytool](#) and system properties is an alternative and more complex option than using the SSL certificate management features of the repository manager.

Before you begin the process of trusting a certificate from the command line you will need:

- a basic understanding of [SSL certificate technology and how the Java VM implements this feature](#)
- command line access to the host operating system and the *keytool* program
- network access to the remote SSL server you want to trust from the host running the repository manager. This must include any HTTP proxy server connection details.

If you are connecting to servers that have certificates which are not signed by a public CA, you will need to complete these steps:

1. Copy the default JVM truststore file (`$JAVA_HOME/jre/lib/security/cacerts`) to a specific location for editing.
2. Import additional trusted certificates into the copied truststore file.
3. Configure JSSE system properties for the repository manager process so that the custom truststore is consulted instead of the default file.

Some common commands to manually trust remote certificates can be found in our [SSL Certificate Guide](#).

After you have imported your trusted certificates into a truststore file, you can add the JVM parameters configuring the truststore file location and password as separate configuration lines into the file `etc/system.properties`.

```
javax.net.ssl.trustStore=<truststore>
javax.net.ssl.trustStorePassword=<truststore_password>
```

Once you have added the properties shown above, restart the repository manager and attempt to proxy a remote repository using the imported certificate. The repository manager will automatically register the certificates in the truststore file as trusted.

5.8.4 Inbound SSL - Configuring to Serve Content via HTTPS

Available in Nexus Repository Manager OSS and Nexus Repository Manager

Providing access to the user interface and content via HTTPS is a best practice.

You have two options:

- Using a separate reverse proxy server in front of the repository manager to manage HTTPS
- Configure the repository manager itself to serve HTTPS directly

5.8.4.1 Using A Reverse Proxy Server

A common approach is to access the repository manager through a dedicated server which answers HTTPS requests on behalf of the repository manager - these servers are called reverse proxies or SSL/TLS terminators. Subsequently requests are forwarded to the repository manager via HTTP and responses received via HTTP are then sent back to the requestor via HTTPS.

There are a few advantages to using these which can be discussed with your networking team. For example, the repository manager can be upgraded/installed without the need to work with a custom JVM keystore. The reverse proxy could already be in place for other systems in your network. Common reverse proxy choices are Apache httpd, nginx, Eclipse Jetty or even dedicated hardware appliances. All of them can be configured to serve SSL content, and there is a large amount of reference material available online.

Serving SSL Directly The second approach is to use the Eclipse Jetty instance that is distributed with the repository manager to accept HTTPS connections.

5.8.4.2 How to Enable the HTTPS Connector

1. Create a Java keystore file at `$install-dir/etc/ssl/keystore.jks` which contains the Jetty SSL certificate to use. Instructions are available on the [Eclipse Jetty documentation site](#).
2. Edit `$install-dir/etc/org.sonatype.nexus.cfg`. Add a property on a new line `application-port-ssl=8443`. Change 8443 to be your preferred port on which to expose the HTTPS connector.

3. Edit `$install-dir/etc/org.sonatype.nexus.cfg`. Change the `nexus-args` property comma delimited value to include `{karaf.etc}/etc/jetty-https.xml`. Save the file.
4. Restart Nexus. Verify HTTPS connections can be established.
5. Update the Base URL to use `https` in your repository manager configuration using the [Base URL capability](#).

Tip

This configuration process is available [as a video demonstration](#).

5.8.4.3 How to Redirect All Plain HTTP Requests to HTTPS

Some organizations need to remind their users that Nexus should only be used over HTTPS - redirecting HTTP requests to HTTPS can help.

1. Follow all the steps under [How to Enable the HTTPS Connector](#). Make sure the `nexus-args` property value still includes the reference to `{karaf.etc}/jetty-http.xml`
2. Edit `$install-dir/etc/org.sonatype.nexus.cfg`. Change the `nexus-args` property comma delimited value to include `{karaf.etc}/jetty-http-redirect-to-https.xml`. Save the file.
3. Restart Nexus. Verify all plain HTTP requests get redirected to the equivalent HTTPS url.

Tip

Redirecting HTTP requests is not recommended because it introduces implied security and creates increased network latency. Clients which send Basic Authorization headers preemptively may unintentionally expose credentials in plain text.

5.8.4.4 How to Disable the HTTP Connector

1. Edit `$install-dir/etc/org.sonatype.nexus.cfg`. Change the `nexus-args` property comma delimited value to not include `{karaf.etc}/jetty-http.xml`. Save the file.
-

2. Restart Nexus. Verify plain HTTP requests are no longer serviced.

Chapter 6

Configuring Maven and Other Build Tools

Available in Nexus Repository Manager OSS and Nexus Repository Manager

6.1 Introduction

Historically Nexus Repository Manager started as a repository manager supporting the Maven repository format. While it supports many other repository formats now, the Maven repository format is still the most common and well supported format for build and provisioning tools running on the JVM and beyond.

This chapter shows example configurations for using Nexus Repository Manager with a Maven and number of other tools. The setups take advantage of the repository manager merging many repositories and exposing them via a repository group. Setting this up is documented in the chapter in addition to the configuration used by specific tools.

6.2 Apache Maven

To use repository manager with [Apache Maven](#), we configure Maven to check the repository manager instead of the default, built-in connection to the Central Repository.

To do this, you add a `mirror` configuration and override the default configuration for the `central` repository in your `~/.m2/settings.xml` as shown in [Listing: Configuring Maven to Use a Single Repository Group](#).

Listing: Configuring Maven to Use a Single Repository Group

```
<settings>
  <mirrors>
    <mirror>
      <!--This sends everything else to /public -->
      <id>nexus</id>
      <mirrorOf>*</mirrorOf>
      <url>http://localhost:8081/repository/maven-public/</url>
    </mirror>
  </mirrors>
  <profiles>
    <profile>
      <id>nexus</id>
      <!--Enable snapshots for the built in central repo to direct -->
      <!--all requests to nexus via the mirror -->
      <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>
    <!--make the profile active all the time -->
    <activeProfile>nexus</activeProfile>
  </activeProfiles>
</settings>
```

In [Listing: Configuring Maven to Use a Single Repository Group](#), we have defined a single profile called `nexus`. It configures a repository and a `pluginRepository` with the `id` `central` that overrides the same repositories in the super pom. The super pom is internal to every Apache Maven install and

establishes default values. These overrides are important since they change the repositories by enabling snapshots and replacing the URL with a bogus URL. This URL is overridden by the `mirror` setting in the same `settings.xml` file to point to the URL of your single repository group. This repository group can, therefore, contain release as well as snapshot components and Maven will pick them up.

The `mirrorOf` pattern of `*` causes any repository request to be redirected to this mirror and to your single repository group, which in the example is the `public` group.

It is possible to use other patterns in the `mirrorOf` field. A possible valuable setting is to use `external : *`. This matches all repositories except those using `localhost` or file based repositories. This is used in conjunction with a repository manager when you want to exclude redirecting repositories that are defined for integration testing. The integration test runs for Apache Maven itself require this setting.

More documentation about mirror settings can be found in the [mini guide on the Maven web site](#).

As a last configuration the `nexus` profile is listed as an active profile in the `activeProfiles` element.

6.3 Apache Ant and Apache Ivy

Apache Ivy is a dependency manager often used in Apache Ant builds. It supports the Maven repository format and can be configured to download dependencies that can be declared in the `ivy.xml` file. This configuration can be contained in the `ivysettings.xml`. A minimal example for resolving dependencies from a repository manager running on `localhost` is shown in [Listing: Minimal Ivy Configuration in an Ant file](#).

