Debian Packaging for the Virtual Observatory

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Outline

Motivation

- make VO-related software easier to install and to update

    ➥ `apt-get install <package_name>`
    ➥ `apt-get update && apt-get dist-upgrade`

- make all sources of VO applications and their dependencies available and distributable

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  ➤ `apt-get install <package_name>`
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- make all sources of VO applications and their dependencies available and distributable

- bring astronomical software to the attention of a wider audience:
  - within the astronomy community
  - to science-interested Debian users

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  ➡ `apt-get install <package_name>`
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- make all sources of VO applications and their dependencies available and distributable

- bring astronomical software to the attention of a wider audience:
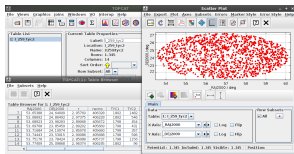 - within the astronomy community
  - to science-interested Debian users

- co-operate with upstream authors (developers) to make their software Debian-compliant, e.g. by
  - introducing versioning schemes (if not present)
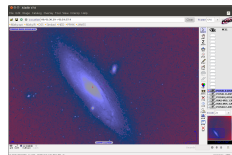 - getting rid of potential licensing issues

Packaging of VO-related Software

- VO applications

  - Topcat (Java)

  - Aladin (Java)
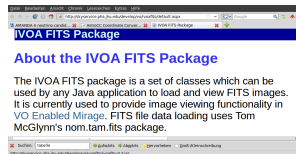

- modules and libraries

  - DaCHS, tapsh (Python)

  - IVOA Fits, ADQL Lib,... (Java)

➡ VO-packaging involves packaging of many non-VO dependencies

Package Management Systems

- collection of software tools for an operating system responsible for installing, upgrading, configuring and removing software packages

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- multi-layer operation, e.g. in Debian:
  - low-level programme `dpkg` for installing and purging packages
  - high-level programme `APT` for resolving package dependencies

➡ package management is one of the greatest achievements of the Linux world

Debian Packages

- Debian 6.0: more than 29,000 binary packages built from approximately 15,000 source packages

- Debian packages
  - support 11 different computer architectures using the Linux kernel
  - are used by a variety of Debian derivatives, e.g. Linux Mint, Ubuntu

- Debian Pure Blends: thematic subset of packages used to support particular target groups, e.g Debian Med, Debian Science

Creating a Package (I)

- `dh_make`: generates a set of template files necessary for the creation of the package, i.a.
  - `control`: contains most relevant metadata of the package, e.g. package description, list of dependencies, architectures, ...

Example for a `control` file

- e.g. `control` file under Aladin's `debian/` directory:

```
Source: aladin
Section: java
Priority: optional
Maintainer: Florian Rothmaier <gavo@ari.uni-heidelberg.de>
Build-Depends: debhelper (>= 7.0.50~), javahelper (>= 0.32) , ant
Build-Depends-Indep: default-jdk, default-jdk-doc,
 libxmlrpc2-java, libjsamp-java, libcommons-codec-java,
 librmilite-java, libstarplastic-java
Standards-Version: 3.9.1
Homepage: http://aladin.u-strasbg.fr/


Package: aladin
Architecture: all
Depends: ${java:Depends}, ${misc:Depends}
Description: interactive software sky atlas
...
```

Creating a Package (I)

- `dh_make`: generates a set of template files necessary for the creation of the package, i.a.
  - `control`: contains most relevant metadata of the package, e.g. package description, list of dependencies, architectures, ...
  - `copyright`: contains copyright and licensing information about the upstream sources
  - `changelog`: documents changes between successive versions of a package
  - `rules`: Makefile that defines the targets used to actually create the package

Creating a Package (II)

- debhelper (v7): suite of small programmes (prefixed by dh_), each with a specific task
  - simple rules file evokes the execution of the 58 dh_* scripts:

```
#!/usr/bin/make -f
%:
    dh $@
```

  - indiviual debhelper scripts can be customised by defining override_dh_* targets, e.g.

```
override_dh_auto_build:
    ant -f source/build.xml jar
```

Packaging in the Java World

- JAR archives provide a number of benefits for developers and users
  - platform-independent file format
  - JARs can be executed as standalone programmes
  - download of a single archive including a set of compressed files is faster than downloading all these files separately

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- packaging, however, is complicated by the common practice of dealing with JAR archives
  - "JAR-within-a-JAR": third-party binary archives included in the class path of an application

