

# Make work Neo4J on OSGI Runtime (Eclipse Virgo Kernel) - 26/02/2015 12:47 AM



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Neo4J is a great Graph Database and OSGi is currently the most serious modularisation framework for Java. Unfortunately Neo4J is not OSGi friendly out of the box and consequently we need to repackage it.

Have a clean integration of Neo4J on OSGi runtime is a major point for the [Ariane project](#) as in the long term Ariane will be composed by plenty of OSGi modules and  $\mu$ -services. For the OSGi value proposition let's have a look to [this](#) and [this](#).

There is a lot of OSGi runtime and most of them are working well. We decided to go with [EclipseVirgo](#) because we failed to [make work Primefaces](#) on <http://karaf.apache.org/> at the time we have to choose our OSGi container. Since then Apache Karaf seems have provided a [correction](#) on that subject but I never get time to test it again. So I'm not saying Eclipse Virgo is better than Apache Karaf. Eclipse Virgo is just working well for our current needs on the Ariane project. But finally the work done here with Eclipse Virgo should be reusable on Apache Karaf. Some little work will be necessary but not so much. Let me know if you're planning to do that work and I'll be happy to help you.

Target of this blog post is show how to integrate the original Neo4J community distribution on the Eclipse Virgo Kernel. Main idea here is to make work Neo4J in Eclipse Virgo with a minimal work and the minimal overhead : that's why we choose Eclipse Virgo Kernel and not Eclipse Virgo Tomcat/Jetty. Finally at the end of this blog post you'll be able to run Neo4J on an OSGi environment as if you run it from the official distribution.

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## Prepare Virgo Kernel to embed Neo4J

We first need to changes some Virgo Kernel configurations. So if not done already you have to download Virgo Kernel (last version is 3.6.3) and unzip it in some working directory. Let's call now \$VIRGO\_HOME the installed Virgo directory. You also have to get and install some JRE 1.7 to run Virgo.

### Setup Virgo Java 1.7 environment

First of all you need to enable JavaSE 1.7 for Virgo: edit the \$VIRGO\_HOME/configuration/java6-server.profile and add JavaSE-1,7 to the org.osgi.framework.executionenvironment list :

### diff configuration/java6-server.profile

```
@@ -209,5 +209,6 @@
org.osgi.framework.executionenvironment = \
    J2SE-1.3,\
    J2SE-1.4,\
    J2SE-1.5,\
- JavaSE-1.6
+ JavaSE-1.6,\
+ JavaSE-1.7
osgi.java.profile.name = Virgo-Java6
```

## Setup Virgo SSH

To deploy OSGI bundles or Virgo plans/pars, we will use the Virgo SSH console. You need to enable the Virgo SSH consoles by editing following files :

- \$VIRGO\_HOME/configuration/osgi.console.properties for the virgo kernel region
- \$VIRGO\_HOME/repository/ext/osgi.console.properties for the virgo user region



### Virgo Regions

To know more about Virgo regions let's have a look to the [Virgo documentation](#).

### diff configuration/osgi.console.properties

```
@@ -1,6 +1,6 @@
telnet.enabled=false
telnet.port=2401
telnet.host=localhost
-ssh.enabled=false
+ssh.enabled=true
ssh.port=2402
-ssh.host=localhost
\ No newline at end of file
+ssh.host=localhos
```

### diff repository/ext/osgi.console.properties

```
@@ -1,6 +1,6 @@
telnet.enabled=false
telnet.port=2501
telnet.host=localhost
-ssh.enabled=false
+ssh.enabled=true
ssh.port=2502
-ssh.host=localhost
\ No newline at end of file
+ssh.host=localhost
```

#### **Virgo users configuration**

You can connect on Virgo through SSH by using the default user/password : admin/springsource.

You can configure the Virgo users through following file : \$VIRGO\_HOME/configuration/org.eclipse.virgo.kernel.users.properties

To know more about authentication in Virgo let's have a look to [Virgo documentation](#).

## Setup Virgo neo4j-community repository

Finally we setup a dedicated neo4j-community repository into Virgo by :

- creating the \$VIRGO\_HOME/repository/neo4j-community directory
- editing the \$VIRGO\_HOME/configuration/org.eclipse.virgo.repository.properties file

### diff

### configuration/org.eclipse.virgo.repository.properties

```
@@ -1,7 +1,11 @@
ext.type=external
ext.searchPattern=repository/ext/{artifact}

+neo4j-community.type=external
+neo4j-community.searchPattern=repository/neo4j
-community/{artifact}
+
+
usr.type=watched
usr.watchDirectory=repository/usr

-chain=ext,usr
+chain=ext,neo4j-community,usr
```

#### **External vs Watched Virgo repository**

You may want to configure a watched repository instead of an external one

(Virgo will then load changes on the repository at runtime). To know more about Virgo provisioning repository look at the [Virgo documentation](#).

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## Install Neo4j into Eclipse Virgo Kernel

### Neo4J community classpath

When you unzip the Neo4j community distribution you have two directories where you can find Neo4J JARs which are composing the Neo4J runtime classpath :

- \$NEO4J\_HOME/system/lib
- \$NEO4J\_HOME/lib

There is a lot of non ready OSGI JARs in the Neo4J 2.1.2 community distribution and most of them are coming from Neo4J JARs. We have different ways to manage these non OSGI friendly JARs we will choose depending on the situations. Our strategy is resumed at the end of this blog post.

### Install OSGI ready Neo4j dependencies into Virgo

Neo4J community dependencies will be installed in \$VIRGO\_HOME/repository/neo4j-community. All these bundles are public bundle you can find on maven repos (eg : <http://nexus.echinopsii.net>).

## List of primary Neo4J community dependencies to install

```
commons-beanutils-1.8.3.jar
com.springsource.org.objectweb.asm-3.1.0.jar
jetty-security-9.0.5.v20130815.jar
org.apache.servicemix.bundles.jline-0.9.94_1.jar
commons-collections-3.2.1.jar
concurrentlinkedhashmap-lru-1.3.1.jar
jetty-server-9.0.5.v20130815.jar
org.apache.servicemix.bundles.lucene-3.6.2_1.jar
commons-configuration-1.6.jar
jackson-core-asl-1.9.7.jar
jetty-servlet-9.0.5.v20130815.jar
parboiled-core-1.1.6.jar
commons-digester-1.8.1.jar
jackson-jaxrs-1.9.7.jar
jetty-util-9.0.5.v20130815.jar
parboiled-scala_2.10-1.1.6.jar
commons-lang-2.4.jar
jackson-mapper-asl-1.9.7.jar
jetty-webapp-9.0.5.v20130815.jar
scala-library-2.10.4.jar
com.springsource.org.bouncycastle.jce-1.39.0.jar
jetty-http-9.0.5.v20130815.jar
jetty-xml-9.0.5.v20130815.jar
com.springsource.org.bouncycastle.mail-1.39.0.jar
jetty-io-9.0.5.v20130815.jar
mimepull-1.6.jar
```

To make some of these bundles happy in OSGI environment you also need to add other bundles to fit the dependencies.

- org.apache.commons.configuration 1.6.0 needs **javax.mail\_1.4.0.v201005080615.jar**.  
I installed this one in **\$VIRGO\_HOME/repository/ext** as this is the target repository for this bundle in the Virgo Tomcat distribution.
- org.apache.commons.configuration 1.6.0 needs **commons-codec\_1.5.jar**.  
I installed this one in **\$VIRGO\_HOME/repository/ext** as this is the target repository for this bundle in the Virgo Tomcat distribution.
- org.apache.commons.configuration 1.6.0 needs **commons-jxpath-1.3.jar**.  
I installed this one in **\$VIRGO\_HOME/repository/neo4j-community**.
- org.apache.commons.jxpath 1.3.0 needs **javax.servlet.jsp\_2.2.0.v201112011158.jar**.  
I installed this one in **\$VIRGO\_HOME/repository/ext** as this is the target repository for this bundle in the Virgo Tomcat distribution.
- javax.servlet.jsp 2.2.0.v201112011158 needs **javax.el\_2.2.0.v201108011116.jar**.  
I installed this one in **\$VIRGO\_HOME/repository/ext** as this is the target repository for this bundle in the Virgo Tomcat distribution.
- org.apache.commons.jxpath 1.3.0 needs **com.springsource.org.jdom-1.1.0.jar**.

