OSGi Tips

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As of release 6.1.5, Jetty ships with jar file manifests that include appropriate OSGi bundle information. This means that you can import the jetty jars into an OSGi framework and use them, for example, to build a HTTP service.

The jetty jars whose manifests include OSGi bundle information are:

- servlet-api-2.5.jar
- jetty-util.jar
- jetty.jar
- jetty-management.jar
- jetty-naming.jar
- jetty-plus.jar
- jetty-annotations.jar
- jsp-api-2.1.jar
- jsp-2.1.jar

Using jetty jars in Equinox

The jetty bundles mostly have dependencies amongst themselves (loosely in the order listed above), although the `jetty-naming.jar` and the the jsp jars do have external dependencies.

If you are using Equinox, it is quite easy to resolve these dependencies. Here's a pre-baked Equinox config.ini file with all the external dependencies already setup up so that they will be loaded at start up time. Assuming you downloaded the config.ini file to `/tmp`, here's a quick way to start up Equinox 3.3 with this config.ini file:

```
> cd $ECLIPSE_HOME
> mkdir configuration
> cp /tmp/config.ini configuration
> cd plugins
> java -jar
org.eclipse.osgi_3.3.0.v20070530.jar
-console
```

If you want to store the config.ini file somewhere else, then you need to include it's location on the command line:

```
cd $ECLIPSE_HOME/plugins
java -jar
org.eclipse.osgi_3.3.0.v20070530.jar
-console -configuration <location of
config.ini>
```

There are more instructions for alternative ways to start Equinox on the Eclipse Equinox website.

Now you should be running Equinox, and you should see a prompt like so:

```
osgi>
```

To see the state of all the bundles which are currently enabled, do:

```
osgi> status
```

You'll see output something like the following:

```
Framework is launched.

id      Bundle Location
State       Bundle File Name
0       System Bundle
  ACTIVE
org.eclipse.osgi_3.3.0.v20070530
1
initial@reference:file:com.ibm.icu_3.6.1.v20
070417.jar/
  ACTIVE      com.ibm.icu_3.6.1.v20070417
2
```

```
initial@reference:file:org.eclipse.core.comm
ands_3.3.0.I20070605-0010.jar/
  ACTIVE
org.eclipse.core.commands_3.3.0.I20070605-00
10
3
initial@reference:file:org.eclipse.text_3.3.
0.v20070606-0010.jar/
  ACTIVE
org.eclipse.text_3.3.0.v20070606-0010
4
initial@reference:file:org.eclipse.core.expr
essions_3.3.0.v20070606-0010.jar/
  ACTIVE
org.eclipse.core.expressions_3.3.0.v20070606
-0010
5
initial@reference:file:org.eclipse.core.file
system_1.1.0.v20070606.jar/
  ACTIVE
org.eclipse.core.filesystem_1.1.0.v20070606
6
initial@reference:file:org.eclipse.core.reso
urces_3.3.0.v20070604.jar/
  ACTIVE
org.eclipse.core.resources_3.3.0.v20070604
7
initial@reference:file:org.eclipse.jdt.core_
3.3.0.v_770.jar/
  ACTIVE
org.eclipse.jdt.core_3.3.0.v_770
```

```
8
initial@reference:file:org.apache.ant_1.7.0.
v200705232135/
  ACTIVE
org.apache.ant_1.7.0.v200705232135
9
initial@reference:file:org.eclipse.osgi.serv
ices_3.1.200.v20070605.jar/
  ACTIVE
org.eclipse.osgi.services_3.1.200.v20070605
10
initial@reference:file:org.eclipse.equinox.a
pp_1.0.0.v20070606.jar/
  ACTIVE
org.eclipse.equinox.app_1.0.0.v20070606
11
initial@reference:file:org.eclipse.core.runt
ime.compatibility.auth_3.2.100.v20070502.jar
/
  ACTIVE
org.eclipse.core.runtime.compatibility.auth_
3.2.100.v20070502
12
initial@reference:file:org.eclipse.core.cont
enttype_3.2.100.v20070319.jar/
  ACTIVE
org.eclipse.core.contenttype_3.2.100.v200703
19
13
initial@reference:file:org.eclipse.equinox.r
egistry_3.3.0.v20070522.jar/
```

