Debian Packaging Tutorial

Magic that makes "`apt-get install`" work

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Outline

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From Source

- Download the source from upstream
- Read the installation instructions
- Hunt for the pre-requisites of installing (Download Dependencies)
- Finally install with these commands
  1. `./configure`
  2. `make`
  3. `make install`

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From Repository

```
sudo apt-get install package_name
```

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Tools of Trade

- A Debian (or Ubuntu) system (with root access)
- Some packages:
  - **build-essential**: contains basic building tools such as **gcc, g++, make** and mainly **dpkg-dev**, which contains basic Debian-specific tools to create packages
  - **devscripts**: contains many useful scripts for Debian maintainers
  - **dh-make**: tool to Debianize the upstream source easily
  - **lintian**: Debian package checker

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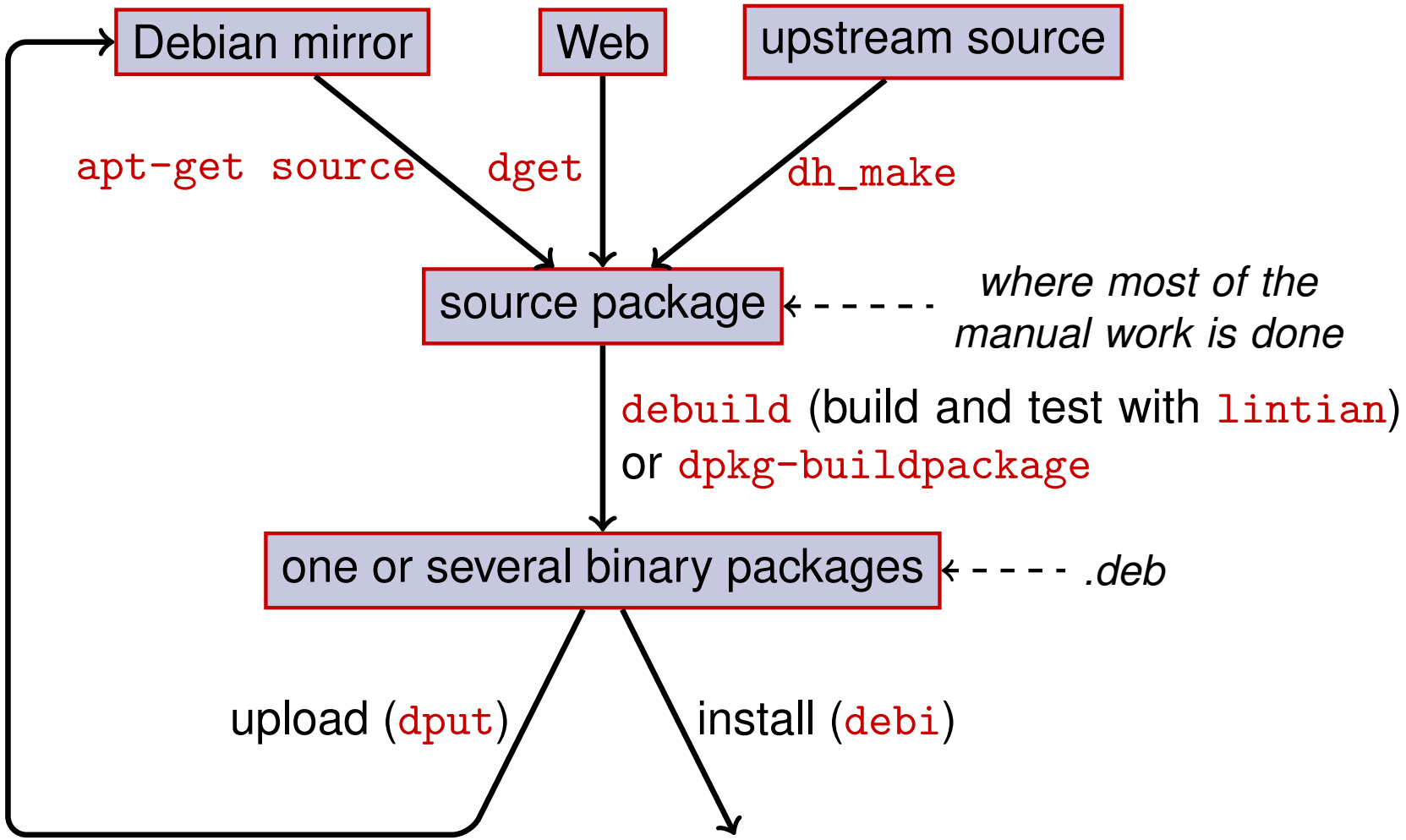
General packaging workflow