Listing: Minimal Ivy Configuration in an Ant file

```
<ivysettings>
  <settings defaultResolver="nexus"/>
  <property name="nexus-public"
    value="http://localhost:8081/repository/maven-public/" />
  <resolvers>
    <ibiblio name="nexus" m2compatible="true" root="${nexus-public}" />
  </resolvers>
</ivysettings>
```

These minimal settings allow the `ivy:retrieve` task to download the declared dependencies.

To deploy build outputs to a repository with the `ivy:publish` task, user credentials and the URL of the target repository have to be added to `ivysettings.xml` and the `makepom` and `publish` tasks have to be configured and invoked.

Full example projects can be found in the `ant-ivy` folder of the [documentation examples project](#) in the `nexus-3.0.x` branch. A full build of the `simple-project`, including downloading the declared dependencies and uploading the build output to the repository manager can be invoked with

```
cd ant-ivy/simple-project
ant deploy
```

6.4 Apache Ant and Eclipse Aether

Eclipse Aether is the dependency management component used in Apache Maven 3+. The project provides Ant tasks that can be configured to download dependencies that can be declared in `pom.xml` file or in the Ant build file directly.

This configuration can be contained in your Ant `build.xml` or a separate file that is imported. A minimal example for resolving dependencies from a repository manager running on `localhost` is shown in [Listing: Minimal Aether Configuration in an Ant file](#).

.Listing: Minimal Aether Configuration in an Ant file

```
<project xmlns:aether="antlib:org.eclipse.aether.ant" ....>
  <taskdef uri="antlib:org.eclipse.aether.ant" resource="org/eclipse/ ↵
    aether/ant/antlib.xml">
    <classpath>
      <fileset dir="${aether.basedir}" includes="aether-ant-tasks-*.jar" ↵
        />
    </classpath>
  </taskdef>
  <aether:mirror id="mirror" url="http://localhost:8081/repository/maven- ↵
    public/" mirrorOf="*" />
  ...
</project>
```

These minimal settings allow the `aether:resolve` task to download the declared dependencies.

To deploy build outputs to a repository with the `aether:deploy` task, user authentication and details about the target repositories have to be added .

Full example projects can be found in the `ant-aether` folder of the [documentation examples project](#) in the `nexus-3.0.x` branch. A full build of the `simple-project`, including downloading the declared dependencies and uploading the build output to the repository manager can be invoked with

```
cd ant-aether/simple-project
ant deploy
```

6.5 Gradle

Gradle has a built in dependency management component that supports the Maven repository format. In order to configure a Gradle project to resolve dependencies declared in `build.gradle` file, a maven repository as shown in [Listing: Gradle Repositories Configuration](#) has to be declared

Listing: Gradle Repositories Configuration

```
repositories {
    maven {
        url "http://localhost:8081/repository/maven-public/"
    }
}
```

These minimal settings allow Gradle to download the declared dependencies.

To deploy build outputs to a repository with the `uploadArchives` task, user authentication can be declared in e.g., `gradle.properties`:

```
nexusUrl=http://localhost:8081
nexusUsername=admin
nexusPassword=admin123
```

and then used in the `uploadArchives` task with a `mavenDeployer` configuration from the Maven plugin:

```
uploadArchives {
    repositories {
        mavenDeployer {
            repository(url: "${nexusUrl}/repository/maven-releases/") {
                authentication(userName: nexusUsername, password: ↵
                    nexusPassword)
            }
            snapshotRepository(url: "${nexusUrl}/repository/maven- ↵
                snapshots") {
```

```
        authentication(userName: nexusUsername, password: ↵
            nexusPassword)
        }
    }
}
}
```

Full example projects can be found in the `gradle` folder of the [documentation book examples project](#) in the `nexus-3.0.x` branch. A full build of the `simple-project`, including downloading the declared dependencies and uploading the build output to the repository manager can be invoked with

```
cd gradle/simple-project
gradle upload
```

6.6 SBT

`sbt` has a built in dependency management component and defaults to the Maven repository format. In order to configure a `sbt` project to resolve dependencies declared in `build.sbt` file, a `resolver` as shown below has to be declared

.Listing: SBT Resolvers Configuration

```
resolvers += "Nexus" at "http://localhost:8081/repository/maven-public/"
```

These minimal settings allow `sbt` to download the declared dependencies.

To deploy build outputs to a repository with the `publish` task, user credentials can be declared in the `build.sbt` file:

```
credentials += Credentials("Nexus Repository Manager",
    "nexus.scala-tools.org", "admin", "admin123")
```

and then used in the `publishTo` configuration:

```
publishTo <=> version { v: String =>
    val nexus = "http://localhost:8081/"
    if (v.trim.endsWith("SNAPSHOT"))
        Some("snapshots" at nexus + "repository/maven-snapshots")
    else
```

```
Some("releases" at nexus + "repository/maven-releases")
```

Further documentation can be found in the [sbt documentation on publishing](#).

6.7 Leiningen

Leiningen has a built in dependency management component and defaults to the Maven repository format. As a build tool it is mostly used for projects using the Coljure language. Many libraries useful for these projects are published to the Clojars repository. If you want to use these, you have to create two proxy repositories with the remote URL `http://clojars.org/repo/`. This repository is mixed and you therefore have to create a release and a snapshot proxy repository and then add both to the public group.

In order to configure a Leiningen project to resolve dependencies declared in the `project.clj` file, a `mirrors` section overriding the built in `central` and `clojars` repositories as shown below has to be declared

.Listing: Leiningen Configuration

```
:mirrors {  
  "central" {:name "Nexus"  
             :url "http://localhost:8081/repository/maven- ←  
                 public/"  
             :repo-manager true}  
  #"clojars" {:name "Nexus"  
             :url "http://localhost:8081/repository/maven- ←  
                 public/"  
             :repo-manager true}  
}
```

These minimal settings allow Leiningen to download the declared dependencies.

To deploy build outputs to a repository with the `deploy` command, the target repositories have to be added to `project.clj` as `deploy-repositories`. This avoids Leiningen checking for dependencies in these repositories, which is not necessary, since they are already part of the `public` repository group used in `mirrors`.

```
:deploy-repositories [  
  ["snapshots" "http://localhost:8081/repository/maven-snapshots"]  
  ["releases" "http://localhost:8081/repository/maven-releases"]  
]
```

```
]
```

User credentials can be declared in `~/.lein/credentials.clj.gpg` or will be prompted for.

Further documentation can be found on the [Leiningen website](#).

Chapter 7

.NET Package Repositories with NuGet

Available in Nexus Repository Manager OSS and Nexus Repository Manager

7.1 Introduction

With the creation of the **NuGet** project, a package management solution for .NET developers has become available. Similar to Apache Maven dependency management for Java developers, NuGet makes it easy to add, remove, and update libraries and tools in Visual Studio projects that use the .NET Framework.

The project websites at www.nuget.org and nuget.codeplex.com host tool downloads and detailed documentation as well as links to further resources and provide a repository and features to upload your open source NuGet packages. With the NuGet Gallery a repository of open source libraries and tools is available and the need for repository management arises.

Nexus Repository Manager and Nexus Repository Manager OSS support the NuGet repository format for hosted and proxy repositories as well as exposing them to the client-side tools as a repository group and has related repositories preconfigured.

