Debian Packaging for the Virtual Observatory

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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
Motivation

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  - `apt-get install <package_name>`
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- bring astronomical software to the attention of a wider audience:
  - within the astronomy community
  - to science-interested Debian users
Motivation

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- 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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evaluation of package metadata, e.g. the software name, its version number or a list of package dependencies
Package Management Systems

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

- evaluation of package metadata, e.g. the software name, its version number or a list of package dependencies

- 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,
                         librmi-lite-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
  ...

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**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
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:

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

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

```makefile
override_dh_auto_build:
  ant -f source/build.xml jar
```
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
  - 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.jutil
    - com.sun.media.jai.codec
    - javax.media.jai
  - uk.ac.starlink.soap
    - jaky
      - 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.hmt
  - gov.fnal.eag.healpix
    - java.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 libtext-java (2.1.7) in “Squeeze”
  - jarray
  - org.jibble.ets.graphics:
    Debian package libj18aps-java (0.1) in “Squeeze”
  - org.mortbay:
    Debian package libjetty-java (6.1.24) in “Squeeze”
  - org.python:
    Debian package jpython (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
  - nesa.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.javatool:
  Debian package gcj-4.4-jre-lib
  (4.4.5-2) in “Squeeze”
- javax.help:
  Debian package javahelp2 (2.0.05.0.1-4) 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

Starjava Libs
- uk.ac.starlink.datatools
  - uk.ac.starlink.array
  - uk.ac.starlink.ast
  - uk.ac.starlink.connect
  - uk.ac.starlink.bds
  - uk.ac.starlink.hdx
  - uk.ac.starlink.ndx
  - nom.tam.util
- org.apache.commons.net
- org.apache.tools
- uk.ac.starlink.fits
- uk.ac.starlink.plastic
- uk.ac.starlink.sog
  - uk.ac.starlink.diva
    - diva
    - javax.accessibility: Standard Library
  - uk.ac.starlink.jutil
    - com.sun.media.jai.codec
    - java.lang.jai
  - uk.ac.starlink.soap
- jsky
  - ca.nrc.cadc.arch.io
  - com.jrefinery
  - com.sun.media.jai.codec
  - java.lang.jai
  - org.dom4j.io

Third Party Libs
- uk.ac.starlink.table
  - uk.ac.starlink.pal
  - edu.jhu.pha.sdss.fits.imageio
  - edu.stanford.ejalbert
  - gnu.jol
  - nom.tam.fits
  - org.astrogrid.samp
  - org.votecore.plastic

Standard Libs/Oracle (Sun)
- uk.ac.starlink.util
  - sun.awt.shell
- uk.ac.starlink.vo
  - adql
  - net.java.openregistry.search
    - nasa.horizon.util
  - uk.ac.starlink.votable
  - uk.ac.starlink.xdoc

- org.apache.axis
- org.apache.commons.logging
- com.sun.media.jai codec
- javax.media.jai
- uk.ac.starlink.task
- uk.ac.starlink.ttools
  - uk.ac.starlink.registry
  - com.lowagie.text
  - jarray
  - org.jibble.epsgographics
  - org.mortbay
  - org.python
  - javax.servlet

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

javax.xml: Standard Library
- org.w3c.dom: Standard Library
- org.xml.sax: Standard Library
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

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.gdx
  - uk.ac.starlink.gdx
  - 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
  - javax.accessibility
  - Standard Library
  - uk.ac.starlink.jaiutil
  - com.sun.media.jai.codec
  - java.util
  - uk.ac.starlink.soap
  - jaxk
  - ca.nrc.cadc.arch.io
  - com.jrefinery:
  - Debian package libfrechart-java (1.0.13) in “Squeeze”
  - com.sun.media.jai.codec
  - java.util
  - 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
  - java.util

- uk.ac.starlink.table
  - uk.ac.starlink.pal
  - edu.jhu.htm
  - gov.nal.eag healer
  - java.util
    - java.math
      - Debian package libjmath-java (1.6.2) in “Squeeze”
- uk.ac.starlink.task
- uk.ac.starlink.tool

Third Party Libs

- Acme.JPM. Encoders
- cds.tool
  - edu.jhu.pha.sdss.fits.image
  - edu.stanford.ejlab
  - gnu.jel
  - nom.tam.fits
  - org.astrogrid.samp
  - org.otech.plastic

Standard Libs/oracle (Sun)

- com.sun.javacc:
  - Debian package gcj4.4-jre-lib (4.4.5-2) in “Squeeze”
- java.hsql:
  - Debian package jhsql2 (2.00.0.1d-4) in “Squeeze”
- java.image:
  - Standard Library
- java.xml:
  - Standard Library
  - org.w3c.dom:
    - Standard Library
  - org.xml.sax:
    - Standard Library
Orphaned Dependencies (I)