I installed this one in **\$VIRGO\_HOME/repository/neo4j-community**.

Finally after these first dependencies install repositories look like this :

### **\$VIRGO\_HOME/repository/ext**

```
commons-codec_1.5.jar
org.eclipse.equinox.region_1.1.0.v20120319-1602.jar
org.eclipse.virgo.kernel.deployer.dm_3.6.3.RELEASE.jar
org.springframework.asm_3.1.0.RELEASE.jar
com.springsource.org.aopalliance_1.0.0.jar
org.eclipse.equinox.util_1.0.300.v20111010-1614.jar
org.eclipse.virgo.kernel.dmfragment_3.6.3.RELEASE.jar
org.springframework.beans_3.1.0.RELEASE.jar
com.springsource.org.apache.commons.fileupload_1.2.0.v20110525.jar
org.eclipse.gemini.blueprint.core_1.0.2.RELEASE.jar
org.eclipse.virgo.kernel.userregion.blueprint.plan
org.springframework.context_3.1.0.RELEASE.jar
com.springsource.org.apache.commons.io_1.4.0.jar
org.eclipse.gemini.blueprint.extender_1.0.2.RELEASE.jar
org.eclipse.virgo.management.fragment_3.6.3.RELEASE.jar
org.springframework.core_3.1.0.RELEASE.jar
javax.el_2.2.0.v201108011116.jar
org.eclipse.gemini.blueprint.io_1.0.2.RELEASE.jar
org.eclipse.virgo.management.plan
org.springframework.expression_3.1.0.RELEASE.jar
javax.mail_1.4.0.v201005080615.jar
org.eclipse.gemini.management_1.0.5.RELEASE.jar
org.jolokia.osgi_1.0.2.jar
osgi.console.properties
javax.servlet.jsp_2.2.0.v201112011158.jar
org.eclipse.osgi.services_3.3.0.v20120307-2102.jar
org.osgi.enterprise_4.2.0.v201108120515.jar
org.eclipse.equinox.ds_1.4.0.v20120112-1400.jar
org.eclipse.virgo.kernel.agent.dm_3.6.3.RELEASE.jar
org.springframework.aop_3.1.0.RELEASE.jar
```

## `$VIRGO_HOME/repository/neo4j-community`

```
commons-beanutils-1.8.3.jar
com.springsource.org.bouncycastle.jce-1.39.0.jar
jackson-jaxrs-1.9.7.jar
jetty-servlet-9.0.5.v20130815.jar
org.apache.servicemix.bundles.lucene-3.6.2_1.jar
commons-collections-3.2.1.jar
com.springsource.org.bouncycastle.mail-1.39.0.jar
jackson-mapper-asl-1.9.7.jar
jetty-util-9.0.5.v20130815.jar
org.apache.servicemix.bundles.neo4j.community-2.1.2.jar
commons-configuration-1.6.jar
com.springsource.org.jdom-1.1.0.jar
jetty-http-9.0.5.v20130815.jar
jetty-webapp-9.0.5.v20130815.jar
parboiled-core-1.1.6.jar
commons-digester-1.8.1.jar
com.springsource.org.objectweb.asm-3.1.0.jar
jetty-io-9.0.5.v20130815.jar
jetty-xml-9.0.5.v20130815.jar
parboiled-scala_2.10-1.1.6.jar
commons-jxpath-1.3.jar
concurrentlinkedhashmap-lru-1.3.1.jar
jetty-security-9.0.5.v20130815.jar
mimepull-1.6.jar
scala-library-2.10.4.jar
commons-lang-2.4.jar
jackson-core-asl-1.9.7.jar
jetty-server-9.0.5.v20130815.jar
org.apache.servicemix.bundles.jline-0.9.94_1.jar
```

## Transform non OSGI friendly JARs dependencies into OSGI bundles

There is some Neo4J dependencies which are not OSGI friendly JARs and we need to transform them as OSGI bundles. That transformation implies defining an OSGI ready manifest into these JARs without touching any line of codes.

This task could be very boring but Eclipse Virgo offers us a cool tool which produces relevant OSGI manifest from a JAR file : [Eclipse Virgo Bundlor](#).

To make our life more easier, we provide some scripting around this tool and a collection of bundlor manifests in our [osgi factory](#). This is the way we created the following bundles from original JARs to install into Virgo Kernel neo4j-community repository.

Actually most of the bundles generated through the [echinopsii osgi factory](#) can be downloaded from the [echinopsii maven repository](#).

Original JAR name	Bundle name	Bundlor manifest	Comments
-------------------	-------------	------------------	----------

logback-access-1.0.7	net.echinopsii.3rdparty.logback-access-1.0.7	<a href="#">go to manifest</a>	This bundle has been regenerated from the original one to declare some dependencies as optional (like tomcat dependencies)
opencsv-2.0.0	net.echinopsii.3rdparty.net.sf.opencsv-2.0.0	<a href="#">go to manifest</a>	Neo4J original dependency as a bundle
janino-2.6.1	net.echinopsii.3rdparty.org.codehaus.janino.janino-2.6.1.jar	<a href="#">go to manifest</a>	Neo4J original dependency as a bundle
commons-compiler-2.6.1	net.echinopsii.3rdparty.org.codehaus.janino.commons-compiler-2.6.1.jar	<a href="#">go to manifest</a>	Needed dependency for janino-2.6.1
ant-1.8.2	net.echinopsii.3rdparty.org.apache.ant-1.8.2.jar	<a href="#">go to manifest</a>	Needed dependency for janino-2.6.1
ant-launcher-1.8.2	net.echinopsii.3rdparty.org.apache.ant-launcher-1.8.2.jar	<a href="#">go to manifest</a>	Needed dependency for janino-2.6.1
rhino-1.7.4	net.echinopsii.3rdparty.org.mozilla.rhino-1.7.4.jar	<a href="#">go to manifest</a>	Neo4J original dependency as a bundle
rrd4j-2.0.7	net.echinopsii.3rdparty.org.rrd4j.rrd4j-2.0.7.jar	<a href="#">go to manifest</a>	Neo4J original dependency as a bundle

Once installed into Virgo, the neo4j-community repository looks like this :



## **\$VIRGO\_HOME/repository/neo4j-community**

```
commons-beanutils-1.8.3.jar
concurrentlinkedhashmap-lru-1.3.1.jar
jetty-webapp-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.rrd4j.rrd4j-2.0.7.jar
commons-collections-3.2.1.jar
jackson-core-asl-1.9.7.jar
jetty-xml-9.0.5.v20130815.jar
org.apache.servicemix.bundles.jline-0.9.94_1.jar
commons-configuration-1.6.jar
jackson-jaxrs-1.9.7.jar
mimepull-1.6.jar
org.apache.servicemix.bundles.lucene-3.6.2_1.jar
commons-digester-1.8.1.jar
jackson-mapper-asl-1.9.7.jar
net.echinopsii.3rdparty.logback-access-1.0.7.jar
org.apache.servicemix.bundles.neo4j.community-2.1.2.jar
commons-jxpath-1.3.jar
jetty-http-9.0.5.v20130815.jar
net.echinopsii.3rdparty.net.sf.opencsv-2.0.0.jar
parboiled-core-1.1.6.jar
commons-lang-2.4.jar
jetty-io-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.apache.ant-1.8.2.jar
parboiled-scala_2.10-1.1.6.jar
com.springsource.org.bouncycastle.jce-1.39.0.jar
jetty-security-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.apache.ant-launcher-1.8.2.jar
scala-library-2.10.4.jar
com.springsource.org.bouncycastle.mail-1.39.0.jar
jetty-server-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.codehaus.janino.com
mons-compiler-2.6.1.jar
com.springsource.org.jdom-1.1.0.jar
jetty-servlet-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.codehaus.janino.jan
ino-2.6.1.jar
com.springsource.org.objectweb.asm-3.1.0.jar
jetty-util-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.mozilla.rhino-1.7.4
.jar
```

**The Neo4J community super-bundle**

We just saw how we can easily transform non OSGI friendly jar into OSGI bundle with Eclipse Virgo Bundlor. But some times this is not enough to make work non-osgi friendly JARs into OSGI environment :

- because you may have import constraint which becomes spaghetti-like dependency chain which could be horrible to demystify. This is the case of the jersey dependency chain.
- because of the heavily use of java ServicesLoader feature introduced in Java 6 - *which is not really OSGI friendly*. This is the case of the Neo4J libraries.