Nexus Repository Manager and NuGet allow you to improve collaboration and control, while speeding up .NET development, facilitating open source libraries and sharing of internal component across teams. When you standardize on a single repository for all your development and use it for internal components

as well, you will get all the benefits of using a repository manager when working in the .NET architecture.

To share a library or tool with NuGet, you create a NuGet package and store it in the NuGet repository on the repository manager. Similarly, you can use packages others have created and made available in their NuGet repositories by proxying them or downloading the packages and installing them in your own hosted repository for third party packages.

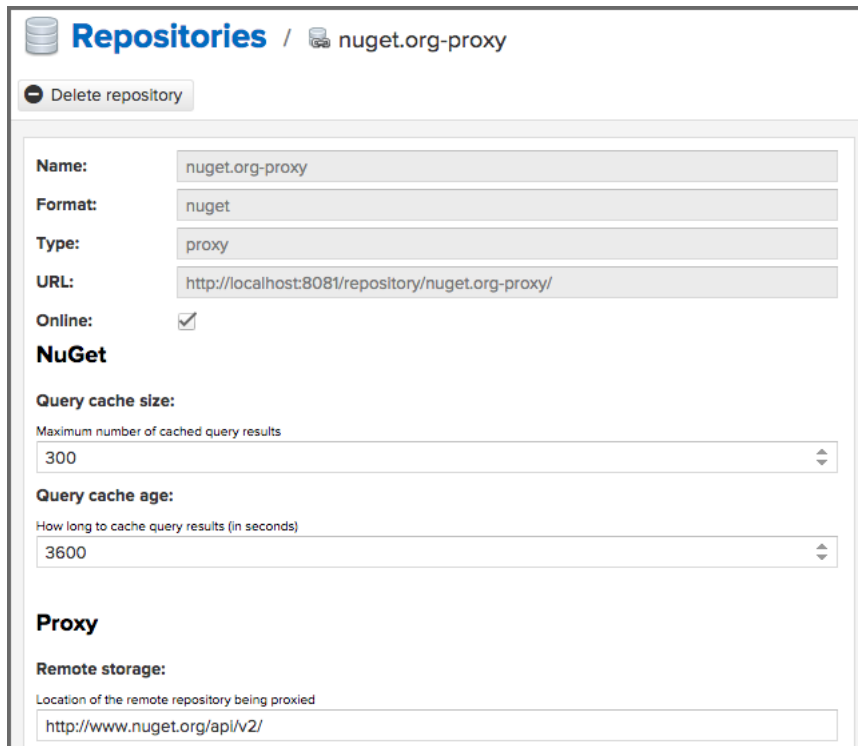
The NuGet Visual Studio extension allows you to download the package from the repository and install it in your Visual Studio project or solution. NuGet copies everything and makes any required changes to your project setup and configuration files. Removing a package will clean up any changes as required.

7.2 NuGet Proxy Repositories

The NuGet Gallery is the common repository used by all package authors and consumers. To reduce duplicate downloads and improve download speeds for your developers and CI servers, you should proxy the NuGet Gallery with the repository manager. If you use other external repositories, you should also proxy these. A default installation of the repository manager has the NuGet gallery set up as a proxy repository with the name *nuget.org-proxy*.

To proxy another external NuGet repository, you simply create a new *nuget (proxy)* as documented in Section 4.3. The *Remote Storage* has to be set to the URL of the remote repository you want to proxy.

The default configuration for proxying the NuGet Gallery is partially visible in Figure 7.1 and uses the URL of the API `http://www.nuget.org/api/v2/`.



The screenshot shows the Nexus 'Repositories' configuration page for a repository named 'nuget.org-proxy'. The page has a breadcrumb 'Repositories / nuget.org-proxy' and a 'Delete repository' button. The configuration fields are as follows:

- Name:** nuget.org-proxy
- Format:** nuget
- Type:** proxy
- URL:** http://localhost:8081/repository/nuget.org-proxy/
- Online:** ☒

NuGet

- Query cache size:** Maximum number of cached query results: 300
- Query cache age:** How long to cache query results (in seconds): 3600

Proxy

- Remote storage:** Location of the remote repository being proxied: http://www.nuget.org/api/v2/

Figure 7.1: NuGet Proxy Repository Configuration for the NuGet Gallery

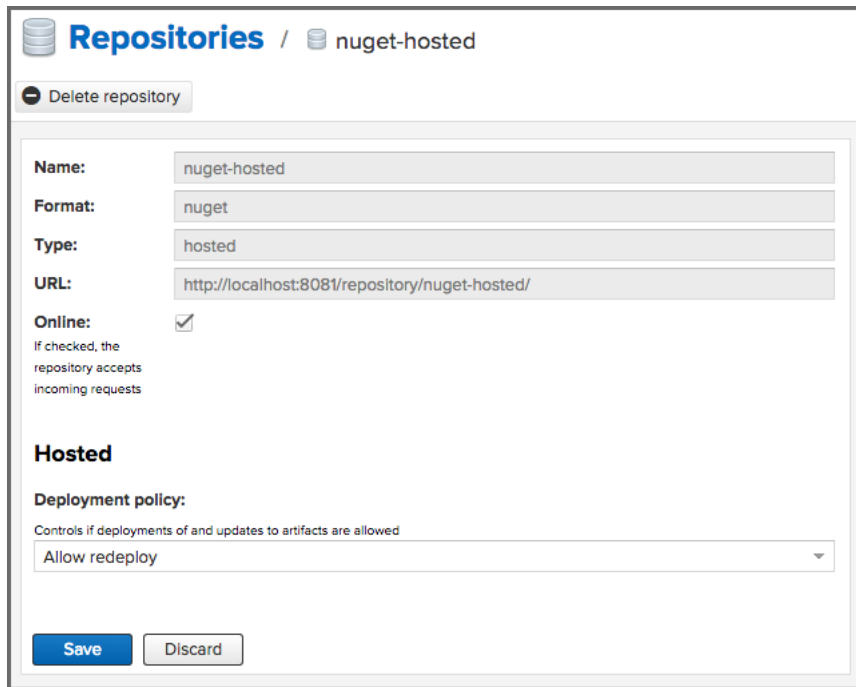
By default, searches in NuGet proxy repositories in the repository manager initiated by a client like `nuget` or VisualStudio will be passed through to the remote repositories. The search results are merged with internal search results and included in an internally managed index. This merging has to make some assumptions to generate component counts. These counts should therefore be considered approximate numbers.

7.3 NuGet Hosted Repositories

A hosted repository for NuGet can be used to upload your own packages as well as third-party packages. The repository manager includes a hosted NuGet repository named *nuget-hosted* by default.

To create another NuGet hosted repository, simply create a new *nuget (hosted)* repository. An example

configuration from the default *nuget-hosted* repository is displayed in Figure 7.2.



The screenshot shows the Nexus web interface for configuring a repository. The breadcrumb path is "Repositories / nuget-hosted". A "Delete repository" button is at the top left. The configuration fields are as follows:

Field	Value
Name	nuget-hosted
Format	nuget
Type	hosted
URL	http://localhost:8081/repository/nuget-hosted/
Online	<input checked="" type="checkbox"/>

Below the "Online" checkbox, it says: "If checked, the repository accepts incoming requests".

The "Hosted" section contains a "Deployment policy:" label and a description: "Controls if deployments of and updates to artifacts are allowed". A dropdown menu is set to "Allow redeploy".

At the bottom are "Save" and "Discard" buttons.

Figure 7.2: Example Configuration for a NuGet Hosted Repository

The NuGet feed is immediately updated as packages are deployed or deleted from the host repository.

