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# **dh-virtualenv Documentation**

*Release 1.0*

**Spotify AB**

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## What is dh-virtualenv

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`dh-virtualenv` is a tool that aims to combine Debian packaging with self-contained virtualenv based Python deployments. To do this, the package extends debhelper's sequence by providing a new command in sequence, `dh_virtualenv`, which effectively replaces following commands from the sequence:

- `dh_auto_install`
- `dh_python2`
- `dh_pycentral`
- `dh_pysupport`

In the sequence the `dh_virtualenv` is inserted right after `dh_perl`.





Following list contains most notable changes by version. For full list consult the git history of the project.

### 1.0

- **Backwards incompatible** Change the default install root to `/opt/venvs`. This is due to the old installation root (`/usr/share/python`) clashing with Debian provided Python utilities. To maintain the old install location, use `DH_VIRTUALENV_INSTALL_ROOT` and point it to `/usr/share/python`.
- **Backwards incompatible** By default, do not run `setup.py test` upon building. The `--no-test` flag has no longer has any effect. To get the old behaviour, use the `--setuptools-test` flag instead.
- **Backwards incompatible** Buildsystem: Move files into build folder in install step instead of build step. Thanks to Ludwig Hähne for the patch!
- Deprecate `--pypi-url` in favour of `--index-url`
- Support upgrading pip to the latest release with `--upgrade-pip` flag.
- Buildsystem: Add support for `DH_UPGRADE_PIP`, `DH_UPGRADE_SETUPTOOLS` and `DH_UPGRADE_WHEEL`. Thanks to Kris Kvilekval for the implementation!
- Buildsystem: Add support for custom requirements file location using `DH_REQUIREMENTS_FILE` and for custom pip command line arguments using `DH_PIP_EXTRA_ARGS`. Thanks to Einar Forselv for implementing!
- Fixing shebangs now supports multiple interpreters. Thanks Javier Santacruz!
- Allow a custom pip executable via `--pip-tool` flag. Thanks Anthony Sottile for the implementation!
- Fix handling of shebang lines for cases where interpreter was wrapped in quotes. Thanks to Kamil Niechajewicz for fixing!
- Support extra arguments to be passed at virtualenv using `--extra-virtualenv-arg`. Thanks to Julien Duponchelle for the fix.

## 0.11

- Allow passing explicit filename for *requirements.txt* using `--requirements` option. Thanks to Eric Larson for implementing!
- Ensure that venv is configured before starting any daemons. Thanks to Chris Lamb for fixing this!
- Make sure *fix\_activate\_path* updates all activate scripts. Thanks to walrusVision for fixing this!

## 0.10

- **Backwards incompatible** Fix installation using the built-in virtual environment on 3.4. This might break installation on Python versions prior to 3.4 when using `--builtin-venv` flag. Thanks to Elonen for fixing!
- Honor `DH_VIRTUALENV_INSTALL_ROOT` in build system. Thanks to Ludwig Hähne for implementing!
- Allow overriding virtualenv arguments by using the `DH_VIRTUALENV_ARGUMENTS` environment variable when using the build system. Thanks to Ludwig Hähne for implementing!
- Add option to skip installation of the actual project. In other words using `--skip-install` installs only the dependencies of the project found in requirements.txt. Thanks to Phillip O'Donnell for implementing!
- Support custom installation suffix instead of the package name via `--install-suffix`. Thanks to Phillip O'Donnell for implementing!

## 0.9

- Support using system packages via a command line flag `--use-system-packages`. Thanks to Wes Mason for implementing this feature!
- Introduce a new, experimental, more modular build system. See the *Building packages with dh-virtualenv* for documentation.
- Respect the `DEB_NO_CHECK` environment variable.

## 0.8

- Support for running triggers upon host interpreter update. This new feature makes it possible to upgrade the host Python interpreter and avoid breakage of all the virtualenvs installed with dh-virtualenv. For usage, see the *Tutorial*. Huge thanks to Jürgen Hermann for implementing this long wanted feature!
- Add support for the built-in venv module. Thanks to Petri Lehtinen!
- Allow custom pip flags to be passed via the `--extra-pip-arg` flag. Thanks to @labeneator for the feature.

## 0.7

- **Backwards incompatible** Support running tests. This change breaks builds that use distutils. For those cases a flag `--no-test` needs to be passed.
- Add tutorial to documentation
- Don't crash on debbuild parameters `-i` and `-a`

- Support custom source directory (debhelper's flag `-D`)

## 0.6

First public release of *dh-virtualenv*



This tutorial will guide you through setting up your first project using *dh-virtualenv*. Having some knowledge on how Debian packages work might help, but it is not a mandatory requirement. You also need some basic build tools, so it is recommended to install *build-essential* and *devscripts* packages.