Outline

Creating Debian Package Steps

1. Setting up your BASH environment
2. Download the upstream tarball
3. Rename the upstream tarball
4. Unpack the upstream tarball
5. Add the Debian packaging files
6. Build the package
7. Check for errors
8. Install the package
9. If everything is working as expected upload it to `mentors.debian.net`

Outline

Step 1: Setting up your BASH environment

- Append the following lines to ~/.bashrc
  [replace the values with Your full name and email address]

```
DEBEMAIL="abdulkarimmemon@gmail.com"
DEBFULLNAME="AbdulKarim Memon"
export $DEBFULLNAME $DEBEMAIL
```

- Restart your terminal or execute following in the terminal.

```
$ source ~/.bashrc
```

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Step 2: Download upstream tarball

1. Create a new directory so that we can work in clean environment
2. Download the source package.

```
$ mkdir ~/packaging
$ cd ~/packaging
$ wget http://download.savannah.gnu.org/releases/smc/
    hyphenation/patterns/hyphen-as-0.7.0.tar.bz2
```

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Step 3: Rename the upstream tarball

Rename the tarball to `<package_name>_<version>.orig.tar.bz2`

```
$ mv hyphen-as-0.7.0.tar.bz2 hyphen-as_0.7.0.orig.tar.
    bz2
```

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Step 4: Unpack the upstream tarball

```
$ tar xvf hyphen-as_0.7.0.orig.tar.bz2
hyphen-as-0.7.0/
hyphen-as-0.7.0/hyph_as_IN.dic
hyphen-as-0.7.0/README
hyphen-as-0.7.0/ChangeLog
hyphen-as-0.7.0/openoffice.org-hyphenation-as
hyphen-as-0.7.0/COPYING
hyphen-as-0.7.0/Makefile
```

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Step 5: Add the Debian packaging files

1. Change to the extracted source.
   `$ cd hyphen-as-0.7.0`
2. To add debian related files execute following command.
   `$ dh_make -c gpl3`

```
$ dh_make -c gpl3

Type of package: single binary, indep binary, multiple binary, library, kernel module, kernel patch?
[s/i/m/l/k/n] s

Maintainer name  : Muneeb Shaikh
Email-Address    : iammuneeb@gmail.com
Date             : Sun, 26 Feb 2012 03:38:41 +0530
Package Name     : hyphen-as
Version          : 0.7.0
License          : gpl3
Type of Package  : Single
Hit <enter> to confirm:
Skipping creating ../hyphen-as_0.7.0.orig.tar.bz2 because it already exists
Done. Please edit the files in the debian/ subdirectory now. You should also
check that the hyphen-as Makefiles install into $DESTDIR and not in / .
```

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Files in debian/

All the packaging work should be made by modifying files in `debian/`

- Main files:
  - **control** – meta-data about the package (dependencies, etc)
  - **rules** – specifies how to build the package
  - **copyright** – copyright information for the package
  - **changelog** – history of the Debian package
- Other files:
  - compat
  - watch
  - dh_install* targets
    *.dirs, *.docs, *.manpages, . . .
  - maintainer scripts
    *.postinst, *.prerm, . . .
  - source/format
  - patches/ – if you need to modify the upstream sources
- Several files use a format based on RFC 822 (mail headers)

debian/changelog

- Lists the Debian packaging changes
- Gives the current version of the package

$$\underbrace{1.2.1.1}_{\text{Upstream version}}\underbrace{\text{-}5}_{\text{Debian revision}}$$

- Edited manually or with `dch`
- Special format to automatically close Debian or Ubuntu bugs
  Debian: `Closes: #595268`; Ubuntu: `LP: #616929`
- Installed as `/usr/share/doc/`*`package`*`/changelog.Debian.gz`

```
hyphen-hi (0.6.0-1) unstable; urgency=low

  * Initial release (Closes: #542240)

 -- Muneeb Shaikh <iammuneeb@gmail.com>  Sun, 31 Jul 2011 18:11:17 +05
```

debian/control

- Package metadata
  - For the source package itself
  - For each binary package built from this source
- Package name, section, priority, maintainer, uploaders, build-dependencies, dependencies, description, homepage, ...
- Documentation: Debian Policy chapter 5
  `http://www.debian.org/doc/debian-policy/ch-controlfields.html`