7.4 NuGet Repository Groups

A repository group is the recommended way to expose all your NuGet repositories from the repository manager to your users, without needing any further client side configuration. A repository group allows you to expose the aggregated content of multiple proxy and hosted repositories with one URL to your tools.

nuget.org-proxy proxy repository that proxies the NuGet Gallery and the *nuget-hosted* hosted repository.

Using the *URL* of the repository group can be used in your client tool and will give you access to the packages in all repositories from the group with one URL. Any new packages added as well as any new repositories added to the group will automatically be available.

7.5 Accessing Packages in Repositories and Groups

You can access the repository group or individual repositories with the `nuget` tool on the command line using their *URL* e.g.:

```
nuget sources add -name nuget-group -source http://localhost:8081/ ↵  
repository/nuget-group/
```

After this source was added, you can list the available packages with the command `nuget list`.

Access to the packages is not restricted by default. If access restrictions are desired, you can configure security directly or via LDAP/Active Directory external role mappings combined with repository targets for fine grained control. Authentication from NuGet is then handled via NuGet API keys as documented in Section 7.6.

7.6 Deploying Packages to NuGet Hosted Repositories

In order to authenticate a client against a NuGet repository, NuGet uses an API key for deployment requests. The API key is acts as an alias for the user account, so the same API key is used for all NuGet repositories within the repository manager. This user-specific key is generated separately by a user and can be regenerated at any time. At regeneration, all previous keys generated for that user are invalid.

7.6.1 Accessing your NuGet API Key

For usage with the repository manager, NuGet API keys are only needed when packages are going to be deployed. Users with the necessary *apikey-all* security privilege can access the *NuGet API Key* feature view via the *User* menu by pressing on their username in the main toolbar.

You can access your API key by pressing on the *Access API Key* button and providing your username

and password again. The resulting dialog as well as the surrounding user interface context is displayed in Figure 7.3. It shows the API key itself as well as the full command line to register the key for usage with `nuget`.

The *Reset API Key* button can be used to invalidate an existing API key and create a new one.

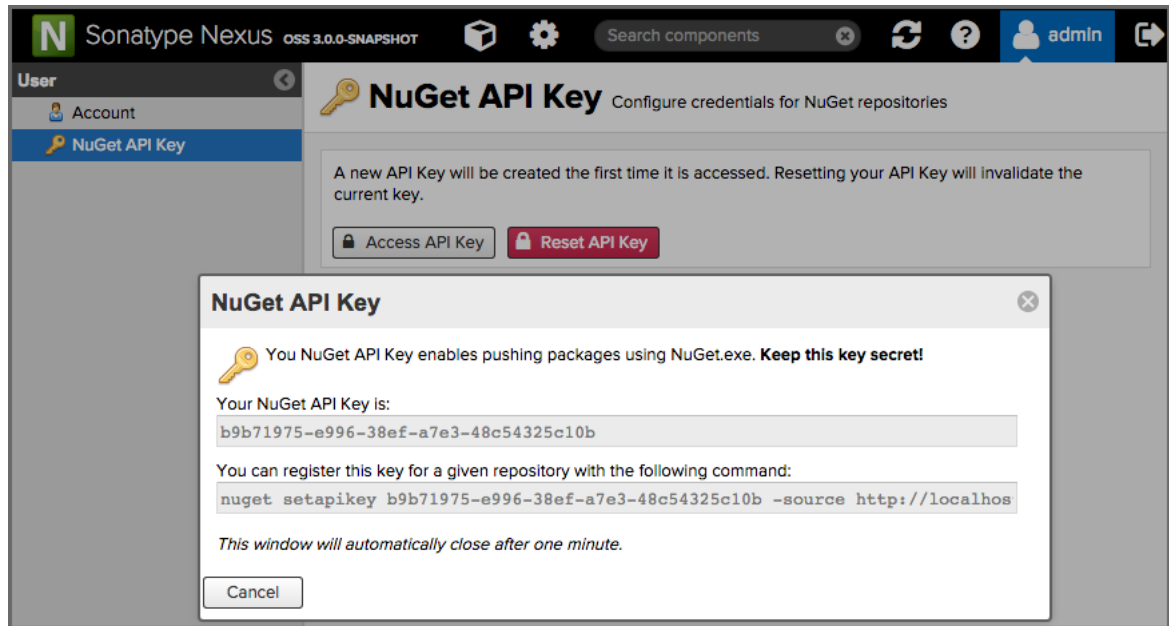


Figure 7.3: Accessing your NuGet API Key

Usage of the API key requires the *NuGet API-Key Realm* to be activated. To do this, simply add the realm to the active realms in the *Realms* feature of the *Security* menu from the *Administration* menu.

7.6.2 Creating a Package for Deployment

Creating a package for deployment can be done with the `pack` command of the `nuget` command line tool or within Visual Studio. Detailed documentation can be found on the [NuGet website](https://docs.microsoft.com/en-us/nuget/create-packages/creating-a-package).

7.6.3 Command line based Deployment to a NuGet Hosted Repository

The `nuget` command line tool allows you to deploy packages to a repository with the `push` command. The command requires you to use the *NuGet API Key* and the *URL* of the target hosted repository. Using the `delete` command of `nuget` allows you to remove packages in a similar fashion.

Further information about the command line tool is available in the [on-line help](#).

7.7 Integration with Visual Studio

In order to access a NuGet repository or preferably all NuGet repositories exposed in a repository group, you provide the *URL* from the repository manager to configure *Name* and *Source* in the Visual Studio configuration for the *Package Sources* of the *NuGet Package Manager* as displayed in Figure 7.4.

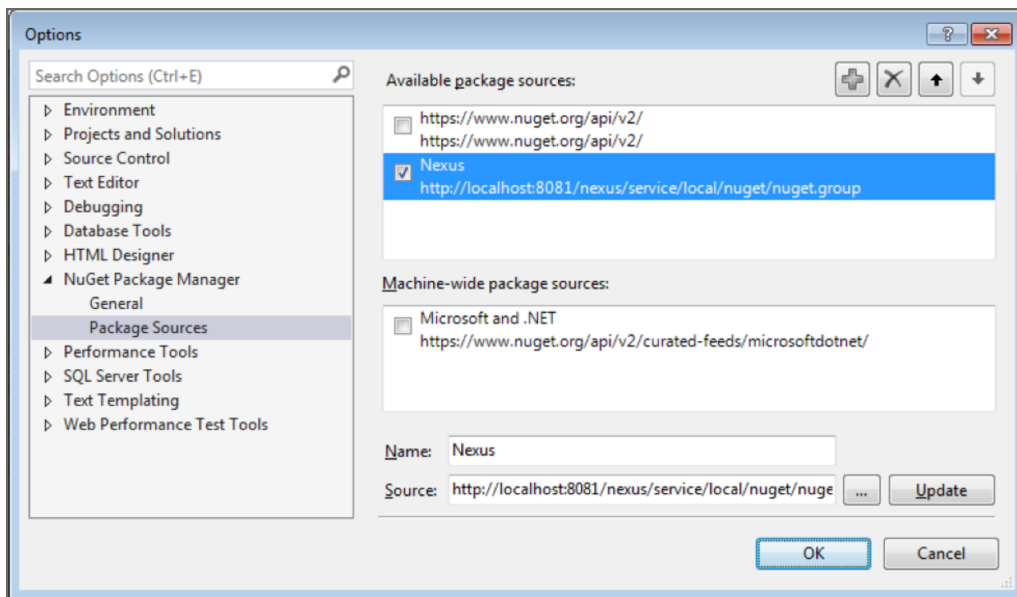


Figure 7.4: Package Source Configuration for the NuGet Package Manager in Visual Studio

With this configuration in place, all packages available in your NuGet repository will be available in the *NuGet Package Manager* in Visual Studio.