- unmaintained libraries included by Topcat

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.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.hmt
- gov.fnal.eng.healpix
  - java.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 libtext-java (2.1.7) in “Squeeze”
  - jarray
  - org.jibble.papers:
    - Debian package libjibbels-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”
  - java.servlet:
    - Debian package libservlet2.5-java in “Squeeze”
- uk.ac.starlink.util
  - sun.awt.shell
  - uk.ac.starlink.vo

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

Standard Libs/oracle (Sun)
- com.sun.javacore:
  - Debian package gcj-4.4-jre-lib (4.4.5-2) in “Squeeze”
  - java.help:
    - Debian package javahelp2 (2.0.05-21-4) in “Squeeze”
- java.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

Welcome to Diva

Welcome to the new home page for Diva, a software infrastructure for visualizing and interacting with dynamic information spaces. Sound interesting? Find out more on the about page, view some nifty demos, or download the software.

Diva is a collaborative project between members of the Ptolemy and JavaTime groups in the EECS department at UC Berkeley. See the Acknowledgments page for more details.

News

- 2/9/01 Diva 0.3 is released! You’ve been waiting forever but your reward is finally here....
- 7/28/99 Web site restructuring begins, in preparation for a Diva 0.3. Diva emerges from hibernation.
- 12/20/98 Diva 0.2 is out! Woo-hoo! We didn’t do everything we were planning to, but there’s some cool stuff in there. Check it out.
- 12/20/98 Diva upgrades to 1.2 finally. Oops, we mean Java 2… The hit detection on complex shapes is screwed up, so we’re going to have to produce some workarounds.
- 11/03/98 We finally get the stable release of Diva up in its new location. Woo-hoo! Check it out.
- 10/31/98 Diva downgrades to JDK1.2beta4. We found that the event-handling in 1.2rc1 was extremely sluggish.
- 10/20/98 Our new Web look. Like it?
- 10/16/98 We missed our first release date... Our theory is that we are suffering from second-system effect already. See the download page for the current schedule.
Missing Sources

- **StarJava Libs**
  - `uk.ac.starlink.datatnode`
  - `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 `nntpd` (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.jutil`
      - `com.sun.media.jai.codec`
      - `javax.media.jai`
    - `uk.ac.starlink.soap`
    - `jasy`
      - `ca.nrc.cadc.arch.io`
      - `com.jrefinery`
        - Debian package `jrefinery.jar` (1.0.13) in "Squeeze"
      - `com.sun.media.jai.codec`
      - `javax.media.jai`
      - `org.dom4j.io`
        - Debian package `libxml2-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.eng.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 `libhttext-java` (2.1.7) in "Squeeze"
    - `jarray`
    - `org.jbbc.epsgs`: Debian package `libjbc-epsgs-java` (0.1) in "Squeeze"
    - `org.mortbay`
      - Debian package `libjetty-java` (6.1.24) in "Squeeze"
    - `org.python`
      - Debian package `python (2.5.1-2)` in "Squeeze"
    - `javax.servlet`
      - Debian package `libservlet-2.5-java` in "Squeeze"
  - `uk.ac.starlink.util`
    - `sun.awt.shell`
  - `uk.ac.starlink.vo`
    - `adql`
    - `net.ivoa.registry.search`
      - `nasa.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.javatool`
    - Debian package `gcj-4.4-jre-lib` (4.4.5-2) in "Squeeze"
  - `javax.help`
    - Debian package `javahelp2` (2.0.05 cheque4) in "Squeeze"
  - `javax.imageio`: Standard Library
  - `javax.xml`: Standard Library
  - `org.w3c.dom`: Standard Library
  - `org.w3c.xlink`: Standard Library
dependencies with a license that does not conform to the DFSG
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
to provide interoperability via SAMP, Aladin 7.0 uses
  ▶ Mark Taylor’s JSAMP hub implementation and
  ▶ Apache XML-RPC for mapping the abstract API to specific I/O operations
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Debian package of Apache XML-RPC available
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  ▶ Mark Taylor’s JSAMP hub implementation and
  ▶ Apache XML-RPC for mapping the abstract API to specific I/O operations

Debian package of Apache XML-RPC available

versions of Apache XML-RPC in Debian (3.1) and Aladin (2.0) are incompatible to each other

investigation of the code has shown that patching Aladin to Apache XML-RPC 3.1 is a tedious and very costly task
Aladin and (J)SAMP

- to provide interoperability via SAMP, Aladin 7.0 uses
  - Mark Taylor’s JSAMP hub implementation and
  - Apache XML-RPC for mapping the abstract API to specific I/O operations

- Debian package of Apache XML-RPC available

- versions of Apache XML-RPC in Debian (3.1) and Aladin (2.0) are incompatible to each other

- investigation of the code has shown that patching Aladin to Apache XML-RPC 3.1 is a tedious and very costly task

better idea: make Aladin fully JSAMP-compliant
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
Outlook

- **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
I’d like to say...

Thank you for your attention!!


Source and Binary Packages

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

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