In such cases the quickest (as you decide to NOT reverse-engineer the dependencies) and safest (as you decide to NOT add any code lines) solution is to create a super-bundle which will include all the problematic JARs and therefore provides a same classpath area for all these dependencies you want to make work together.

To make this super-bundle we use the great work from Apache Servicemix team who deliver a maven engineering tool to generate OSGI bundle from severals dependencies. The Neo4J community super-bundle definition can be found [here](#).

The final neo4j.community repository looks like this :

## **\$VIRGO\_HOME/repository/neo4j-community**

```
commons-beanutils-1.8.3.jar
concurrentlinkedhashmap-lru-1.3.1.jar
jetty-webapp-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.neo4j.community.superbundle-2.1.2.jar
commons-collections-3.2.1.jar
jackson-core-asl-1.9.7.jar
jetty-xml-9.0.5.v20130815.jar
org.apache.servicemix.bundles.jline-0.9.94_1.jar
commons-configuration-1.6.jar
jackson-jaxrs-1.9.7.jar
jsr311-api-1.1.2.r612.jar
org.apache.servicemix.bundles.lucene-3.6.2_1.jar
commons-digester-1.8.1.jar
jackson-mapper-asl-1.9.7.jar
mimepull-1.6.jar
org.apache.servicemix.bundles.neo4j.community-2.1.2.jar
commons-jxpath-1.3.jar
jetty-http-9.0.5.v20130815.jar
net.echinopsii.3rdparty.logback-access-1.0.7.jar
parboiled-core-1.1.6.jar
commons-lang-2.4.jar
jetty-io-9.0.5.v20130815.jar
net.echinopsii.3rdparty.net.sf.opencsv-2.0.0.jar
parboiled-scala_2.10-1.1.6.jar
com.springsource.org.bouncycastle.jce-1.39.0.jar
jetty-security-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.apache.ant-1.8.2.jar
scala-library-2.10.4.jar
com.springsource.org.bouncycastle.mail-1.39.0.jar
jetty-server-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.apache.ant-launcher-1.8.2.jar
com.springsource.org.jdom-1.1.0.jar
jetty-servlet-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.codehaus.janino.commons-compiler-2.6.1.jar
com.springsource.org.objectweb.asm-3.1.0.jar
jetty-util-9.0.5.v20130815.jar
net.echinopsii.3rdparty.org.codehaus.janino.janino-2.6.1.jar
```

## **Install and start Neo4J super-bundle in Eclipse Virgo Kernel**

Once Virgo Kernel is started (\$VIRGO\_HOME/bin/startup.sh) we can connect on the Kernel Region console through SSH :

```
#default user/password : admin/springsource
ssh -p 2502 admin@localhost
```

Then we can start the Neo4J super-bundle like this :

```
osgi> vsh:install
repository:bundle/net.echinopsii.3rdparty.org.neo4j.community.superbundle/2.1.2
[2015-02-23 15:09:49.993] Thread-29
<DE0000I> Installing bundle
'net.echinopsii.3rdparty.org.neo4j.community.superbundle' version '2.1.2'.
[2015-02-23 15:09:50.756] Thread-29
<DE0001I> Installed bundle
'net.echinopsii.3rdparty.org.neo4j.community.superbundle' version '2.1.2'.
Artifact bundle
net.echinopsii.3rdparty.org.neo4j.community.superbundle 2.1.2 installed

osgi> vsh:bundle list
...
100
net.echinopsii.3rdparty.org.neo4j.community.superbundle 2.1.2
RESOLVED
...

osgi> vsh:bundle start 100
[2015-02-23 18:14:31.430] Thread-33
<DE0004I> Starting bundle
'net.echinopsii.3rdparty.org.neo4j.community.superbundle' version '2.1.2'.
bundle
net.echinopsii.3rdparty.org.neo4j.community.superbundle:2.1.2 started successfully

osgi> vsh:bundle list
...
100 S
net.echinopsii.3rdparty.org.neo4j.community.superbundle 2.1.2
ACTIVE
...
```

### Examine Neo4J

> [Expand](#)

