

The Free Java Jigsaw Puzzle



Tom Marble - FOSDEM 2011

Overview

- Scope
- Living in Hell
- Jigsaw goals
- Jigsaw match to Debian
- Prerequisite homework
- Next steps
- Links

About me

- MSEE (I like hardware hacking too :)
- Worked at Sun 1997-2008
 - Chief Technologist for the dot-com sales area
 - Java Performance Engineer
 - Re-licensed Java for Debian non-free (DLJ)
 - OpenJDK Ambassador (core team)
- Automotive electronics / Smart Grid standards
- Interested in STM and embedded development

Living in Hell

- APT removed pkg dependency Hell, but..
- JAR Hell remains
 - http://en.wikipedia.org/wiki/Java_Classloader#JAR_hell
 - Multiple versions on classpath (mix old and new)
 - App dep graph has nested version mismatch
 - Many open source Java applications include binary jars *in the source*

What is Jigsaw

- Currently a Mercurial forest off of OpenJDK trunk
- The JDK is modularized and versioned such that run time dependencies are resolved using metadata to insure no module is ever linked to more than one version of another
- Get rid of the classpath!

Requirements → Features

- Fast class loading, predictability
- Feature subsets
- Substitutability
- Optionality
- Self applicability
- Static resolution at install time
- Multi-module pkgs
- Virtual modules
- Optional modules
- Module aware launcher

Jigsaw Example

- Multiple versions of com.foo.app are available:

```
src/modules/com.foo.app-4.0/com/foo/HelloWorld.java
                        /module-info.java
/com.foo.app-5.0/com/foo/HelloWorld.java
                        /module-info.java
```

```
Jigsaw  com.foo.app@5.0  com/foo/HelloWorld.class
                        module-info.class
                        com.foo.app@6.0  com/foo/HelloWorld.class
                        module-info.class
```

- javac offers versions 4.0 and 5.0 from ModulePath to the module system, which also considers its own 5.0 and 6.0 versions
- The module system selects 6.0; javac adds it to M's "magic ClassPath"

Why do you want Jigsaw?

- Smaller download/disk size
- Smaller memory footprint / faster startup time
- Handle module versioning that matches Debian versioning (coordinated behavior between JVM and dpkg).
- And possibly play with new features planned for JDK 7, 8 like TCO, F/J, Closures, etc.
- Smaller, simpler booting/porting?

Clojure

- What? Lisp like dialect on the JVM
- Why? Lisp idioms, STM
 - http://clojure.org/concurrent_programming
- Interest in building on Jigsaw?
 - Rich Hickey's What the JVM Needs
 - http://wiki.jvmlangsummit.com/What_the_JVM_needs
- report from the first “clojure conj”
- Imagine
 - `#!/bin/ojc`

Monolithic vs. Modular

- Monolithic (openjdk-6) hello world
 - JDK = 136 MB
 - App = 425 B
 - Total = 136,000,425 B
- Modular (jigsaw trunk) hello world
 - JDK = 30 KB (?)
 - App = 425 B
 - Total = 30,425 B

Crossplatform Modularity

- Debian is is a good platform to start
- GNU/Linux can quickly adopt
 - Ubuntu (and other Debian derivatives)
 - Fedora (and other *.RPM derivatives)
- BSD – some packaging
- OpenSolaris - <http://www.illumos.org/>
- MacOS – wonky
- Windows – very painful

Jigsaw :: Debian

- Debian packages
 - Should correspond to Jigsaw modules
- Jigsaw modules
 - `AltusMetrum@1.0 provides Telemetry@1.1 {
requires GeoMath@2.0;
}`
- Also `permits` (controls reverse-depends?)