ACTIVE
org.eclipse.equinox.registry_3.3.0.v20070522
14
initial@reference:file:org.eclipse.equinox.preferences_3.2.100.v20070522.jar/
ACTIVE
org.eclipse.equinox.preferences_3.2.100.v20070522
15
initial@reference:file:org.eclipse.equinox.common_3.3.0.v20070426.jar/
ACTIVE
org.eclipse.equinox.common_3.3.0.v20070426
16
initial@reference:file:org.eclipse.core.jobs_3.3.0.v20070423.jar/
ACTIVE
org.eclipse.core.jobs_3.3.0.v20070423
17
initial@reference:file:org.eclipse.core.runtime_3.3.100.v20070530.jar/
ACTIVE
org.eclipse.core.runtime_3.3.100.v20070530
18
initial@reference:file:org.eclipse.core.variables_3.2.0.v20070426.jar/
ACTIVE
org.eclipse.core.variables_3.2.0.v20070426
19
initial@reference:file:org.eclipse.ant.core_3.1.200.v20070522.jar/

```
  ACTIVE
org.eclipse.ant.core_3.1.200.v20070522
Registered Services
{org.osgi.service.packageadmin.PackageAdmin}
={service.ranking=2147483647,
service.pid=0.org.eclipse.osgi.framework.int
ernal.core.PackageAdminImpl,
service.vendor=Eclipse.org, service.id=1}
{org.osgi.service.startlevel.StartLevel}={se
rvice.ranking=2147483647,
service.pid=0.org.eclipse.osgi.framework.int
ernal.core.StartLevelManager,
service.vendor=Eclipse.org, service.id=2}
{org.eclipse.osgi.framework.log.FrameworkLog
}={service.ranking=2147483647,
service.pid=0.org.eclipse.core.runtime.adapt
or.EclipseLog, service.vendor=Eclipse.org,
service.id=3}
{org.eclipse.osgi.framework.log.FrameworkLog
}={service.ranking=-2147483648,
performance=true,
service.pid=46org.eclipse.core.runtime.adapt
or.EclipseLog, service.vendor=Eclipse.org,
service.id=4}
{javax.xml.parsers.SAXParserFactory}={servic
e.id=5}
{javax.xml.parsers.DocumentBuilderFactory}={
service.id=6}
{org.eclipse.osgi.service.datalocation.Locat
ion}={type=osgi.user.area, service.id=7}
{org.eclipse.osgi.service.datalocation.Locat
```

```
ion}={type=osgi.instance.area, service.id=8}
{org.eclipse.osgi.service.datalocation.Locat
ion}={type=osgi.configuration.area,
service.id=9}
{org.eclipse.osgi.service.datalocation.Locat
ion}={type=osgi.install.area, service.id=10}
{org.eclipse.osgi.service.urlconversion.URLC
onverter}={protocol=[bundleentry,bundleresou
rce], service.id=11}
{org.eclipse.osgi.service.environment.Enviro
nmentInfo}={service.ranking=2147483647,
service.pid=0.org.eclipse.core.runtime.inter
nal.adaptor.EclipseEnvironmentInfo,
service.vendor=Eclipse.org, service.id=12}
{org.eclipse.osgi.service.resolver.PlatformA
dmin}={service.ranking=2147483647,
service.pid=0.org.eclipse.osgi.internal.base
adaptor.StateManager,
service.vendor=Eclipse.org, service.id=13}
{org.eclipse.osgi.service.pluginconversion.P
luginConverter}={service.ranking=2147483647,
service.pid=0.org.eclipse.core.runtime.inter
nal.adaptor.PluginConverterImpl,
service.vendor=Eclipse.org, service.id=14}
{org.eclipse.osgi.framework.console.CommandP
rovider}={service.ranking=2147483647,
service.pid=0.org.eclipse.core.runtime.inter
nal.adaptor.EclipseCommandProvider,
service.vendor=Eclipse.org, service.id=15}
{org.eclipse.osgi.service.localization.Bundl
eLocalization}={service.ranking=2147483647,
```

```
service.pid=0.org.eclipse.core.runtime.inter
nal.adaptor.BundleLocalizationImpl,
service.vendor=Eclipse.org, service.id=16}
{org.eclipse.osgi.internal.provisional.verif
ier.CertificateVerifierFactory}={service.id=
17}
{org.eclipse.osgi.internal.provisional.verif
ier.CertificateTrustAuthority}={service.rank
ing=-2147483648,
osgi.certificate.trust.authority=org.eclipse
.osgi, service.id=18}
{org.eclipse.osgi.framework.console.CommandP
rovider}={service.ranking=2147483647,
service.id=19}
{org.eclipse.osgi.service.urlconversion.URLC
onverter}={protocol=platform, service.id=20}
{org.eclipse.core.runtime.IAdapterManager}={
service.id=21}
{org.osgi.service.url.URLStreamHandlerServic
e}={url.handler.protocol=[platform],
service.id=22}
{org.eclipse.core.runtime.IExtensionRegistry
}={service.id=23}
{org.eclipse.osgi.framework.console.CommandP
rovider}={service.id=24}
{org.eclipse.core.internal.preferences.excha
nge.IProductPreferencesService}={service.id=
25}
{org.eclipse.core.runtime.preferences.IPrefe
rencesService}={service.id=26}
{org.osgi.service.prefs.PreferencesService}=
```

```
{service.id=27}
{org.eclipse.core.runtime.jobs.IJobManager}=
{service.id=28}
{org.eclipse.osgi.framework.console.CommandP
rovider}={service.id=29}
{org.eclipse.core.runtime.content.IContentTy
peManager}={service.id=30}
{org.eclipse.osgi.service.runnable.Applicati
onLauncher}={service.id=31}
{org.osgi.service.application.ApplicationDes
criptor}={eclipse.application.type=main.thre
ad, application.name=,
application.visible=false,
application.container=org.eclipse.equinox.ap
p,
service.pid=org.eclipse.equinox.app.error,
application.launchable=true,
application.locked=false,
```

```
application.location=initial@reference:file:
org.eclipse.equinox.app_1.0.0.v20070606.jar/
, service.id=32}
```