### super-bundle

[source](#)

```
osgi> vsh:bundle examine 100
Id: 100
Name:
net.echinopsii.3rdparty.org.neo4j.community.superbundle
```

```
Version          2.1.2
State:           ACTIVE
Spring Powered:  true
Bundle Location:
file:/CC/DEV/ariane.master/ariane.community.environment/Virgo/virgo-kernel-3.6.3.RELEASE/work/deployer/s/global/14/0/net.echinopsii.3rdparty.org.neo4j.community.superbundle-2.1.2.jar/#org.eclipse.virgo.region.user
Imported Packages:
    ch.qos.logback.core.spi [1.0.0, 2.0.0)
        exported by ch.qos.logback.core
1.0.7.v20121108-1250 [4]
    org.apache.lucene.util [0.0.0, oo)
        exported by
org.apache.servicemix.bundles.lucene 3.6.2.1
[125]
    org.parboiled.scala.parserrunners [1.1.0,
2.0.0)
        exported by org.parboiled.scala 1.1.6
[137]
    javax.ws.rs [1.1.0, 2.0.0)
        exported by
org.neo4j.3rdparty.javax.ws.rs.jsr311-api 1.1.2
[135]
    javax.mail.internet [0.0.0, oo)
        exported by javax.mail
1.4.0.v201005080615 [107]
    ch.qos.logback.core [1.0.0, 2.0.0)
        exported by ch.qos.logback.core
1.0.7.v20121108-1250 [4]
    ch.qos.logback.classic.encoder [1.0.0,
2.0.0)
        exported by ch.qos.logback.classic
1.0.7.v20121108-1250 [3]
    org.xml.sax [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    javax.xml.stream [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    org.parboiled.errors [1.1.0, 2.0.0)
        exported by org.parboiled.core 1.1.6
[136]
    org.apache.lucene.store [0.0.0, oo)
        exported by
org.apache.servicemix.bundles.lucene 3.6.2.1
[125]
    jline [0.9.0, 1.0.0)
        exported by
org.apache.servicemix.bundles.jline 0.9.94.1
[124]
    javax.lang.model [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    org.eclipse.jetty.util.thread [9.0.0,
10.0.0)
        exported by org.eclipse.jetty.util
9.0.5.v20130815 [131]
```

```
org.parboiled.common [1.1.0, 2.0.0)
  exported by org.parboiled.core 1.1.6
[136]
  javax.management.openmbean [0.0.0, oo)
    exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
  javax.lang.model.util [0.0.0, oo)
    exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
  scala.util.matching [2.10.0, 3.0.0)
    exported by
org.scala-lang.scala-library
2.10.4.v20140209-180020-VFINAL-b66a39653b [138]
  org.eclipse.jetty.server.handler [9.0.0,
10.0.0)
    exported by org.eclipse.jetty.server
9.0.5.v20130815 [129]
  scala.util.parsing.combinator [2.10.0,
3.0.0)
    exported by
org.scala-lang.scala-library
2.10.4.v20140209-180020-VFINAL-b66a39653b [138]
  ch.qos.logback.classic [1.0.0, 2.0.0)
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1.0.7.v20121108-1250 [3]
  javax.crypto [0.0.0, oo)
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3.8.2.v20130124-134944 [0]
  javax.servlet.jsp [0.0.0, oo)
    exported by javax.servlet.jsp
2.2.0.v201112011158 [108]
  org.w3c.dom [0.0.0, oo)
    exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
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    exported by ch.qos.logback.classic
1.0.7.v20121108-1250 [3]
  org.codehaus.jackson.io [1.9.0, 2.0.0)
    exported by jackson-core-asl 1.9.7
[105]
  org.codehaus.janino [0.0.0, oo)
    exported by
net.echinopsii.3rdparty.org.codehaus.janino.jan
ino 2.6.1 [114]
  javax.management.remote [0.0.0, oo)
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  org.parboiled.buffers [1.1.0, 2.0.0)
    exported by org.parboiled.core 1.1.6
[136]
  org.bouncycastle.jce [0.0.0, oo)
    exported by
com.springsource.org.bouncycastle.jce 1.39.0
[102]
  javax.xml.transform.stream [0.0.0, oo)
    exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
  org.codehaus.jackson [1.9.0, 2.0.0)
    exported by jackson-core-asl 1.9.7
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[105]
    org.apache.lucene.search [0.0.0, oo)
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org.apache.servicemix.bundles.lucene 3.6.2.1
[125]
    org.rrd4j.core [0.0.0, oo)
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net.echinopsii.3rdparty.org.rrd4j.rrd4j 2.0.7
[116]
    javax.annotation.processing [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    scala.collection [2.10.0, 3.0.0)
        exported by
org.scala-lang.scala-library
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3.8.2.v20130124-134944 [0]
    org.parboiled.matchers [1.1.0, 2.0.0)
        exported by org.parboiled.core 1.1.6
[136]
    org.objectweb.asm [0.0.0, oo)
        exported by
com.springsource.org.objectweb.asm 3.1.0 [104]
    javax.imageio.stream [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    org.bouncycastle.jce.provider [0.0.0, oo)
        exported by
com.springsource.org.bouncycastle.jce 1.39.0
[102]
    org.eclipse.jetty.util.resource [9.0.0,
10.0.0)
        exported by org.eclipse.jetty.util
9.0.5.v20130815 [131]
    javax.xml.transform.dom [0.0.0, oo)
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2.0.0)
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1.0.7.v20121108-1250 [4]
    ch.qos.logback.classic.pattern [1.0.0,
2.0.0)
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9.0.5.v20130815 [132]
    javax.imageio [0.0.0, oo)
        exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    scala.collection.parallel [2.10.0, 3.0.0)
        exported by
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2.10.4.v20140209-180020-VFINAL-b66a39653b [138]
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[125]
  org.apache.tools.ant.types [0.0.0, oo)
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net.echinopsii.3rdparty.org.apache.ant 1.8.2
[111]
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[125]
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[2.10.0, 3.0.0)
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  javax.ws.rs.core [1.1.0, 2.0.0)
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[135]
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9.0.5.v20130815 [127]
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  exported by
net.echinopsii.3rdparty.org.rrd4j.rrd4j 2.0.7
[116]
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9.0.5.v20130815 [126]
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3.0.0)
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1.7.2.v20121108-1250 [56]
  javax.servlet.annotation [2.6.0, 3.0.0)
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3.0.0.v201112011016 [10]
  org.bouncycastle.asn1.x509 [0.0.0, oo)
  exported by
com.springsource.org.bouncycastle.jce 1.39.0
[102]
  org.eclipse.jetty.server.session [9.0.0,
10.0.0)
  exported by org.eclipse.jetty.server
9.0.5.v20130815 [129]
  com.googlecode.concurrentlinkedhashmap
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[1.3.0, 2.0.0)
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com.googlecode.concurrentlinkedhashmap.lru
1.3.1 [101]
    javax.mail.util [0.0.0, oo)
        exported by javax.mail
1.4.0.v201005080615 [107]
    org.eclipse.jetty.util.component [9.0.0,
10.0.0)
        exported by org.eclipse.jetty.util
9.0.5.v20130815 [131]
    javax.management [0.0.0, oo)
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        exported by org.jvnet.mimepull 1.6.0
[134]
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[125]
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3.0.0.v201112011016 [10]
    au.com.bytecode.opencsv [0.0.0, oo)
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[110]
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    javax.net.ssl [0.0.0, oo)
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    javax.xml.transform.sax [0.0.0, oo)
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        exported by org.eclipse.jetty.server
9.0.5.v20130815 [129]
    org.eclipse.jetty.servlet [9.0.0, 10.0.0)
        exported by org.eclipse.jetty.servlet
9.0.5.v20130815 [130]
    javax.naming [0.0.0, oo)
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[105]
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    exported by org.parboiled.core 1.1.6
[136]
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  javax.ws.rs.ext [1.1.0, 2.0.0)
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[135]
  org.ietf.jgss [0.0.0, oo)
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3.8.2.v20130124-134944 [0]
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    exported by org.parboiled.scala 1.1.6
[137]
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    exported by ch.qos.logback.core
1.0.7.v20121108-1250 [4]
  javax.xml.bind.annotation [0.0.0, oo)
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    exported by javax.mail
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  org.apache.commons.configuration [1.6.0,
2.0.0)
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  scala.collection.immutable [2.10.0, 3.0.0)
    exported by
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2.10.4.v20140209-180020-VFINAL-b66a39653b [138]
  javax.lang.model.type [0.0.0, oo)
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3.8.2.v20130124-134944 [0]
  org.mozilla.javascript [0.0.0, oo)
    exported by
net.echinopsii.3rdparty.org.mozilla.rhino 1.7.4
[115]
  javax.imageio.spi [0.0.0, oo)
    exported by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
  scala [2.10.0, 3.0.0)
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  org.parboiled.scala.rules [1.1.0, 2.0.0)
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[137]
    org.codehaus.jackson.map [1.9.0, 2.0.0)
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[106]
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com.springsource.org.apache.commons.io 1.4.0
[98]
    org.eclipse.jetty.util.ssl [9.0.0, 10.0.0)
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9.0.5.v20130815 [131]
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3.8.2.v20130124-134944 [0]
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2.10.4.v20140209-180020-VFINAL-b66a39653b [138]
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oo)
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3.8.2.v20130124-134944 [0]
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net.echinopsii.3rdparty.org.apache.ant 1.8.2
[111]
    javax.activation [0.0.0, oo)
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3.8.2.v20130124-134944 [0]
    org.parboiled.support [1.1.0, 2.0.0)
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[136]
    org.bouncycastle.x509 [0.0.0, oo)
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com.springsource.org.bouncycastle.jce 1.39.0
[102]
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    javax.xml.transform [0.0.0, oo)
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[109]
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org.scala-lang.scala-library
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    exported by
org.apache.servicemix.bundles.lucene 3.6.2.1
[125]
    javax.servlet.http [2.6.0, 3.0.0)
    exported by javax.servlet
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    org.neo4j.graphdb.traversal 2.1.2

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ocbuilders 2.1.2
    org.neo4j.server.webadmin.rest 2.1.2
    org.neo4j.server.rest.repr.formats 2.1.2
    org.neo4j.shell 2.1.2

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    org.neo4j.kernel.impl.transaction 2.1.2
    org.neo4j.ext.udc 2.1.2
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    org.neo4j.cypher.javacompat.internal 2.1.2  
    org.neo4j.collection.primitive.hopscotch 2.1.2  
    org.neo4j.kernel.api.impl.index.bitmaps 2.1.2  
    org.neo4j.unsafe.impl.batchimport 2.1.2  
    org.neo4j.kernel.api.impl.index 2.1.2  
    org.neo4j.server.rest.discovery 2.1.2  
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    org.neo4j.kernel.api.properties 2.1.2  
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    org.neo4j.helpers 2.1.2  
    org.neo4j.server.extension.auth 2.1.2

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    org.neo4j.graphalgo.impl 2.1.2  
    org.neo4j.server.web 2.1.2  
    org.neo4j.shell.impl 2.1.2  
    org.neo4j.kernel.impl.api.state 2.1.2  
    org.neo4j.kernel.api.exceptions 2.1.2

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    org.neo4j.kernel.impl.coreapi.schema 2.1.2  
    org.neo4j.server.guard 2.1.2  
    org.neo4j.graphdb.config 2.1.2

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    org.neo4j.kernel.info 2.1.2  
    org.neo4j.jmx 2.1.2  
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    org.neo4j.unsafe.impl.batchimport.store
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    org.neo4j.kernel.impl.index 2.1.2
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org.neo4j.cypher.internal.compiler.v2_0.ast.con
vert 2.1.2
    org.neo4j.cypher.javacompact 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.mutatio
n 2.1.2
    org.neo4j.kernel.impl.persistence 2.1.2
    org.neo4j.index.impl.lucene 2.1.2
    org.neo4j.graphdb.index 2.1.2
    org.neo4j.kernel.api.index 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.pipes.a
gggregation 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.ast.rew
riters 2.1.2
    org.neo4j.kernel.impl.annotations 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.planner
.logical 2.1.2
    org.neo4j.kernel.impl.nioneo.store 2.1.2
    org.neo4j.graphalgo.impl.util 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.docbuil
ders 2.1.2
    org.neo4j.cypher.internal.compiler.v1_9.spi
2.1.2
    org.neo4j.server.database 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.executi
onplan.verifiers 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.ast.con
vert 2.1.2
    org.neo4j.jmx.impl 2.1.2
    org.neo4j.kernel.impl.locking 2.1.2
```

```
org.neo4j.server.security 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.executionplan 2.1.2
    org.neo4j.server.webadmin.console 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.commands 2.1.2

org.neo4j.cypher.internal.compiler.v2_0.commands 2.1.2
    org.neo4j.graphdb.factory 2.1.2
    org.neo4j.cypher.internal.spi.v1_9 2.1.2
    org.neo4j.server.helpers 2.1.2
    org.neo4j.server.rest.security 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.parser 2.1.2
    org.neo4j.kernel.configuration 2.1.2
    org.neo4j.graphmatching.impl 2.1.2
    org.neo4j.kernel.impl.util 2.1.2
    org.neo4j.cypher.internal.spi.v2_1 2.1.2
    org.neo4j.unsafe.impl.batchimport.input 2.1.2

org.neo4j.cypher.internal.compiler.v2_0.data 2.1.2
    org.neo4j.kernel.impl.traversal 2.1.2
    org.neo4j.cypher.internal.helpers.Converge 2.1.2
    org.neo4j.unsafe.batchinsert 2.1.2
    org.neo4j.cypher.internal.spi.v2_0 2.1.2
    org.neo4j.kernel.impl.util.concurrent 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.commands.values 2.1.2

org.neo4j.kernel.impl.storemigration.monitoring 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.data 2.1.2
    org.neo4j.shell.kernel.apps 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.commands 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.helpers 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.commands.expressions 2.1.2
    org.neo4j.server.rest.web 2.1.2
    org.neo4j.server.plugins 2.1.2
    org.neo4j.shell.apps.extra 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.executionplan.builders 2.1.2
    org.neo4j.cypher.internal.compiler.v2_1.spi
```