Chapter 8

Private Registry for Docker

Available in Nexus Repository Manager OSS and Nexus Repository Manager

8.1 Introduction

Docker containers and their usage have revolutionized the way applications and the underlying operating system are packaged and deployed to development, testing and production systems.

The creation of the **Open Container Initiative**, and the involvement of a large number of stakeholders, guarantees that the ecosystem of tools around the lightweight containers and their usage will continue to flourish.

Docker Hub is the original registry for Docker container images and it is being joined by more and more other publicly available registries such as the **Google Container Registry** and others.

Nexus Repository Manager and Nexus Repository Manager OSS support Docker registries as the Docker repository format for hosted and proxy repositories. You can then expose these repositories to the client-side tools directly or as a repository group, which is a repository that merges and exposes the contents of multiple repositories in one convenient URL.

This allows you to reduce time and bandwidth usage for accessing Docker images in a registry as well

as share your images within your organization in a hosted repository. Users can then launch containers based on those images, resulting in a completely private Docker registry with all the features available in the repository manager.

8.2 SSL and Docker Connector Configuration

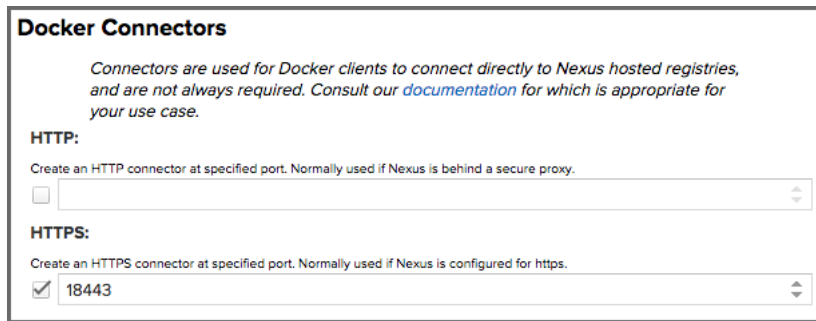
Docker relies on secure connections using SSL to connect to the repositories. You are therefore required to expose the repository manager to your client tools via HTTPS. This can be configured via an external proxy server or directly with the repository manager. Further details can be found in [Section 5.8.4](#).

Interaction of the `docker` client with repositories requires specific ports to be used. These can be configured in the repository configuration in the *Docker Connectors* section. In order for this to work on your network, you need to ensure that the chosen ports are available in your organization and not used by some other application, and that no firewall or other network configuration prevents connectivity.

Note

The `docker` client does not allow a context as part of the path to a registry, as the namespace and image name are embedded in the URLs it uses. This is why requests to repositories on the repository manager are served on a specific and separate port from the rest of the application instead of how most other repositories serve content via a path i.e. `<nexus-hostname>/<repositoryName>/<path to content>`.

The recommended minimal configuration requires one port for a Docker repository group used for read access to all repositories and one port for each hosted Docker repository that will receive push events from your users. The *Docker Connector* configuration displayed in [Figure 8.1](#) is available in the configuration for proxy and hosted Docker repositories as well as Docker repository groups.



Docker Connectors

Connectors are used for Docker clients to connect directly to Nexus hosted registries, and are not always required. Consult our [documentation](#) for which is appropriate for your use case.

HTTP:

Create an HTTP connector at specified port. Normally used if Nexus is behind a secure proxy.

☐

HTTPS:

Create an HTTPS connector at specified port. Normally used if Nexus is configured for https.

☒ 18443

Figure 8.1: Docker Connector Configuration

If you have configured the repository manager to use HTTPS directly, you have to configure a HTTPS docker connector. If an external proxy server translates incoming HTTPS requests to HTTP and forwards the request to the repository manager via HTTP you have to configure the respective HTTP port.

Tip

A configured context-path for the user interface does not affect the Docker connector URLs. E.g. if your repository manager instance is configured to be available at <http://localhost:8081/nexus> instead of the default root context <http://localhost:8081/>, the URLs for your Docker repositories will still only use the configured port for the repository and omit the context path in the URL. This is a side-effect of the the fact that Docker does not support context paths in the registry API.

8.3 Support for Docker Registry API

The Docker client tools interact with a repository via the registry API. It is available in version 1 (V1) and version 2 (V2). The newer V2 will completely replace the old V1 in the future. Currently DockerHub and other registries as well as other tools use V2, but in many cases fall back to V1. E.g., search is currently only implemented in V1.

Nexus Repository Manager and Nexus Repository Manager OSS support V1 as well as V2 of the API. All Docker repository configurations contain a section to configure *Docker Registry API Support*. If you activate *Enable Docker V1 API* for a repository it is enabled to use V1 as a fallback from V2. Without this option any V1 requests result in errors from the client tool.

Tip

We suggest to **only** activate V1 support for repository groups that will be used for command line-based searches, when any client side tools in use require V1 or when a upstream proxy repository requires V1.

8.4 Proxy Repository for Docker

Docker Hub is the common registry used by all image creators and consumers. To reduce duplicate downloads and improve download speeds for your developers and CI servers, you should proxy Docker Hub and any other registry you use for Docker images.

To proxy a Docker registry, you simply create a new *docker (proxy)* as documented in Section 4.3 in details.

Minimal configuration steps are:

- Define *Name*
- Define URL for *Remote storage*
- *Enable Docker V1 API* support, if required by the remote repository
- Select correct *Docker index* and configure it
- Select *Blobstore* for *Storage*

Optionally you can configure *Docker Connectors* as explained in Section 8.2, although typically read access is done via a repository group and not a proxy repository directly, and write access is done against a hosted repository.

The *Remote Storage* has to be set to the URL of the remote registry you want to proxy. The configuration for proxying Docker Hub uses the URL `https://registry-1.docker.io` for the *Remote storage* URL.

The *Proxy* configuration for a Docker proxy repository includes a configuration URL to access the *Docker Index*. The index is used for requests related to searches, users, docker tokens and other aspects. The registry and the index are typically co-hosted by the same provider, but can use different URLs. E.g. the index for Docker Hub is exposed at `https://index.docker.io/`.

The default option *Use proxy registry (specified above)* will attempt to retrieve any index data from the same URL configured as the *Remote storage* URL.

The option to *Use Docker Hub* fulfills any index related requests by querying the Docker Hub index at <https://index.docker.io/>. This configuration is desired when the proxy repository is Docker Hub itself or any of its mirrors.

The option to use a *Custom index* allows you to specify the URL of the index for the remote repository.

It is important to configure a correct pair of *Remote Storage* URL and *Docker Index* URL. In case of a mismatch, search results potentially do not reflect the content of the remote repository and other problems can occur.

Tip

Just to recap, in order to configure a proxy for Docker Hub you configure the *Remote Storage* URL to <https://registry-1.docker.io>, enable Docker V1 API support and for the choice of *Docker Index* select the *User Docker Hub* option.

8.5 Hosted Repository for Docker (Private Registry for Docker)

A hosted repository using the Docker repository format is typically called a private Docker registry. It can be used to upload your own container images as well as third-party images. It is common practice to create two separate hosted repositories for these purposes.

To create a Docker hosted repository, simply create a new *docker (hosted)* repository as documented in Section 4.3.