  ➡ no (third-party) source code distributed

  ➡ potential licensing issues concealed

Topcat's Dependencies

Starjava Libs

- uk.ac.starlink.datanode
  - uk.ac.starlink.array
  - uk.ac.starlink.ast
  - uk.ac.starlink.connect
  - uk.ac.starlink.hds
  - uk.ac.starlink.hdx
  - uk.ac.starlink.ndx
  - nom.tam.util
  - org.apache.commons.net:
    Debian package
    libcommons-net-java (1.4.1) in
    "Squeeze"
  - org.apache.tools:
    Debian package ant (1.8.0) in
    "Squeeze"
- uk.ac.starlink.fits
- uk.ac.starlink.plastic
- uk.ac.starlink.sog
  - uk.ac.starlink.diva
    * diva
    * javax.accessibility:
      Standard Library
  - uk.ac.starlink.jaiutil
    * com.sun.media.jai.codec
    * javax.media.jai
  - uk.ac.starlink.soap
  - jsky
    * ca.nrc.cadc.arch.io
    * com.jrefinery:
      Debian package
      libjfreechart-java
      (1.0.13) in "Squeeze"
    * com.sun.media.jai.codec
    * javax.media.jai
    * org.dom4j.io:
      Debian package
      libdom4j-java (1.6.1) in
      "Squeeze"

- org.apache.axis:
  Debian package libaxis-java
  (1.4) in "Squeeze"
- org.apache.commons.logging:
  Debian package
  libcommons-logging-java (1.1.1)
  in "Squeeze"
- com.sun.media.jai.codec
- javax.media.jai

- uk.ac.starlink.table
  - uk.ac.starlink.pal
  - edu.jhu.htm
  - gov.fnal.eag.healpix
    * javax.vecmath:
      Debian package
      libvecmath-java (1.5.2) in
      "Squeeze"
- uk.ac.starlink.task
- uk.ac.starlink.ttools
  - uk.ac.starlink.registry
  - com.lowagie.text:
    Debian package libitext-java
    (2.1.7) in "Squeeze"
  - jarray
  - org.jibble.epsgraphics:
    Debian package libjibeps-java
    (0.1) in "Squeeze"
  - org.mortbay:
    Debian package libjetty-java
    (6.1.26) in "Squeeze"
  - org.python:
    Debian package jython (2.5.1-2)
    in "Squeeze"
  - javax.servlet:
    Debian package
    libservlet2.5-java in "Squeeze"
- uk.ac.starlink.util
  - sun.awt.shell

- uk.ac.starlink.vo
  - adql
  - net.ivoa.registry.search
    * ncsa.horizon.util
- uk.ac.starlink.votable
- uk.ac.starlink.xdoc

Third Party Libs

- Acme.JPM.Encoders
- cds.tools
- edu.jhu.pha.sdss.fits.imageio
- edu.stanford.ejalbert
- gnu.jel
- nom.tam.fits
- org.astrogrid.samp
- org.votech.plastic

Standard Libs/Oracle (Sun)

- com.sun.javadoc:
  Debian package gcj-4.4-jre-lib
  (4.4.5-2) in "Squeeze"
- javax.help:
  Debian package javahelp2 (2.0.05.ds1-4)
  in "Squeeze"
- javax.imageio: Standard Library
- javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library

Debian-packaged Dependencies (I)

- packages already available in the current (stable) Debian release

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Debian-packaged Dependencies (II)

➥ no extra work needed in case of version matching (`.jar` ↔ `.deb`)

Version Problems

- Debian package is incompatible with the classes needed by Topcat

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  - jarray
  - org.jibble.epsgraphics: Debian package libjibeps-java (0.1) in "Squeeze"
  - org.mortbay: Debian package libjetty-java (6.1.24) in "Squeeze"
  - org.python: Debian package jython (2.5.1-2) in "Squeeze"
  - javax.servlet: Debian package libservlet2.5-java in "Squeeze"
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- javax.imageio: Standard Library
- javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library

Orphaned Dependencies (I)

- unmaintained libraries included by Topcat

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Standard Libs/Oracle (Sun)

- com.sun.javadoc:
  Debian package gcj-4.4-jre-lib (4.4.5-2) in "Squeeze"
- javax.help:
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- javax.imageio: Standard Library
- javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library

Orphaned Dependencies (II)