## Step 1: Install dh-virtualenv

In order to use it, you need to install the *dh-virtualenv*. If you run Debian Jessie (testing), Debian Sid (unstable) or Ubuntu 14.04 LTS (Trusty), you can install *dh-virtualenv* simply with *apt-get*:

```
sudo apt-get install dh-virtualenv
```

For more recent packages there is [an unofficial PPA maintained](<https://launchpad.net/~spotify-jyrki/+archive/ubuntu/dh-virtualenv>) by the author.

For other systems the only way is to build and install it yourself. Steps to do that, after you have cloned the repository are:

```
sudo apt-get install devscripts python-virtualenv git equivs # Install needed packages
git clone https://github.com/spotify/dh-virtualenv.git      # Clone Git repository
cd dh-virtualenv                                          # Move into the
↳ repository
sudo mk-build-deps -ri                                    # This will install
↳ build dependencies
dpkg-buildpackage -us -uc -b                              # Build the *dh-
↳ virtualenv* package

# and finally, install it (you might have to solve some
# dependencies when doing this):
sudo dpkg -i ../dh-virtualenv_<version>.deb
```

## Step 2: Setup the Debian packaging

Grab your favourite Python project you want to use *dh-virtualenv* with and set it up. Only requirement is that your project has a somewhat sane `setup.py` and requirements listed in a `requirements.txt` file. Note however that defining any requirements is not mandatory.

Next you need to define the Debian packaging for your software. To do this, create a directory called `debian` in the project root.

To be able to build a debian package, a few files are needed. First, we need to define the compatibility level of the project. For this, do:

```
echo "9" > debian/compat
```

The 9 is a magic number for latest compatibility level, but we don't need to worry about that. Next we need a file that tells what our project is about, a file called `control`. Enter a following `debian/control` file:

```
Source: my-awesome-python-software
Section: python
Priority: extra
Maintainer: Matt Maintainer < matt@example.com >
Build-Depends: debhelper (>= 9), python, dh-virtualenv (>= 0.8)
Standards-Version: 3.9.5

Package: my-awesome-python-software
Architecture: any
Pre-Depends: dpkg (>= 1.16.1), python2.7 | python2.6, ${misc:Pre-Depends}
Depends: ${python:Depends}, ${misc:Depends}
Description: really neat package!
 second line can contain extra information about it.
```

The `control` file is used to define the build dependencies, so if you are building a package that requires for example `lxml`, make sure you define `libxml2-dev` in *Build-Depends* etc.

*Depends* in the lower section is used to define run-time dependencies. Following the example above, in case of `lxml` you would add `libxml2` in to the *Depends* field.

To help keeping your installed virtualenv in sync with the host's Python interpreter in case of updates, create a file named `debian/«pkgname».triggers`, where «pkgname» is what you named your package in the `control` file. It triggers a special script whenever the Python binary changes; don't worry, that script is provided by *dh-virtualenv* automatically.

```
# Register interest in Python interpreter changes (Python 2 for now); and
# don't make the Python package dependent on the virtualenv package
# processing (noawait)
interest-noawait /usr/bin/python2.6
interest-noawait /usr/bin/python2.7

# Also provide a symbolic trigger for all dh-virtualenv packages
interest dh-virtualenv-interpreter-update
```

Note that if you provide a custom `postinst` script with your package, then don't forget to put the `#DEBHELPER#` marker into it, else the trigger script will be missing.

Next, we need a changelog file. It is basically a documentation of changes in your package plus the source for version number for Debian package builder. Here's a short sample changelog to be entered in `debian/changelog`:

```
my-awesome-python-software (0.1-1) unstable; urgency=low

* Initial public release

-- Matt Maintainer <matt@example.com> Fri, 01 Nov 2013 17:00:00 +0200
```

You don't need to create this file by hand, a handy tool called `dch` exists for entering new changelog entries.

Now, last bit is left, which is the `debian/rules` file. This file is basically a Makefile that Debian uses to build the package. Content for that is fairly straightforward:

```
#!/usr/bin/make -f

%:
    dh $@ --with python-virtualenv
```

And there we go, debianization of your new package is ready!

### Step 3: Build your project

Now you can just build your project by running `dpkg-buildpackage -us -uc`. Enjoy your newly baked *dh-virtualenv* backed project! :)





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## Building packages with dh-virtualenv

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Building packages with *dh-virtualenv* is relatively easy to start with but it also supports lot of customization to fit in your general needs.

By default, *dh-virtualenv* installs your packages under `/opt/venvs/<packagename>`. The package name is provided by the `debian/control` file.

To use an alternative install prefix, add a line like

```
export DH_VIRTUALENV_INSTALL_ROOT=</your/custom/install/dir>
```

to the top of your `debian/rules` file. `dh_virtualenv` will use `DH_VIRTUALENV_INSTALL_ROOT` instead of `/opt/venvs` when it constructs the install path.

To use an install suffix other than the package name, call the `dh_virtualenv` command using the `--install-suffix` command line option. See Advanced Usage for further information on passing options.

### Simple usecase

To signal debhelper to use *dh-virtualenv* for building your package, you need to pass `--with python-virtualenv` to debhelper sequencer.