Minimal configuration steps are:

- Define *Name*
- Select *Blobstore* for *Storage*

If you add a *Docker Connectors* configuration as documented in Section 8.2 you can push images to this repository, and subsequently access them directly from the hosted repository or ideally from the Docker repository group as documented in Section 8.6.

By default this step will allow repeated deployment of images. If you want to enforce new deployments using different versions, set the *Deployment Policy* to *Disable Redeploy*.

8.6 Repository Groups for Docker

A repository group is the recommended way to expose all your repositories for read access to your users. It allows you to pull images from all repositories in the group without needing any further client side configuration after the initial setup. A repository group allows you to expose the aggregated content of multiple proxy and hosted repositories with one URL to your tools.

To create a Docker repository group, simply create a new *docker (group)* repository as documented in Section 4.3.

Minimal configuration steps are:

- Define *Name*
- Select *Blobstore* for *Storage*
- Add Docker repositories to the *Members* list in the desired order

Typically the member list includes a mixture of proxy and hosted repositories to allow access to public as well as private images.

Using the *Docker Connectors* port of the repository group and the URL of the repository manager in your client tool gives you access to the container images in all repositories from the group. Any new images added as well as any new repositories added to the group will automatically be available.

Tip

Check out this repository configuration demonstrated in [a video](#).

8.7 Authentication

If access to a repository requires the user to be authenticated, `docker` queries the user for the username, password and email address and persists it in `~/.docker/config.json`. Typically this is required when [anonymous access](#) to the repository manager is disabled or the operation requires authentication. An example is a `push` operation that publishes an image to the repository.

The authentication can be configured in a separate step using the `docker login` command for the desired repository or repository group:

```
docker login <nexus-hostname>:<repository-port>
```

Provide your repository manager credentials of username and password as well as an email address. This authentication is persisted in `~/.docker/config.json` and reused for any subsequent interactions against that repository. Individual login operations must be performed for each repository and repository group you want to access in an authenticated manner.

Tip

Specifically when planning to push to a repository a pre-emptive login operation is advisable as it removes the need for user interaction and is therefore suitable for continuous integration server setups and the automations scenarios.

8.8 Accessing Repositories

You can browse Docker repositories in the user interface and inspect the components and assets and their details as documented in [Section 3.4](#).

When using the `docker` command line client, or any other tools using the repository manager indirectly, the common structure for commands can be:

```
docker <command> <nexus-hostname>:<repository-port>/<namespace>/<image>:<tag>
docker search <nexus-hostname>:<repository-port>/<search-term>
```

with

command

a docker command such a *push* or *pull*

nexus-hostname

the IP number or hostname of your repository manager

repository-port

the port configured as the Docker connector for the specific repository or repository group

namespace

the namespace of the specific image reflecting the owner

image

the name of the Docker image

tag

the optional tag of the image, defaulting to *latest* when omitted

search-term

the search term or name of the image to search for

The most important aspects are to know and use the correct hostname for the repository manager and the port for the desired repository or repository group.

8.9 Searching

Searching for Docker images can be performed in the user interface as described in Section 3.3. This search will find all Docker images that are currently stored in repositories, either because they have been pushed to a hosted repository or they have been proxied from an upstream repository and cached in the repository manager.

The more common use case for a Docker user is to search for images on the command line:

```
$ docker search postgres
NAME                DESCRIPTION                                STARS   OFFICIAL   ←
AUTOMATED
postgres            The PostgreSQL object-relational database... 1025    [OK]
...
```

By default this search uses Docker Hub as preconfigured in `docker` and will only find images available there. A more powerful search is provided by the repository manager when searching against a repository group with the syntax

```
docker search <nexus-hostname>:<repository-port>/<search-term>
```

with

nexus-hostname

the IP number or hostname of your repository manager

repository-port

the port configured as the Docker connector for the specific repository or repository group

search-term

the search term or name of the image to search for

An example looking for a `postgres` image on Nexus Repository Manager OSS running on the host `nexus.example.com` and exposing a repository group with a Docker connector port of 18443 looks like this:

```
docker search nexus.example.com:18443/postgres
```

The results include all images found in the repositories that are part of the repository group. This includes any private images you have pushed to your hosted repositories. In addition it includes all results returned from the remote repositories configured as proxy repositories in the group.

8.10 Pulling Images

Downloading images, also known as pulling, from the repository manager can be performed with the `docker pull` command. The only necessary additions are the hostname or IP address of the repository manager as well as the Docker connector port for the repository or repository group to download from:

```
docker pull <nexus-hostname>:<repository-port>/<image>
```

The preferred setup is to proxy all relevant sources of public/private images you want to use with Docker Hub being the most common choice. Then configure one or more hosted repositories to contain your own images, and expose these repositories through one Docker group repository.

Examples for various images from Nexus Repository Manager OSS running on the host `nexus.example.com` and exposing a Docker repository group with a Docker connector port of 18443 are:

```
docker pull nexus.example.com:18443/ubuntu
docker pull nexus.example.com:18443/bitnami/node
docker pull nexus.example.com:18443/postgres:9.4
```

These snippets download the official ubuntu image, the node image from the user bitnami and the version 9.4 of the postgres image. Official images such as ubuntu or postgres belong to the library user on Docker Hub and will therefore show up as library/ubuntu and library/postgres in the repository manager.

After a successful pull you can start the container with run.

8.11 Pushing Images

Sharing an image can be achieved, by publishing it to a hosted repository. This is completely private and requires you to tag and push the image. To tag an image, the image identifier (imageId) is required. It is listed when showing the list of all images with `docker images`. Syntax and an example are for creating a tag are

```
docker tag <imageId> <nexus-hostname>:<repository-port>/<image>:<tag>
docker tag af340544ed62 nexus.example.com:18444/hello-world:mytag
```

Once the tag, which can be equivalent to a version, is created successfully, you can confirm its creation with `docker images` and issue the push with the syntax:

```
docker push <nexus-hostname>:<repository-port>/<image>:<tag>
```



Important

Note that the repository port needs to be the Docker connector port configured for the **hosted** repository to which you want to push to. You can not push to a repository group or a proxy repository.

A sample output could look like this:

```
$ docker push nexus.example.com:18444/hello-world:labeltest
```

```
The push refers to a repository [nexus.example.com:18444/hello-world] (len ↵
: 1)
Sending image list
Pushing repository nexus.example.com:18444/hello-world (1 tags)
535020c3e8ad: Image successfully pushed
af340544ed62: Image successfully pushed
Pushing tag for rev [af340544ed62] on
{https://nexus.example.com:18444/repository/docker-internal/v1/ ↵
repositories/hello-world/tags/labeltest}
```

Now, this updated image is available in the repository manager and can be pulled by anyone with access to the repository, or the repository group, containing the image. Pulling the image from the repository group exposed at port 18443 can be done with:

```
docker pull nexus.example.com:18443/hello-world:labeltest
```

Prior to push, and depending on your configuration, repository manager login credentials may be required before a push or pull can occur.

Tip

Searching, Browsing, Pushing and Pulling are all showcased in [this video](#).

Pushing large images can result in failures due to network interruptions and other issues. These partial uploads result in temporary storage for these transfers in the repository manager filling up. The task *Purge Incomplete Docker Uploads* can be configured to delete these files. Further documentation can be found in Section [4.2.5](#).