2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.parser  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.functions  
2.1.2

org.neo4j.server.rrd.sampler 2.1.2

org.neo4j.kernel.api.exceptions.schema  
2.1.2

org.neo4j.shell.kernel.apps.cypher 2.1.2

org.neo4j.kernel.guard 2.1.2

org.neo4j.kernel.logging 2.1.2

org.neo4j.unsafe.impl.batchimport.stats  
2.1.2

org.neo4j.server.rest.domain 2.1.2

org.neo4j.kernel.api.constraints 2.1.2

org.neo4j.kernel.impl.coreapi 2.1.2

org.neo4j.cypher.internal.compiler.v2\_1.executionplan.builders.prepare 2.1.2

org.neo4j.index.lucene.unsafe.batchinsert  
2.1.2

org.neo4j.kernel.impl.storemigration 2.1.2

org.neo4j.kernel.impl.locking.community  
2.1.2

org.neo4j.graphdb.event 2.1.2

org.neo4j.kernel.impl.storemigration.legacystore  
2.1.2

org.neo4j.server.logging 2.1.2

org.neo4j.server.scripting.javascript 2.1.2

org.neo4j.graphalgo.impl.ancestor 2.1.2

org.neo4j.cypher.internal.compiler.v1\_9.helpers  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.pipes.matching  
2.1.2

org.neo4j.kernel.extension 2.1.2

org.neo4j.kernel.impl.util.statistics 2.1.2

org.neo4j.kernel.impl.transaction.xaframework  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.ast  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.executionplan.builders  
2.1.2

org.neo4j.server.rest.transactional.error  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_1.parser.matchers  
2.1.2

org.neo4j.cypher.internal.compiler.v2\_0.spi  
2.1.2

org.neo4j.kernel.impl.api.scan 2.1.2

org.neo4j.cypher.internal.compiler.v1\_9.command

```
s.expressions 2.1.2
  org.neo4j.graphalgo.impl.centraliity 2.1.2

org.neo4j.kernel.impl.nioneo.store.windowpool
2.1.2

org.neo4j.cypher.internal.compiler.v2_0.mutatio
n 2.1.2
  org.neo4j.kernel.impl.cache 2.1.2
  org.neo4j.graphmatching 2.1.2
  org.neo4j.ext.udc.impl 2.1.2
  org.neo4j.shell.apps 2.1.2
  org.neo4j.server.impl 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.profile
r 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.pipes
2.1.2
  org.neo4j.kernel.impl.recovery 2.1.2
  org.neo4j.graphalgo 2.1.2
  org.neo4j.collection.primitive 2.1.2
  org.neo4j.kernel.api 2.1.2
  org.neo4j.kernel.impl.api.store 2.1.2

org.neo4j.cypher.internal.compiler.v1_9.symbols
2.1.2
  org.neo4j.cypher.internal.helpers 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.planner
2.1.2
  org.neo4j.cypher 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.executi
onplan.builders 2.1.2
  org.neo4j.server.modules 2.1.2
  org.neo4j.server.scripting 2.1.2

org.neo4j.cypher.internal.compiler.v2_1.mutatio
n 2.1.2

org.neo4j.cypher.internal.compiler.v2_0.pipes
2.1.2
Published services:
  240
org.neo4j.kernel.extension.KernelExtensionFacto
ry
  consumed by
org.eclipse.virgo.shell.command 3.6.3.RELEASE
[68]
  241
org.neo4j.graphdb.factory.GraphDatabaseFactory
  consumed by
org.eclipse.virgo.shell.command 3.6.3.RELEASE
[68]
  242
org.osgi.service.blueprint.container.BlueprintC
ontainer
  consumed by
```

```
org.eclipse.virgo.shell.command 3.6.3.RELEASE
[68]
    243
org.eclipse.gemini.blueprint.context.DelegatedE
xecutionOsgiBundleApplicationContext
    consumed by
org.eclipse.virgo.shell.command 3.6.3.RELEASE
[68]
Consumed services:
    2
org.osgi.service.packageadmin.PackageAdmin
    published by org.eclipse.osgi
3.8.2.v20130124-134944 [0]
    198
org.springframework.beans.factory.xml.Namespace
HandlerResolver
    published by
org.eclipse.gemini.blueprint.extender
1.0.2.RELEASE [78]
    199 org.xml.sax.EntityResolver
    published by
org.eclipse.gemini.blueprint.extender
```

```
1.0.2.RELEASE [78]
Fragments:
  None
```

---

## Start the Neo4J server in Eclipse Virgo Kernel

### Neo4J and Jetty integration into Virgo Kernel environment

To add the Jetty configuration into Virgo Kernel environment, create the `$/VIRGO_HOME/org/eclipse/jetty/webapp` directory. Then copy the Jetty [webdefault.xml](#) in it.

To add the neo4j configuration into Virgo Kernel environment, create the following directories :

- `$/VIRGO_HOME/neo4j/conf`
- `$/VIRGO_HOME/neo4j/data`
- `$/VIRGO_HOME/neo4j/graph`

Then copy the neo4j configuration files into `$/VIRGO_HOME/neo4j/conf` :

- `$/VIRGO_HOME/neo4j/conf/neo4j-http-logging.xml`
- `$/VIRGO_HOME/neo4j/conf/neo4j.properties`
- `$/VIRGO_HOME/neo4j/conf/neo4j-server.properties`

You need to adapt these files to fit your environment path.