Jigsaw :: Debian (2)

```
module freemind @ 0.9 {  
    requires libcommons-lang-java @ 2.4;  
    requires libjgoodies-forms-java @ 1.3.0;  
    requires libjibx1.1-java @ 1.1.6;  
    requires openjdk-6-jre @ 6b8-1.8.1;  
    requires simplyhtml @ 0.13.1;  
}
```

```
Package: freemind  
Version: 0.9.0~rc7+dfsg-1  
Depends: openjdk-6-jre | sun-java6-jre,  
libcommons-lang-java,  
    libjgoodies-forms-java, libjibx1.1-java |  
libjibx-java (>= 1.1),  
    libjibx1.1-java | libjibx-java (<< 1.2),  
simplyhtml (>> 0.13)
```

jpkg

- Jigsaw tool to create *.deb's
- Demo application at
 - `jdk/src/solaris/demo/jigsaw/basic`
 - `make -> run.sh -> sudo dpkg -i ...`
- Clever, Java tool to automatically create binary packages, but...

jpkg (2)

- Does not follow Debian Policy and Debian Java Policy
- ```
dpkg -i jdk.base_7_ea_amd64.deb
dpkg: error processing jdk.base_7_ea_amd64.deb
 (--install):
parse error, in file
'/var/lib/dpkg/tmp.ci/control' near line 2
package 'jdk.base':
error in Version string `7_ea': invalid
character in version number
```

# jpkg (3)

- Jigsaw version syntax: 7\_ea
- **Debian** version syntax
  - `([0-9]:)? [0-9] [0-9a-z~\.\+]+ -[0-9] [0-9a-z~\.\+]+`
  - `--epoch-- --version----- --debian revision---`
  - `dpkg --compare-versions "$a" lt "$b"`
- **Fedora** version syntax
  - Epoch:Version-Release (EVR)
  - `foo-1.0-1.fc13`



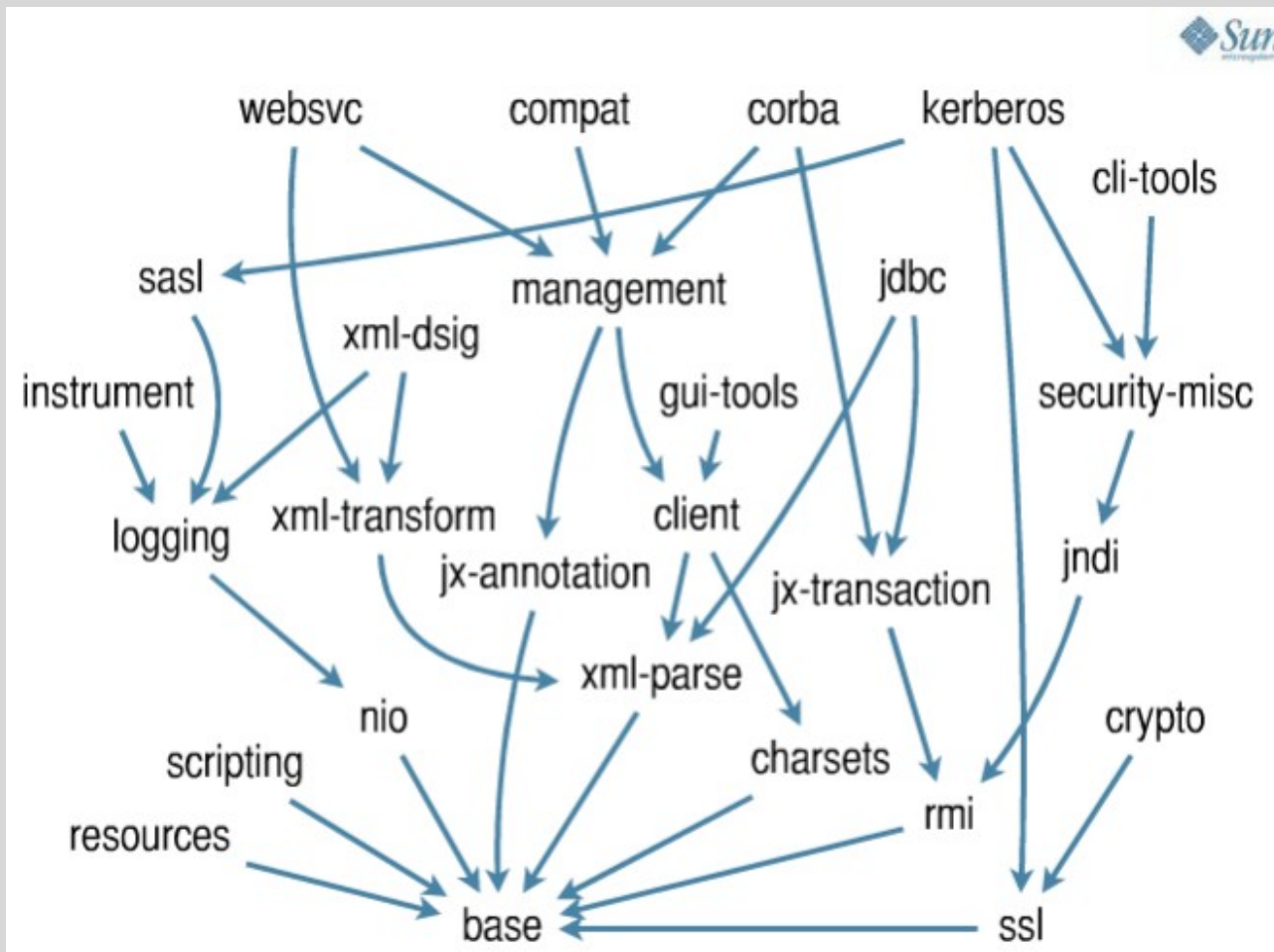
# jpkg (4)