Chapter 9

Node Packaged Modules and npm Registries

Available in Nexus Repository Manager OSS and Nexus Repository Manager

9.1 Introduction

The command line tool `npm` is a package management solution for Javascript-based development. It is used to create and use *node packaged modules* and is built into the popular Javascript platform **Node.js**, which is mostly used for server-side application development.

The npm registry at <https://www.npmjs.org/> is the default package registry, from which components can be retrieved. It contains a large number of open source packages for Node.js based server-side application development, build tools like *bower* or *grunt* and many other packages for a variety of use cases.

Nexus Repository Manager and Nexus Repository Manager OSS support the npm registry format for proxy repositories. This allows you to take advantage of the packages in the npm registry and other public registries without incurring repeated downloads of packages, since they will be proxied in the repository manager.

In addition, Nexus Repository Manager and Nexus Repository Manager OSS support running your own

private registry - also known as a hosted repository using the *npm* format. You can share internally developed, proprietary packages within your organization via these private registries allowing you to collaborate efficiently across development teams with a central package exchange and storage location.

To simplify configuration Nexus Repository Manager and Nexus Repository Manager OSS supports aggregation of npm registries. This allows you to expose all the external packages from the npm registry and other public registries as well as the private registries as one registry, which greatly simplifies client configuration.

To share a package or tool with npm, you create a npm package and store it in the npm registry hosted by the repository manager. Similarly, you can use packages others have created and made available in their NPM repositories by proxying them or downloading the packages and installing them in your own private registry for third party packages.

9.2 Proxying npm Registries

To reduce duplicate downloads and improve download speeds for your developers and CI servers, you should proxy the registry hosted at <https://registry.npmjs.org>. By default npm accesses this registry directly. You can also proxy any other registries you require.

To proxy an external npm registry, you simply create a new *npm (proxy)* as documented in Section 4.3. The *Remote Storage* has to be set to the URL of the remote repository you want to proxy. The official URL for the main npm registry is <https://registry.npmjs.org>.

Minimal configuration steps are:

- Define *Name*
- Define URL for *Remote storage*
- Select *Blobstore* for *Storage*

9.3 Private npm Registries

A private npm registry can be used to upload your own packages as well as third-party packages. You can create a private npm registry by setting up a hosted repository with the npm format in the repository

manager. It is good practice to create two separate hosted repositories for these purposes.

To create a hosted repository with npm format, simply create a new *npm (hosted)* as documented in Section 4.3.

Minimal configuration steps are:

- Define *Name*
- Select *Blobstore* for *Storage*

The npm registry information is immediately updated as packages are deployed or deleted from the repository.

9.4 Grouping npm Registries

A repository group is the recommended way to expose all your npm registries repositories from the repository manager to your users, without needing any further client side configuration. A repository group allows you to expose the aggregated content of multiple proxy and hosted repositories with one URL to npm and other tools. This is possible for npm repositories by creating a new *npm (group)* as documented in Section 4.3.

Minimal configuration steps are:

- Define *Name*
- Select *Blobstore* for *Storage*
- Add npm repositories to the *Members* list in the desired order

A typical, useful example would be to group the proxy repository that: proxies the npm registry, a npm, hosted repository with internal software packages and another npm, hosted repository with third-party packages.

Using the *URL* of the repository group as your npm repository URL in your client tool will give you access to the packages in all three repositories with one URL. Any new packages added as well as any new repositories added to the group will automatically be available.

9.5 Browsing npm Registries and Searching Modules

You can browse npm repositories in the user interface inspecting the components and assets and their details as documented in [Section 3.4](#).

Searching for npm modules can be performed in the user interface as described in [Section 3.3](#). This search will find all npm modules images that are currently stored in the repository manager, either because they have been pushed to a hosted repository or they have been proxied from an upstream repository and cached in the repository manager.

9.6 Configuring npm

Once you have set up your hosted and proxy repositories for npm packages, and created a repository group to merge them, you can access them with the npm tool on the command line as one registry.

You can configure the registry used by npm in your `.npmrc` file located in your user's home directory. If the file does not exist simply create it and add the registry configuration with the URL of your npm repository group. You can see the public URL of your group repository in the repository list in the *Repository Path* column.

Registry configuration in `.npmrc`

```
registry = http://localhost:8081/repository/npm-all/
```

With this configuration any npm commands will use the new registry from the repository manager. The command line output will reference the URLs in `--verbose` mode or with `info` logging for the downloads of the requested packages:

```
$ npm --loglevel info install grunt
...
npm http fetch GET http://localhost:8081/repository/npmjs-org/grunt/-/ ↵
grunt-0.4.5.tgz
npm http fetch 200 http://localhost:8081/repository/npmjs-org/grunt/-/ ↵
grunt-0.4.5.tgz
...
npm http fetch GET http://localhost:8081/repository/npm-all/underscore/-/ ↵
underscore-1.7.0.tgz
npm http fetch 200 http://localhost:8081/repository/npm-all/underscore/-/ ↵
underscore-1.7.0.tgz
```

...

9.7 npm Security

By default any anonymous user has read access to the repositories and repository groups. If anonymous access, as documented in Section 5.6 is disabled, or write access is required for publishing a package, the user needs to authenticate to the repository manager.

This authentication requires the `npm Bearer Token Realm`. Simply add the realm to the active realms in the `Realms` feature of the `Security` menu from the `Administration` menu to activate it as documented in Section 5.2.

Once the realm is activated, a user can establish the authentication to a repository with the `npm login` command.

```
npm login --registry=http://localhost:8081/repository/npm-internal
```

Provide your repository manager username and password as well as your email address when prompted. Upon successful completion, a line for authentication of this combination is automatically added to your `.npmrc` configuration file for the specific repository.

Further details on `npm login` can be found on the [npm website](#).

9.8 Publishing npm Packages

Publishing your own packages to a npm hosted repository allows you to share packages across your organization or with external partners. With authentication configured you can publish your packages with the `npm publish` command.

The `npm publish` command uses a `registry` configuration value to know where to publish your package. There are several ways to change the registry value to point at your hosted npm repository.

Since the `.npmrc` file usually contains a registry value intended only for getting new packages, a simple

way to override this value is to provide a registry to the publish command:

```
npm publish --registry http://localhost:8081/repository/npm-internal/
```

Alternately, you can edit your package.json file and add a publishConfig section:

```
"publishConfig" : {  
  "registry" : "http://localhost:8081/repository/npm-internal/"  
},
```

Detailed information about package creation can be found on the [npm website](#).

If your package requires the use of `npm scope`, the repository manager supports this functionality. Packages published to the repository manager with a defined scope are reflected with the scope value populating the repository group field in Browse and Search. Details on scoping are available on the [npm website](#) also.

Once a package is published to the private registry in the repository manager, any other developers or build servers that access the repository manager via the repository group have instant access to it.

9.9 Deprecating npm Packages

Once your packages have been pushed to an npm hosted repository, you can mark them as deprecated. This is useful when a newer version of the package is available, and you want to warn people that the old package has reached end of life or you want to avoid usage and warn your users for some other reason.

The `npm deprecate` command uses a `registry` configuration value to inform where the package lives. To deprecate an existing package, use a command like the following:

```
npm deprecate --registry http://localhost:8081/repository/npm-internal/ ↵  
testproject1@0.0.1 "This package is deprecated"
```

If you change your mind, you can reverse this action using the same command. To undeprecate a package, pass an empty string to the deprecate command:

```
npm deprecate --registry http://localhost:8081/repository/npm-internal/ ↵  
testproject1@0.0.1 ""
```

The message text is persisted in the `deprecated` attribute of the *packageJson* section for the asset and can be viewed in the user interface.