### Enable Neo4J RMI in Virgo Kernel environment

Neo4J use RMI and so we need to enable it in Virgo Kernel environment. Edit the `$/VIRGO_HOME/bin/dmk.sh` and add the following lines :

## Add RMI to Virgo Kernel

```
@@ -206,15 +207,19 @@ then

-Dorg.eclipse.virgo.kernel.config=$CONFIG_DIR \

-Dosgi.sharedConfiguration.area=$CONFIG_DIR \

-Dosgi.java.profile="file:$JAVA_PROFILE" \

-Declipse.ignoreApp=true \

-Dosgi.install.area=$KERNEL_HOME \

-Dosgi.configuration.area=$CONFIG_AREA \

-Dssh.server.keystore="$CONFIG_DIR/hostkey.ser" \

+

-Dosgi.frameworkClassPath=$FWCLASSPATH \

+ -Declipse.security=osgi \

+

-Djava.security.policy=$CONFIG_DIR/virgo.policy \

+

-Declipse.enableStateSaver=true \

+

-Djava.rmi.server.codebase="file://$KERNEL_HOME

/repository/neo4j-community/net.echinopsii.3rdp

arty.org.neo4j.community.superbundle-2.1.2.jar" \

+

-Djava.endorsed.dirs="$KERNEL_HOME/lib/endorsed

" \

+ -classpath $CLASSPATH \

+

org.eclipse.equinox.launcher.Main \

+ -noExit \

+ $LAUNCH_OPTS \

+ $ADDITIONAL_ARGS
```

Then add and edit \$VIRGO\_HOME/configuration/virgo.policy :

## Virgo security policy

```
grant { permission java.security.AllPermission;

};
```



### OSGI security

OSGI provides security features extending the Java ones. To know more look at this [doc](#) and this [presentation](#).

The above security policy is totally unsecure but very convenient. Feel free

to adapt this policy to your paranoia...

## Get and install the neo4j-osgi demonstration application

To start the Neo4J server in Virgo, we will use a dedicated application which bootstrap Neo4J following OSGI way. You can get this application [here](#).

### Neo4JActivator

This little class is the OSGI bootstrapping handler. When starting/stopping the bundle the start/stop method of this class are called.

At startup the only thing done is the Neo4JManagedService registration into the service registry with the pid "net.echinopsii.demo.Neo4JManagedService".

## Neo4JActivator.java

```
package net.echinopsii.demo;
import org.osgi.framework.BundleActivator;
import org.osgi.framework.BundleContext;
import org.osgi.framework.ServiceRegistration;
import org.osgi.service.cm.ManagedService;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import java.util.Dictionary;
import java.util.Hashtable;

public class Neo4JActivator implements
BundleActivator {

    private final static Logger log =
LoggerFactory.getLogger(Neo4JManagedService.class);
    private ServiceRegistration
neo4jServiceRegistration;
    private Neo4JManagedService
neo4jManagedService = new
Neo4JManagedService();

    @Override
    public void start(BundleContext
bundleContext) throws Exception {
        Dictionary props = new Hashtable();
        log.debug("Starting
net.echinopsii.demo.Neo4JManagedService");
        props.put("service.pid",
"net.echinopsii.demo.Neo4JManagedService");
        neo4jServiceRegistration =
bundleContext.registerService(ManagedService.class.getName(), neo4jManagedService, props);
    }

    @Override
    public void stop(BundleContext
bundleContext) throws Exception {
        if (neo4jServiceRegistration !=null) {
            neo4jManagedService.stop();
            neo4jManagedService=null;

neo4jServiceRegistration.unregister();
            neo4jServiceRegistration=null;
        }
    }
}
```

## Neo4JManagedService

The Neo4JManagedService handle the configuration and start the Neo4J server according to the neo4j configuration path.

### Neo4JManagedService.java

```
package net.echinopsii.demo;
import org.osgi.framework.BundleActivator;
import org.osgi.framework.BundleContext;
import org.osgi.framework.ServiceRegistration;
import org.osgi.service.cm.ManagedService;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import java.util.Dictionary;
import java.util.Hashtable;
public class Neo4JActivator implements
BundleActivator {

    private final static Logger log =
LoggerFactory.getLogger(Neo4JManagedService.cla
ss);
    private ServiceRegistration
neo4jServiceRegistration;
    private Neo4JManagedService
neo4jManagedService = new
Neo4JManagedService();

    @Override
    public void start(BundleContext
bundleContext) throws Exception {
        Dictionary props = new Hashtable();
        log.debug("Starting
net.echinopsii.demo.Neo4JManagedService");
        props.put("service.pid",
"net.echinopsii.demo.Neo4JManagedService");
        neo4jServiceRegistration =
bundleContext.registerService(ManagedService.cl
ass.getName(), neo4jManagedService, props);
    }

    @Override
    public void stop(BundleContext
bundleContext) throws Exception {
        if (neo4jServiceRegistration !=null) {
            neo4jManagedService.stop();
            neo4jManagedService=null;

neo4jServiceRegistration.unregister();
            neo4jServiceRegistration=null;
        }
    }
}
```

### pom.xml

When building the project, maven will setup the OSGI manifest of the bundle according to this pom. Look at the necessary import to make work the Neo4J bootstrap.



## pom.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project
xmlns="http://maven.apache.org/POM/4.0.0"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"

xsi:schemaLocation="http://maven.apache.org/POM
/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">

    <modelVersion>4.0.0</modelVersion>

    <groupId>net.echinopsii.demo</groupId>
    <artifactId>neo4j-osgi</artifactId>
    <version>1.0.0</version>
    <packaging>bundle</packaging>

    <properties>

<version.osgi.org.neo4j>2.1.2</version.osgi.org
.neo4j>
    </properties>

    <dependencies>
        <dependency>
            <groupId>org.osgi</groupId>

<artifactId>org.osgi.core</artifactId>
            <version>4.2.0</version>
        </dependency>
        <dependency>
            <groupId>org.osgi</groupId>

<artifactId>org.osgi.compendium</artifactId>
            <version>4.2.0</version>
        </dependency>
        <dependency>
            <groupId>org.slf4j</groupId>
            <artifactId>slf4j-api</artifactId>
            <version>1.7.6</version>
        </dependency>
        <dependency>
            <groupId>org.neo4j</groupId>

<artifactId>neo4j-kernel</artifactId>
            <version>2.1.2</version>
        </dependency>
        <dependency>
            <groupId>org.neo4j.app</groupId>

<artifactId>neo4j-server</artifactId>
            <version>2.1.2</version>
```

```
        </dependency>
</dependencies>

<build>
  <plugins>
    <plugin>

<groupId>org.apache.felix</groupId>

<artifactId>maven-bundle-plugin</artifactId>
  <extensions>>true</extensions>
  <version>2.4.0</version>
  <configuration>
    <instructions>

<Bundle-SymbolicName>net.echinopsii.demo.neo4j-
osgi</Bundle-SymbolicName>

<Bundle-Version>1.0.0</Bundle-Version>

<Bundle-Activator>net.echinopsii.demo.Neo4JActi
vator</Bundle-Activator>
    <Import-Package>

org.neo4j.graphdb;version="${version.osgi.org.n
eo4j}",

org.neo4j.graphdb.factory;version="${version.os
gi.org.neo4j}",

org.neo4j.kernel;version="${version.osgi.org.ne
o4j}",

org.neo4j.kernel.logging;version="${version.osg
i.org.neo4j}",

org.neo4j.server;version="${version.osgi.org.ne
o4j}",

org.neo4j.server.configuration;version="${versi
on.osgi.org.neo4j}",

org.neo4j.server.configuration.validation;versi
on="${version.osgi.org.neo4j}",

org.neo4j.server.database;version="${version.os
gi.org.neo4j}",

org.neo4j.server.webadmin.rest;version="${versi
on.osgi.org.neo4j}",

org.neo4j.server.rest.web;version="${version.os
gi.org.neo4j}",

org.neo4j.server.rest.discovery;version="${versi
on.osgi.org.neo4j}",

org.neo4j.server.webadmin.rest.console;version=
```

```
"${version.osgi.org.neo4j}",  
  
org.eclipse.jetty.servlet.listener,  
    *  
    </Import-Package>  
    </instructions>  
    </configuration>  
</plugin>
```