Sample debian/control

```
Source: hyphen-hi
Section: text
Priority: optional
Maintainer: Muneeb Shaikh <iammuneeb@gmail.com>
Uploaders: Debian-IN Team <debian-in-workers@lists.alioth.debian.org>
Build-Depends: debhelper (>= 7.0.50~),
               dictionaries-common (>= 0.10)
Standards-Version: 3.9.2
Homepage: http://wiki.smc.org.in/Hyphenation
Vcs-Git: git://git.debian.org/debian-in/hyphen-hi.git
Vcs-Browser: http://git.debian.org/?p=debian-in/hyphen-hi.git;a=summary

Package: hyphen-hi
Architecture: all
Depends: ${misc:Depends},
         dictionaries-common (>= 0.10)
Recommends: libreoffice-writer | openoffice.org-writer
Description: Hindi hyphenation patterns for OpenOffice.org/LibreOffice
 Hyphenation is the process of inserting hyphens in between the syllables of
 a word so that when the text is justified, maximum space is utilized.
 .
 This package provides the hyphenation rules for Hindi language.
```

Architecture: all or any

Two kinds of binary packages:

- Packages with different contents on each Debian architecture
  - Example: C program
  - `Architecture: any` in `debian/control`
    - Or, if it only works on a subset of architectures:
      `Architecture: amd64 i386 ia64 hurd-i386`
  - buildd.debian.org: builds all the other architectures for you on upload
  - Named *package*`_`*version*`_`*architecture*`.deb`
- Packages with the same content on all architectures
  - Example: Perl library
  - `Architecture: all` in `debian/control`
  - Named *package*`_`*version*`_all.deb`

A source package can generate a mix of `Architecture: any` and `Architecture: all` binary packages

debian/rules

- Makefile
- Interface used to build Debian packages
- Documented in Debian Policy, chapter 4.8
  `http://www.debian.org/doc/debian-policy/ch-source.html#s-debianrules`
- Five required targets:
  - `build`: should perform all the configuration and compilation
  - `binary, binary-arch, binary-indep`: build the binary packages
    - `dpkg-buildpackage` will call `binary` to build all the packages, or `binary-arch` to build only the `Architecture: any` packages
  - `clean`: clean up the source directory

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Step 6: Build the package

- Various tools to build the package.
  - **dbkg-buildpackage**
  - **debuild**
  - **pdebuild**
  - **git-buildpackage**
- Execute following command to build the package.

  `$ dpkg-buildpackage -us -uc`

```
dpkg-buildpackage: export CFLAGS from dpkg-buildflags (origin: vendor): -g -O2
dpkg-buildpackage: export CPPFLAGS from dpkg-buildflags (origin: vendor):
.
.
.
dpkg-deb: building package ‘hyphen-hi’ in ‘../hyphen-hi_0.7.0-2_all.deb’.
  dpkg-genchanges  >../hyphen-hi_0.7.0-2_amd64.changes
dpkg-genchanges: not including original source code in upload
  dpkg-source --after-build hyphen-hi
dpkg-buildpackage: binary and diff upload (original source NOT included)
```

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Step 6: Check for errors

- Use **lintian** to check the errors and warnings in package.

```
$ lintian hyphen-hi_0.7.0-2_amd64.changes

W: hyphen-hi source: no-debian-copyright
E: hyphen-hi: no-copyright-file
```

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Step 7: Install the package

- Use **dpkg** to install the package.
  `$ sudo dpkg -i hyphen-hi_0.7.0-2_all.deb`

```
[sudo] password for muneeb:
Selecting previously deselected package hyphen-hi.
(Reading database ... 602891 files and directories currently installed
Unpacking hyphen-hi (from hyphen-hi_0.7.0-2_all.deb) ...
Setting up hyphen-hi (0.7.0-2) ...
Processing triggers for postgresql-common ...
Building PostgreSQL dictionaries from installed myspell/hunspell packa
  en_au
  en_ca
  en_gb
  en_us
  en_za
```

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Step 8: Uploading to mentors.debian.net

- About `mentors.debian.net`
- Catch us on IRC or via email to know more about configuring it
  - IRC: #debian-in-mentors @ irc.oftc.net
  - Mailing List: debian-in-workers
- Upload the package using `dput`

```
$ dput mentors-ftp hyphen-hi_0.7.0-2_amd64.changes
```

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References

- Debian New Maintainers' Guide
  http://www.debian.org/doc/manuals/maint-guide/
- Packaging Tutorial
  http://wiki.debian.org/PackagingTutorial
- Intro to Debian Packaging
  http://wiki.debian.org/IntroDebianPackaging1

Queries?

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Thank You