- example: `diva` package
- last version released in April 2003

Missing Sources

- source code of these libraries not (yet) available

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- uk.ac.starlink.datanode

  - uk.ac.starlink.array
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  - org.apache.commons.net: Debian package libcommons-net-java (1.4.1) in "Squeeze"
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  - org.mortbay: Debian package libjetty-java (6.1.24) in "Squeeze"
  - org.python: Debian package jython (2.5.1-2) in "Squeeze"
  - javax.servlet: Debian package libservlet2.5-java in "Squeeze"

- uk.ac.starlink.util

  - sun.awt.shell

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  - adql
  - net.ivoa.registry.search
    * ncsa.horizon.util

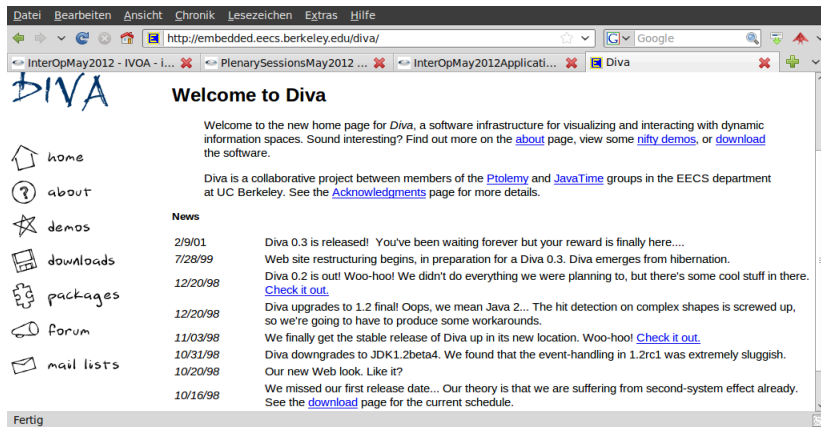- uk.ac.starlink.votable
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- javax.imageio: Standard Library
- javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library

- **dependencies with a license that does not conform to the DFSG**

Starjava Libs

- uk.ac.starlink.datanode
  - uk.ac.starlink.array
  - uk.ac.starlink.ast
  - uk.ac.starlink.connect
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- javax.imageio: Standard Library
- javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library

Licensing Issues (II)

- Debian package `libjai-core-java` contains the
  - `com.sun.media.jai` and
  - `javax.media.jai`

  classes

- distributed under the Java Research License (JRL)
  - created by Sun
  - to be used for non-commercial academic uses

➡ license is incompatible with the Debian Free Software Guidelines which do not place any restrictions on the fields of endeavour

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➡ better idea: make Aladin fully JSAMP-compliant

Packaging Status

- Debian-packaged VO software
  - modules and libraries, e.g.:
    - ★ Markus' `TAPsh`
    - ★ Tom McGlynn's `FITS` lib
    - ★ Grégory Mantelet's `ADQL` lib
  - applications
    - ★ first version of an `Aladin` package ready
    - ★ `Topcat`: work in progress

- Debian-packaged "third-party" software required by VO software
  - PostgreSQL plugins `pgsphere` and `q3c` for the GAVO data centre
  - more than 15 Java libraries for `Aladin`, `Topcat` and `SPLAT`

- short-term goals:
  - ▸ fix the issues mentioned in this talk (e.g. licensing, missing sources)
  - ▸ finish Debian packages for `Topcat`, `SPLAT` and `DaCHS`
  - ▸ make our packages available to the public via a local repository

- mid-term goals:
  - ▸ bring as many packages as possible into the next stable Debian release

➡ establish the VO as a subset of Debian Science

Thank you for your attention!!

References

📄 Josip Rodin and Osamu Aoki: Debian New Maintainers' Guide,
www.debian.org/doc/manuals/maint-guide/maint-guide.en.pdf,
www.debian.org/doc/manuals/maint-guide/index.en.html.

📄 Lukas Nussbaum: Debian Packaging Tutorial,
www.debian.org/doc/manuals/packaging-tutorial/
packaging-tutorial.en.pdf.

📄 Joe Brockmeier: Create Debian Linux packages,
www.ibm.com/developerworks/linux/library/l-debpkg/index.html.

📄 IVOA Recommendation. Simple Application Messaging Protocol
Version 1.3, http://www.ivoa.net/Documents/SAMP/.

Source and Binary Packages

- Debian source packages
  - `package_version.orig.tar.gz`: original upstream source code tarball
  - `package_version-revision.debian.tar.gz`: contents of the `debian/` directory
  - `package_version-revision.dsc`: summary of the contents of the source code generated from the `control` file

- Debian binary packages
  - `package_version-revision_arch.deb`: completed binary package