```
        </plugins>
    </build>
</project>
```

### install the demo app

Once builded you can install the neo4j-osgi-1.0.0.jar in the \$VIRGO\_HOME/repository/usr.  
You also need to define the Neo4JManagedService configuration by adding and editing \$VIRGO\_HOME/repository/usr/net.echinopsii.demo.Neo4JManagedService.properties file :

#### Neo4JManagedService configuration

```
neo4j.configfile = <PATH TO
neo4j-server.properties file>
```

Finally you can configure the log level of this little app in \$VIRGO\_HOME/configuration/serviceability.xml

#### Set up log level

```
@@ -73,6 +73,11 @@
        <appender-ref ref="LOG_FILE" />
    </logger>

+    <logger level="DEBUG"
+additivity="false" name="net.echinopsii.demo">
+        <appender-ref
+ref="SIFTED_LOG_FILE" />
+        <appender-ref ref="LOG_FILE"
+ />
+    </logger>
+
    <root level="INFO">
        <appender-ref
+ref="SIFTED_LOG_FILE" />
        <appender-ref ref="LOG_FILE" />
```

### Run neo4j-osgi demonstration application and test the OSGI embedded Neo4J server

Execute the following commands to make run the OSGI embedded Neo4J server.

#### Starting Neo4J server

```
osgi> vsh:install
repository:configuration/net.echinopsii.demo.Neo4JManagedService
[2015-02-23 19:03:06.250] Thread-29
```

```

<DE0000I> Installing configuration
'net.echinopsii.demo.Neo4JManagedService'
version '0.0.0'.
[2015-02-23 19:03:06.279] Thread-29
<DE0001I> Installed configuration
'net.echinopsii.demo.Neo4JManagedService'
version '0.0.0'.

osgi> vsh:config list
Name
Version                               State
net.echinopsii.demo.Neo4JManagedService  0.0.0
RESOLVED
org.eclipse.virgo.kernel                0.0.0
ACTIVE
org.eclipse.virgo.kernel.jmxremote.access 0.0.0
ACTIVE
org.eclipse.virgo.kernel.userregion      0.0.0
ACTIVE
org.eclipse.virgo.kernel.users           0.0.0
ACTIVE
org.eclipse.virgo.medic                  0.0.0
ACTIVE
org.eclipse.virgo.repository              0.0.0
ACTIVE
osgi.console                             0.0.0
ACTIVE
osgi.console.ssh                          0.0.0
ACTIVE
osgi.console.telnet                       0.0.0
ACTIVE

osgi> vsh:config start
net.echinopsii.demo.Neo4JManagedService
[2015-02-23 19:04:11.326] Thread-29
<DE0004I> Starting configuration
'net.echinopsii.demo.Neo4JManagedService'
version '0.0.0'.
[2015-02-23 19:04:11.333] Thread-29
<DE0005I> Started configuration
'net.echinopsii.demo.Neo4JManagedService'
version '0.0.0'.

osgi> vsh:config list

Name
Version                               State
net.echinopsii.demo.Neo4JManagedService  0.0.0
ACTIVE
org.eclipse.virgo.kernel                0.0.0
ACTIVE
org.eclipse.virgo.kernel.jmxremote.access 0.0.0
ACTIVE
org.eclipse.virgo.kernel.userregion      0.0.0
ACTIVE
org.eclipse.virgo.kernel.users           0.0.0
ACTIVE

```

```
org.eclipse.virgo.medic                0.0.0
ACTIVE
org.eclipse.virgo.repository            0.0.0
ACTIVE
osgi.console                            0.0.0
ACTIVE
osgi.console.ssh                        0.0.0
ACTIVE
osgi.console.telnet                     0.0.0
ACTIVE
```

```
osgi> vsh:config examine
net.echinopsii.demo.Neo4JManagedService
```

```
Factory pid:
Bundle Location:
file:/CC/DEV/ariane.master/ariane.community.environment/Virgo/virgo-kernel-3.6.3.RELEASE/work/deployer/s/global/16/0/neo4j-osgi-1.0.0.jar/#org.eclipse.virgo.region.user
Properties:
    neo4j.configfile:
```

```
/CC/DEV/ariane.master/ariane.community.environment/Virgo/virgo-kernel-3.6.3.RELEASE/neo4j/conf/neo4j-server.properties
    service.pid:
        net.echinopsii.demo.Neo4JManagedService
```

```
osgi> vsh:install
repository:bundle/net.echinopsii.demo.neo4j-osgi/1.0.0
[2015-02-23 19:04:23.917] Thread-29
<DE0000I> Installing bundle
'net.echinopsii.demo.neo4j-osgi' version '1.0.0'.
[2015-02-23 19:04:23.934] Thread-29
<DE0001I> Installed bundle
'net.echinopsii.demo.neo4j-osgi' version '1.0.0'.
```

```
osgi> vsh:bundle list
...
138 net.echinopsii.demo.neo4j-osgi
1.0.0
RESOLVED
```

```
osgi> vsh:bundle start 138
[2015-02-23 19:04:41.335] Thread-29
<DE0004I> Starting bundle
'net.echinopsii.demo.neo4j-osgi' version '1.0.0'.
bundle net.echinopsii.demo.neo4j-osgi:1.0.0
started successfully
```

```
osgi> vsh:bundle list
...
```

```
138 net.echinopsii.demo.neo4j-osgi
1.0.0
ACTIVE
```

Once these commands are executed you can see the following lines into the Virgo logs (\$VIRGO\_HOME/serviceability/logs/log.log)

```
[2015-02-23 23:02:13.722] DEBUG ManagedService
Update Queue
net.echinopsii.demo.Neo4JManagedService
Create neo4j server
[2015-02-23 23:02:13.759] DEBUG ManagedService
Update Queue
net.echinopsii.demo.Neo4JManagedService
Start neo4j server
[2015-02-23 23:02:15.321] WARN ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
o.e.j.s.ServletContextHandler@20d2bf07{/ ,null,n
ull} contextPath ends with /
[2015-02-23 23:02:15.322] WARN ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Empty contextPath
[2015-02-23 23:02:15.323] INFO ManagedService
Update Queue org.eclipse.jetty.server.Server
jetty-9.0.5.v20130815
[2015-02-23 23:02:15.352] INFO ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Started
o.e.j.s.h.MovedContextHandler@684d34eb{/ ,null,A
VAILABLE}
[2015-02-23 23:02:15.422] INFO ManagedService
Update Queue
com.sun.jersey.server.impl.application.WebAppli
cationImpl Initiating Jersey
application, version 'Jersey: 1.9 09/02/2011
11:17 AM'
[2015-02-23 23:02:15.856] INFO ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Started
o.e.j.s.ServletContextHandler@56ef55d3{/db/mana
ge,null,AVAILABLE}
[2015-02-23 23:02:15.861] INFO ManagedService
Update Queue
com.sun.jersey.server.impl.application.WebAppli
cationImpl Initiating Jersey
application, version 'Jersey: 1.9 09/02/2011
11:17 AM'
[2015-02-23 23:02:16.181] INFO ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Started
o.e.j.s.ServletContextHandler@4fa0f24f{/db/data
,null,AVAILABLE}
```

