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# Automated Semantic Versioning for OSGi Bundles

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# Agenda

- Versioning in OSGi
- How tools can help
- Tooling available
- Technical background
- Status

“Humans are already incapable of handling version management on the scale required today. Tools need rules and guidelines ... [and] it is paramount that versions have semantics.”

Semantic Versioning,  
Technical Whitepaper, rev 1.0



# Versioning in OSGi

- Enables **version co-existence** at runtime
- Used by the resolver
  - exported package: version
  - imported package: range
  - **matched** as part of constraint solving

Manifest-Version: 1.0

Bundle-ManifestVersion: 2

Bundle-Name: Apache Felix Configuration Admin Service

Bundle-SymbolicName: org.apache.felix.configadmin

**Bundle-Version: 1.0.10**

**Export-Package:** org.apache.felix.cm;version="1.0",org.apache.felix.cm.  
file;uses:="org.apache.felix.cm,org.osgi.framework";version="1.0" (...)

**Import-Package:** org.apache.felix.cm;version="1.0",org.apache.felix.cm.  
file;version="1.0",org.osgi.framework;version="1.3" (...)

## References

- R4 Core spec, mainly 3.6.2 Version Matching
- Semantic versioning whitepaper

# Versions yes, but *semantic*...?

- Bundle-Version: 0.9.0  
X  
Bundle-Version: 1.0.0

“Marketing” vs  
“Semantic”  
version IDs

Original	Semantic	Changes	Original	Semantic	Changes
0.9.0	1.0.0	n/a	...	...	...
0.9.2	1.1.0	extension	1.0.4	1.0.2	(none)
1.0.0	2.0.0	removal	1.2.0	2.0.0	modification
			...	...	...
			1.2.2	2.0.2	(none)
			1.4.0	2.1.0	extension

Example - revision streams of  
two bundles

# Versions yes, but *semantic*...?

- Export–Package:  
x.y.z;version=0.9.0

X

Export–Package:

x.v.z;version=1.0.0

**Resolver believes  
package version IDs**

```
org.osgi.framework.BundleException: Activator start error.  
    at org.apache.felix.framework.Felix.startBundle(Felix.java:1629)  
    at org.apache.felix.framework.Felix.startBundle(Felix.java:1519)  
    at org.apache.felix.framework.BundleImpl.startBundleImpl(BundleImpl.java:354)  
    at org.apache.felix.shell.impl.StartCommandImpl.execute(StartCommandImpl  
.java:82)  
    at org.apache.felix.shell.impl.Activator$ShellServiceImpl.executeCommand  
(Activator.java:265)  
    at org.apache.felix.shell.impl.Activator$ShellServiceImpl.run(Activator.j  
ava:87)  
    at java.lang.Thread.run(Unknown Source)  
Caused by: java.lang.NoSuchMethodError: cz.zcu.kiv.osgi.tempsensor.TempSensorSvc  
.getMaxTemp()D  
    at cz.zcu.kiv.osgi.weatherstation.Activator.start(Activator.java:40)
```

# OSGi Semantic versions

- 1.0.0 -> 1.**1**.0 -> **2**.0.0 signal changes
  - Semantics = **versioning policy**
- OSGi world has one
  - R4 Core **suggests *M.m.μ.q*** as common
  - Semantic versioning **whitepaper requires** this
- Note: different contexts => different consequences
  - API x implementation package
  - consumer x provider x implementer (API)

# How tools can support OSGi semantic versions



- ✓ IDE: bundle development, manifest editing
  - *inferring / generating version IDs*
- ✓ Bnd/maven/.../repository: assembly, deployment, distribution
- ✓ Resolver: dependency resolution, wiring
  - *version matching*

„*Open world*“ scenario:

- development / **release tool** extensions

„*Closed world*“ (controlled bundle set):

- **repository** extensions

# Tool support for the „Open world“ case

http://osgi.kiv.zcu.cz/obvs/index.html

OSGi Bundle Versioning Service (OBVS)

## OSGi Bundle Versioning Service

This website provides a service to version [OSGi bundles](#) according to the [Semantic Versioning](#) rules. [Details are available](#) for the curious.

### How to use

Submit the JAR files of a base bundle and its sequel. The service will return (for download) the sequel bundle with versioning headers between it and the sequel.

Older version	D:\tmp\los
Newer version	

### Statistics

Service launch date: Tu  
 Performed versionings

---

OBVS [1.0.beta](#). This service is run by  
 Maintainer: [Premek Brada](#). By using t

```

Bundle-Name: Apache Felix Bundle Repository
Bundle-SymbolicName: org.apache.felix.bundlerepository
Bundle-Version: 1.0.1
DynamicImport-Package: org.apache.felix.shell
Export-Package: org.osgi.service.obr;version="1.0.0";uses:="org.osgi.framework"
Import-Package: org.osgi.framework;version="1.3",org.osgi.service.log;
resolution:=optional;version="1.3.0",org.osgi.service.obr;version="1.0"
Bnd-LastModified: 1238533562871
OBVS-Reference: 201009071638414
OBVS-Bundle-Version-Orig: 1.4.0
OBVS-Export-Package-Orig: org.osgi.service.obr;version="1.0";uses:="org.osgi.framework"
    
```

## The „Closed world“ case

# Apache ACE integration (WiP)

- Enhanced repository enforces versions
- API
  - extended *BundleStore* interface
  - String *put(InputStream bundle)*
- Implementation
  - generates filename (returned)
  - stores versioned copy of *bundle*