Chapter 10

Raw Repositories, Maven Sites and More

Available in Nexus Repository Manager OSS and Nexus Repository Manager

10.1 Introduction

Nexus Repository Manager and Nexus Repository Manager OSS include support for hosting, proxying and grouping static websites - the *raw* format. Hosted repositories with this format can be used to store and provide a Maven-generated website. Proxy repositories can subsequently proxy them in other servers. The *raw* format can also be used for other resources than HTML files exposed by straight HTTP-like browsable directory structures.

This chapter details the process of configuring raw repositories, configuring a simple Maven project to publish a Maven-generated project site and other use cases for raw repositories.

10.2 Creating a Hosted Raw Repository

To create a raw repository for hosting a static website, you simply create a new repository using the *raw* (*hosted*) recipe as documented in [Section 4.3](#).

For the Maven site example in Section 10.3, set the *Name* to `site` and change the *Deployment policy* to *Allow redeploy*.

After creating the new raw repository, it appears in the list of repositories with the name *site* provided earlier. The *URL* in the list can be used for deployment and access usage.

10.3 Creating and Deploying a Maven Site

10.3.1 Creating a New Maven Project

In this section, you are be creating a minimal Maven project with a simple website that can be published to the hosted raw repository created in Section 10.2.

The following steps can be used to create a new Maven project:

- Run the command `mvn archetype:generate` in a command line interface
- Confirm the first prompt using the default selection (number will vary)
- Confirm the default selection for the archetype version
- Set the `groupId` to `org.sonatype.books.nexus`
- Set the `artifactId` to `sample-site`
- Confirm the default version of `1.0-SNAPSHOT`
- Confirm the preset package of `org.sonatype.books.nexus`
- Confirm the properties configuration

After running the `archetype:generate` command, you will have a new project in a `sample-site` directory.

10.3.2 Configuring Maven for Site Deployment

To deploy a site to a raw repository in the repository manager, you need to configure the project's `distributionManagement`, add site deployment information, and then update your Maven settings to

include the appropriate credentials.

Add the following section to `sample-site/pom.xml` before the `dependencies` element. This section tells Maven where to publish the Maven-generated project website:

Distribution Management for Site Deployment

```
<distributionManagement>
  <site>
    <id>nexus</id>
    <url>dav:http://localhost:8081/repository/site/</url>
  </site>
</distributionManagement>
```

The URL in the distribution management is not parameterized, which means that any redeployment overwrites old content and potentially leaves old stale files behind. To have a new deployment directory for each version, change the URL to a parameterized setup or change the whole URL between deployments.

If you combine this approach with a redirector or a static page that links to the different copies of your site, you can e.g., maintain separate sites hosting your javadoc and other documentation for different releases of your software.

The dav protocol used by for deployment to the repository manager requires that you add the implementation library as a dependency of the Maven site plugin in your Maven project:

Dependency for the Maven Site Plugin for DAV Support

```
<build>
  <plugins>
    <plugin>
      <artifactId>maven-site-plugin</artifactId>
      <version>3.4</version>
      <dependencies>
        <dependency>
          <groupId>org.apache.maven.wagon</groupId>
          <artifactId>wagon-webdav-jackrabbit</artifactId>
          <version>2.8</version>
        </dependency>
      </dependencies>
    </plugin>
  </plugins>
</build>
```


10.3.3 Adding Credentials to Your Maven Settings

When the Maven site plugin deploys a site, it needs to supply the appropriate deployment credentials to the repository manager. To configure this, you need to add credentials to your Maven settings. Edit your `~/.m2/settings.xml` file and add the following server configuration to the `servers` element.

Configuring Deployment Credentials for Site Deployment

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

Note

[Configuring Deployment Credentials for Site Deployment](#) uses the default `admin` username and password. For real world usage you would use the username and password of a user with the privilege to write to the target repository.

10.3.4 Publishing a Maven Site

To publish the site to the hosted raw repository in the repository manager, run `mvn site-deploy` from the `sample-site` directory. The Maven site plugin will deploy this site to the repository using the credentials stored in your Maven settings:

Sample Maven Log from Deploying a Site

```
$ mvn site-deploy
[INFO] Scanning for projects...
[INFO] -----
[INFO] Building sample-site 1.0-SNAPSHOT
...
[INFO] --- maven-site-plugin:3.4:site (default-site) @ sample-site ---
...
[INFO] Generating "About" report.
```

```
...
[INFO] --- maven-site-plugin:3.4:deploy (default-deploy) @ sample-site ---
http://localhost:8081/repository/site/ - Session: Opened
[INFO] Pushing /Users/manfred/training/sample-site/target/site
[INFO] >>> to http://localhost:8081/repository/site/.
...
Transfer error: java.io.IOException: Unable to create collection: http:// ↵
localhost:8081/repository/; status code = 400
Uploading: ../project-summary.html to http://localhost:8081/repository/ ↵
site/

##http://localhost:8081/repository/site/./project-summary.html - Status ↵
code: 201

Transfer finished. 5078 bytes copied in 0.075 seconds
http://localhost:8081/repository/site/ - Session: Disconnecting
http://localhost:8081/repository/site/ - Session: Disconnected
...
[INFO] BUILD SUCCESS
...
```

Once the site has been published, you can load the site in a browser by going to [http://localhost:8081/-repository/site/index.html](http://localhost:8081/repository/site/index.html).



Figure 10.1: Maven-Created Sample Site Hosted in a Raw Repository

Tip

A complete Maven project example can be found in the [documentation book examples](#).

10.4 Proxying and Grouping Raw Repositories

Beside the common use case using hosted raw repositories for site deployments, the repository manager supports proxying as well as grouping of raw repositories.

The creation follows the same process as documented in Section 4.3 using the *raw (proxy)* and the *raw (group)* recipes.

A raw proxy repository can be used to proxy any static website. This includes a Maven site hosted in a raw repository in another Nexus Repository Manager server or a plain static website hosted on another web server like Apache httpd. It can also be used to proxy directory structures exposed via a web server to distribute archives such as `https://nodejs.org/dist/`.

Note

No content is modified when proxied. This means that e.g., any absolute URL used with HTML document remain absolute and therefore bypass the proxying mechanism.

Grouping raw repositories is possible and can e.g., be used to aggregate multiple site repositories. However keep in mind that the raw format does not contain any logic to resolve conflicts between the different repositories in the group. Any request to the group causes the repository manager to check the member repositories in order and return the first matching content.

10.5 Uploading Files to Hosted Raw Repositories

Many other tools, besides using Maven, can be used to upload files to a hosted raw repository. A simple HTTP PUT can upload files. The following example uses the `curl` command and the default credentials of the `admin` user to upload a `test.png` file to a hosted raw repository with the name `documentation`.

An Example Upload Command Using curl:

```
curl -v --user 'admin:admin123' --upload-file ./test.png http://localhost :8081/repository/documentation/test.png ↵
```

After a completed upload the repository manager provides the file at the URL `http://localhost:8081/repository/documentation/test.png`. Using this approach in a script entire static websites or any other binary resources can be uploaded.

Appendix A

Contributing

The Nexus Repository Manager documentation is an open source project in which you can participate, if you have an idea for documentation. Sonatype's books include open writing efforts, and we see the value of the documentation contributions the same as code contributions. If you are interested in our technology and would like to contribute, please review the basics described in this appendix.

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Contributors The following people have been authors or contributors to the book in the past:

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Appendix B

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```

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