```
[2015-02-23 23:02:16.226] INFO ManagedService
Update Queue
org.eclipse.jetty.webapp.StandardDescriptorProc
essor          NO JSP Support for /browser,
did not find
org.apache.jasper.servlet.JspServlet
[2015-02-23 23:02:16.235] INFO ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Started
o.e.j.w.WebAppContext@44a79fe6{/browser,file:/C
C/DEV/ariane.master/ariane.community.enviro
nment/Virgo/virgo-kernel-3.6.3.RELEASE/work/deploye
r/s/global/14/0/net.echinopsii.3rdparty.org.neo
4j.community.superbundle-2.1.2.jar/browser/,AVA
ILABLE}
[2015-02-23 23:02:16.238] INFO ManagedService
Update Queue
com.sun.jersey.server.impl.application.WebAppli
cationImpl      Initiating Jersey
application, version 'Jersey: 1.9 09/02/2011
11:17 AM'
[2015-02-23 23:02:16.379] INFO ManagedService
Update Queue
org.eclipse.jetty.server.handler.ContextHandler
Started
o.e.j.s.ServletContextHandler@20d2bf07{/,null,A
VAILABLE}
[2015-02-23 23:02:16.385] INFO ManagedService
Update Queue
org.eclipse.jetty.server.ServerConnector
```



```
Started
ServerConnector@6b53108d{HTTP/1.1}{0.0.0.0:7474}
}
```

And consequently you can have a look to the Neo4J webapplication (<http://your-server-fqdn:7474>) and begin to play with the Neo4J Movie Graph tutorial 😊

The screenshot displays the Neo4J web application interface. On the left, a dark sidebar contains navigation icons: a logo, a star, and an information icon. The main content area is titled "Saved scripts" and features a dropdown menu with two sections: "General" and "System".

- General**
  - Create a node
  - Get some data
  - What is related, and how
  - REST API
- System**
  - Server configuration
  - Kernel information
  - ID Allocation
  - Store file sizes
  - Extensions

At the bottom of the sidebar, there is a dashed box with the text "Drop Cypher script file to import".

On the right side of the interface, a REST API response is shown. The response is a JSON array containing three objects, each representing a node with properties like "description", "name", and "attributes".

```
HTTP : GET /db/man
[
  {
    "description": "..."
    "name": "org"
    "attributes": {
      "descrip": "..."
      "name": "..."
      "value": "..."
      "isReadal": "..."
      "type": "..."
      "isWrite": "..."
      "isIs": "..."
    },
  },
  {
    "description": "..."
    "name": "..."
    "value": "..."
    "isReadal": "..."
    "type": "..."
    "isWrite": "..."
    "isIs": "..."
  },
  {
    "description": "..."
    "name": "..."
    "value": "..."
    "isReadal": "..."
    "type": "..."
    "isWrite": "..."
    "isIs": "..."
  },
]
```



## Annex : Neo4J classpath bundleisation strategy

JARs in \$NEO4J_HOME/system/lib	OSGI bundle ?	Bundleisation methodology
asm-3.1.jar	no	use already asm bundle by springsource <b>to be installed in Virgo</b>
bcprov-jdk16-140.jar	no	use already bouncycastle bundle by springsource <b>to be installed in Virgo</b>
commons-beanutils-1.8.0.jar	yes	<b>to be installed in Virgo</b>
commons-beanutils-core-1.8.0.jar	no	same as commons beanutils
commons-collections-3.2.1.jar	yes	<b>to be installed in Virgo</b>
commons-compiler-2.6.1.jar	no	bundleisation through bundlor <b>to be installed in Virgo</b>
commons-configuration-1.6.jar	yes	<b>to be installed in Virgo</b>
commons-digester-1.8.1.jar	yes	<b>to be installed in Virgo</b>
commons-io-1.4.jar	yes	<b>provided by Virgo :</b> <a href="http://com.springsource.org.apache.commons.io_1.4.0.jar">com.springsource.org.apache.commons.io_1.4.0.jar</a>
commons-lang-2.4.jar	yes	<b>to be installed in Virgo</b>
commons-logging-1.1.1.jar	no	<b>provided by Virgo :</b> <a href="http://org.slf4j.jcl_1.7.2.v20121108-1250.jar">org.slf4j.jcl_1.7.2.v20121108-1250.jar</a>
jackson-core-asl-1.9.7.jar	yes	<b>to be installed in Virgo</b>
jackson-jaxrs-1.9.7.jar	yes	<b>to be installed in Virgo</b>

jackson-mapper-asl-1.9.7.jar	yes	to be installed in Virgo
janino-2.6.1.jar	no	bundleisation through bundlor to be installed in Virgo
javax.servlet-3.0.0.v201112011016.jar	yes	provided by Virgo : javax.servlet_3.0.0.v201112011016.jar
jcl-over-slf4j-1.6.1.jar	yes	provided by Virgo : org.slf4j.jcl_1.7.2.v20121108-1250.jar
jersey-core-1.9.jar	yes	Neo4j super bundle
jersey-multipart-1.9.jar	yes	Neo4j super bundle
jersey-server-1.9.jar	yes	Neo4j super bundle
jetty-http-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-io-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-security-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-server-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-servlet-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-util-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-webapp-9.0.5.v20130815.jar	yes	to be installed in Virgo
jetty-xml-9.0.5.v20130815.jar	yes	to be installed in Virgo
jsr311-api-1.1.2.r612.jar	yes	to be ignored packages already present in jersey-core...
logback-access-1.1.2.jar	yes	to be installed in Virgo (Note: we'll use logback-access-1.0.7 to fit Virgo logback versioning)
logback-classic-1.1.2.jar	yes	provided by Virgo : ch.qos.logback.classic_1.0.7.v20121108-1250
logback-core-1.1.2.jar	yes	provided by Virgo : ch.qos.logback.core_1.0.7.v20121108-1250
mimepull-1.6.jar	yes	to be installed in Virgo
neo4j-browser-2.1.2.jar	no	Neo4j super bundle
neo4j-server-2.1.2.jar	no	Neo4j super bundle
neo4j-server-2.1.2-static-web.jar	no	Neo4j super bundle
opencsv-2.0.jar	no	Neo4j super bundle

rhino-1.7R4.jar	no	bundleisation through bundlor <b>to be installed in Virgo</b>
rrd4j-2.0.7.jar	no	bundleisation through bundlor <b>to be installed in Virgo</b>
slf4j-api-1.6.2.jar	yes	<b>provided by Virgo :</b> org.slf4j.api_1.7.2.v20121108-1250

JARs in \$NEO4J_HOME/lib	OSGI bundle ?	Bundleisation methodology
concurrentlinkedhashmap-lru-1.3.1.jar	yes	<b>to be installed in Virgo</b>
geronimo-jta_1.1_spec-1.1.1.jar	yes	<b>provided by Virgo :</b> org.eclipse.osgi_3.8.1.v20120830-144521
lucene-core-3.6.2.jar	no	use servicemix bundle <b>to be installed in Virgo</b>
neo4j-cypher-2.1.2.jar	no	Neo4j super bundle
neo4j-cypher-commons-2.1.2.jar	no	Neo4j super bundle
neo4j-cypher-compiler-1.9-2.0.3.jar	no	Neo4j super bundle
neo4j-cypher-compiler-2.0-2.0.3.jar	no	Neo4j super bundle
neo4j-cypher-compiler-2.1-2.1.2.jar	no	Neo4j super bundle
neo4j-graph-algo-2.1.2.jar	no	Neo4j super bundle
neo4j-graph-matching-2.1.2.jar	no	Neo4j super bundle
neo4j-jmx-2.1.2.jar	no	Neo4j super bundle
neo4j-kernel-2.1.2.jar	no	Neo4j super bundle
neo4j-lucene-index-2.1.2.jar	no	Neo4j super bundle
neo4j-primitive-collections-2.1.2.jar	no	Neo4j super bundle
neo4j-shell-2.1.2.jar	no	Neo4j super bundle
neo4j-udc-2.1.2.jar	no	Neo4j super bundle
opencsv-2.0.jar	no	bundleisation through bundlor <b>to be installed in Virgo</b>
org.apache.servicemix.bundles.jline-0.9.94_1.jar	yes	<b>to be installed in Virgo</b>
parboiled-core-1.1.6.jar	yes	<b>to be installed in Virgo</b>
parboiled-scala_2.10-1.1.6.jar	yes	<b>to be installed in Virgo</b>
scala-library-2.10.4.jar	yes	<b>to be installed in Virgo</b>

server-api-2.1.2.jar	no	Neo4j super bundle
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karaf mapping monitoring neo4j osgi primefaces virgo **visualizati  
on**