You can now go ahead and import the jetty jars. This is a matter of using the `install` command to load each of them. Assuming I have jetty 6.1.5 installed in `/home/janb/src/jetty-6.1.5`, I install the servlet-api-2.5 jar and check on it's status by doing:

```
osgi> install
file:///home/janb/src/jetty-6.1.5/lib/servle
t-api-2.5-6.1.5.jar
Bundle id is 21

osgi>diag 21
file:///home/janb/src/jetty-6.1.5/lib/servle
t-api-2.5-6.1.5.jar [21]
  No unresolved constraints.
```

The final step is to `start` that jar so that it is available to the OSGi environment:

```
osgi> start 21
```

Rinse and repeat for all the jars we listed at the top of this article and you will have successfully imported and made available the jetty jars in OSGi!

Note: if you get unresolved constraints on bundles that appear to be provided by the bundle itself, you can safely ignore the error on the 'diag' step. This is the case for `servlet-api.jar` and `jetty.jar`.

OSGi dependency resolution, and a closer look at the Equinox config.ini file

As we said before, jetty is mostly self-contained. There are a few jars (aka *bundles* in OSGi-speak) which do, however, have external dependencies and these must be resolved before you will be able to fully use jetty. If you are using the supplied config.ini file, then this is already solved for you. However, if you are using a different OSGi framework, or you'd like to understand a bit more about dependency resolution, then read on.