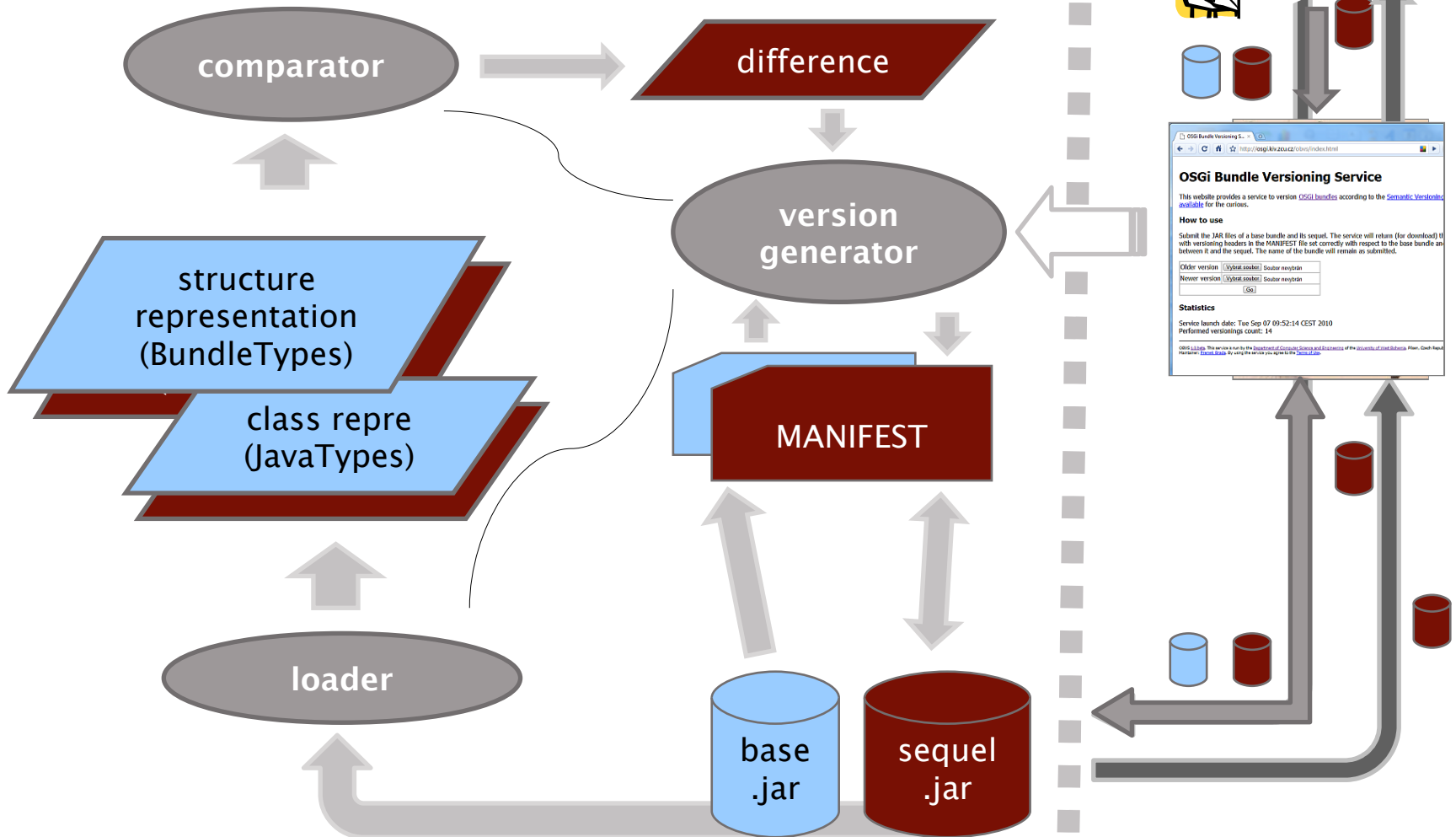
```
> vers-ace-demo d:\tmp\org.apache.felix.fileinstall-0.9.0.jar
File successfully stored with name 'org.apache.felix.fileinstall-0.9.0.jar'
> vers-ace-demo d:\tmp\org.apache.felix.fileinstall-0.9.2.jar
File successfully stored with name 'org.apache.felix.fileinstall-0.10.0.jar'
> vers-ace-demo d:\tmp\fileinstall-1.0.0.jar
File successfully stored with name 'org.apache.felix.fileinstall-0.10.1.jar'
```

```
org.apache.felix.configadmin-1.0.0
org.apache.felix.configadmin-1.0.1
org.apache.felix.configadmin-1.0.2
org.apache.felix.configadmin-1.0.3
org.apache.felix.fileinstall-0.10.0
org.apache.felix.fileinstall-0.10.1
org.apache.felix.fileinstall-0.9.0
repository
```

# Under the hood

- Scope: detects and versions **syntactical changes** on the **public interface** of packages => bundles
- Works on bundle .jar (bytecode)
- Checks for subtype relation
- Stubs => ignores user-defines packages
- Modifies bundle meta-data

# Under the hood



# What (not) to expect, aka Status

- **Service**: currently in „beta“
  - open use, free access
  - beta testing: failing bundles can be stored
- Apache ACE integration: a prototype
- **Some limitations**
  - changes in imported packages (reconstruction non-trivial)
  - Declarative Services, "include" and "exclude" directives
  - Java 5 features (generics, annotations)

# Summary

- **Tooling for OSGi semantic versioning**
  - package and bundle versions
  - API and implementation packages
  - standalone bundles, repositories
- OBVS at <http://osgi.kiv.zcu.cz/obvs/>
- **Plans for the future**
  - improve (integrate what's done)
  - REST API, tool integration?



<http://osgi.kiv.zcu.cz/obvs/>

# THANK YOU

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