- Lintian reports

- ```
# lintian --binary jdk.base_7_ea_amd64.deb
E: jdk.base: control-file-has-bad-permissions postinst 0775 != 0755
E: jdk.base: control-file-has-bad-permissions preinst 0775 != 0755
E: jdk.base: control-file-has-bad-permissions prerm 0775 != 0755
E: jdk.base: bad-version-number 7_ea
E: jdk.base: bad-version-in-relation depends: jdk.boot (=7_ea)
E: jdk.base: bad-version-in-relation depends: sun.charsets (=7_ea)
E: jdk.base: bad-version-in-relation depends: sun.localedata (=7_ea)
E: jdk.base: bad-version-in-relation depends: sun.resources (=7_ea)
Can't call method "data" on an undefined value at
/usr/share/lintian/checks/deb-format line 63.
internal error: cannot run deb_format check on package jdk.base
warning: skipping check of binary package jdk.base
internal error: file-info invoked in wrong directory
internal error: debian-readme invoked in wrong directory
internal error: md5sums invoked in wrong directory
```

Inside Jigsaw

- A source package with 126+ binary packages
 - What's the best way to handle this?



Prerequisite Homework

- Basic debian package building: debuild, pbuilder, cowbuilder, and friends...
- Understand openjdk-6 packaging (dboj technical study)
- Update openjdk-6 packaging for recent changes in IcedTea-Web, HSX
- Understand openjdk-7 packaging
- Jigsaw build with IcedTea system
 - Fix version string problem
 - Replace jpkg with native deb-helper tools

Show your work: dboj

- Debian meta Build helper for OpenJDK
- Check valid choices for OpenJDK, IcedTea
- Check build depends, disk space
- Create directory structure
- Download and delta-patch IcedTea
- Use IcedTea to download upstream tarballs, apply fsg.sh, recreate dfsg tarball
- Download and delta-patch Debian packaging
- Build with debuild, cowbuilder, etc.

Next Steps...

- Collaborate with other Jigsaw hackers!
- Summer project?
- Handle potential mismatch between native package dependency satisfiers and Jigsaw module satisfiers
- Handle version skew + upgrades
 - allow multiple versions to be installed at the same time?
- Update Debian Java Policy

OSUOSL Universal Porting Lab

- Debconf discussion about supporting all architectures: i386, amd64, arm, armel, powerpc, mips, mipsel, sparc, alpha, hppa, ia64, s390 (GNU Hurd, GNU/NetBSD, GNU/kFreeBSD)
- Limited access to minor architecture machines
- OSUOSL - Universal Porting Lab
 - Server Space, Bandwidth, minimal admin
- Contribution from Rob Savoye (HPPA)
- Contribution from Michael Dexter (LinuxFund/Hardware Exchange): ia64, mips
- Sun T2000, Power5/G5, x86, amd64, Mac OS X
- Coming soon (hopefully!)

Links

- Jigsaw
<http://openjdk.java.net/projects/jigsaw/>
- JVM Language Summit
<http://openjdk.java.net/projects/mlvm/jvmlangsummit/>
- Debian meta Build helper for OpenJDK (dboj)
<http://gitorious.org/freejava/dboj>

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