The jars and their external package dependencies are:

- jetty-naming.jar

    - javax.mail
- jsp-api-2.1.jar
    - com.sun.org.apache.xalan.internal.res,
    - com.sun.org.apache.xml.internal.utils,
    - com.sun.org.apache.xpath.internal,
    - com.sun.org.apache.xpath.internal.jaxp,
    - com.sun.org.apache.xpath.internal.objects,
    - javax.naming,
    - javax.sql,
    - javax.xml.namespace,
    - javax.xml.parsers,
    - javax.xml.transform,
    - javax.xml.transform.dom,
    - javax.xml.transform.sax,
    - javax.xml.transform.stream,
    - javax.xml.xpath,
    - org.w3c.dom,
    - org.w3c.dom.traversal,
    - org.xml.sax,
    - org.xml.sax.helpers
- jsp-2.1.jar
    - javax.el,
    - javax.xml.parsers,
    - javax.xml.transform,
    - javax.xml.transform.dom,
    - javax.xml.transform.stream,
    - javax.xml.validation,
    - org.apache.tools.ant,
    - org.apache.tools.ant.taskdefs,
    - org.apache.tools.ant.types,
    - org.eclipse.jdt.core.compiler,
    - org.eclipse.jdt.internal.compiler,
    - org.eclipse.jdt.internal.compiler.classfmt,
    - org.eclipse.jdt.internal.compiler.env,
    - org.eclipse.jdt.internal.compiler.problem,
    - org.w3c.dom,
    - org.w3c.dom.ls,
    - org.xml.sax,
    - org.xml.sax.ext,
    - org.xml.sax.helpers,
    - sun.misc

All of these, *except* for `javax.mail`, `org.apache.tools.ant.` **and `org.eclipse.jdt.`** can all be found in the jvm's `rt.jar`. In Equinox, by default, these system packages from the system classloader are *not* exposed inside the OSGi framework. So, we need to expose them by using this setup in the config.ini:

```
org.osgi.framework.system.packages=javax.nam
ing, javax.naming.directory,
javax.naming.spi, javax.management,
javax.management.loading,
javax.management.modelmbean, javax.net,
javax.net.ssl, javax.crypto,
javax.crypto.interfaces, javax.crypto.spec,
javax.security.auth,
javax.security.auth.spi,
javax.security.auth.callback,
javax.security.auth.login,
javax.security.cert, javax.xml.parsers,
javax.xml.xpath, javax.xml.transform.sax,
javax.xml.transform.dom,
javax.xml.namespace, javax.xml.transform,
javax.xml.transform.stream,
javax.xml.validation, org.xml.sax,
org.xml.sax.helpers, org.xml.sax.ext,
com.sun.org.apache.xalan.internal,
com.sun.org.apache.xalan.internal.res,
com.sun.org.apache.xml.internal.utils,
com.sun.org.apache.xpath.internal,
com.sun.org.apache.xpath.internal.jaxp,
com.sun.org.apache.xpath.internal.objects,
com.sun.org.apache.xml.internal,
org.w3c.dom, org.w3c.dom.traversal,
org.w3c.dom.ls, javax.sql,
javax.transaction, sun.misc
```

To resolve the `javax.mail`, `org.apache.tools.ant.` **and** **`org.eclipse.jdt.`** packages - which equate to

the `mail.jar`, `ant.jar` and the `core.jar` from the jetty distribution - we need to use these Eclipse plugins (note, this page was created based on Eclipse 3.3, so the plugin versions may change depending on your Eclipse version):

- javax.mail_1.4.0.v200706111329.jar (this can be found in Orbit)
- org.apache.ant_1.7.0.v200705232135.jar
- org.eclipse.jdt.core_3.3.0.v_770.jar

These plugins have their own dependencies which need to be resolved, and so we end up with this list of bundle dependencies, which we instruct Eclipse to pre-load for us, rather than manually installing and resolving each one:

```
osgi.bundles=com.ibm.icu@start,
org.eclipse.core.commands@start,
org.eclipse.text@start,
org.eclipse.core.expressions@start,
org.eclipse.core.filesystem@start,
org.eclipse.core.resources@start,
org.eclipse.jdt.core@start,
org.apache.ant@start,
org.eclipse.osgi.services@start,
org.eclipse.equinox.app@start,
org.eclipse.core.runtime.compatibility.auth@
start, org.eclipse.core.contenttype@start,
org.eclipse.equinox.registry@start,
org.eclipse.equinox.preferences@start,
org.eclipse.equinox.common@start,
org.eclipse.core.jobs@start,
org.eclipse.core.runtime@start,
org.eclipse.core.variables@start,
org.eclipse.ant.core@start
```