In a nutshell, the simplest `debian/rules` file to build using *dh-virtualenv* looks like this:

```
#!/usr/bin/make -f

%:
    dh $@ --with python-virtualenv
```

However, the tool makes a few assumptions of your project's structure:

- For installing requirements, you need to have a file called `requirements.txt` in the root directory of your project. The requirements file is not mandatory.

- The project must have a `setup.py` file in the root of the project. Sequencer will run `setup.py install` to install the package inside the virtualenv.

After these are place, you can just build the package with your favorite tool!

## Environment variables

Certain environment variables can be used to customise the behaviour of the debhelper sequencer in addition to the standard debhelper variables.

### **DH\_VIRTUALENV\_INSTALL\_ROOT**

Define a custom root location to install your package(s). The resulting location for a specific package will be `“/path/to/install/root/<packagename>”` unless `--install-suffix` is used.

## Command line options

To change the default behavior the `dh_virtualenv` command accepts a few command line options:

**-p** <package>, **--package** <package>  
Act on the package named <package>

**-N** <package>, **--no-package** <package>  
Do not act on the specified package

**-v**, **--verbose**  
Turn on verbose mode. This has a few effects: it sets root logger level to `DEBUG` and passes `verbose` flag to `pip` when installing packages. This can also be provided using the standard `DH_VERBOSE` environment variable.

**--install-suffix** <suffix>  
Override virtualenv installation suffix. The suffix is appended to `/opt/venvs`, or the `DH_VIRTUALENV_INSTALL_ROOT` environment variable if specified, to construct the installation path.

**--extra-index-url** <url>  
Use extra index url <url> when running `pip` to install packages. This can be provided multiple times to pass multiple URLs to `pip`. This is useful if you for example have a private Python Package Index.

**--preinstall** <package>  
Package to install before processing the requirements. This flag can be used to provide a package that is installed by `pip` before processing requirements file. This is handy if you need to install for example a custom setup script or other packages needed to parse `setup.py`. This flag can be provided multiple times to pass multiple packages for pre-install.

**--pip-tool** <exename>  
Executable that will be used to install requirements after the preinstall stage. Usually you'll install this program by using the `--preinstall` argument. The replacement is expected to be found in the virtualenv's `bin/` directory.

**--upgrade-pip** <package>  
New in version 1.0.

Force upgrading pip to the latest available release. *Note:* This can produce non-repeatable builds.

**--index-url** <URL>  
Base URL of the PyPI server. This flag can be used to pass in a custom URL to a PyPI mirror. It's useful if you for example have an internal mirror of the PyPI or you run a special instance that only exposes selected

packages of PyPI. If this is not provided, the default will be whatever `pip` uses as default (usually `http://pypi.python.org/simple`).

**--extra-pip-arg** <PIP ARG>

Extra parameters to pass to the `pip` executable. This is useful if you need to change the behaviour of `pip` during the packaging process. You can use this flag multiple times to pass in different `pip` flags. As an example passing in `--extra-pip-arg --no-compile` to the `override_dh_virtualenv` section of the `debian/rules` file will disable the generation of `pyc` files.

**--extra-virtualenv-arg** <VIRTUALENV ARG>

Extra parameters to pass to the `virtualenv` executable. This is useful if you need to change the behaviour of `virtualenv` during the packaging process. You can use this flag multiple times to pass in different `virtualenv` flags.

**--requirements** <REQUIREMENTS FILE>

Use a different requirements file when installing. Some packages such as `pbr` expect the `requirements.txt` file to be a simple list of requirements that can be copied verbatim into the `install_requires` list. This command option allows specifying a different `requirements.txt` file that may include `pip` specific flags such as `-i`, `-r` and `-e`.

**--setuptools**

Use `setuptools` instead of `distribute` in the `virtualenv`

**--setuptools-test**

New in version 1.0.

Run `python setup.py test` when building the package. This was the old default behaviour before version 1.0. This option is incompatible with the deprecated `--no-test`.

**--python** <path>

Use a specific Python interpreter found in `path` as the interpreter for the `virtualenv`. Default is to use the system default, usually `/usr/bin/python`.

**--builtin-venv**

Enable the use of the build-in `venv` module, i.e. use `python -m venv` to create the `virtualenv`. For this to work, requires Python 3.4 or later to be used, e.g. by using the option `--python /usr/bin/python3.4`. (Python 3.3 has the `venv` module, but `virtualenvs` created with Python 3.3 are not bootstrapped with `setuptools` or `pip`.)

**-S, --use-system-packages**

Enable the use of system site-packages in the created `virtualenv` by passing the `--system-site-packages` flag to `virtualenv`.

**--skip-install**

Skip running `pip install .` after dependencies have been installed. This will result in anything specified in `setup.py` being ignored. If this package is intended to install a `virtualenv` and a program that uses the supplied `virtualenv`, it is up to the user to ensure that if `setup.py` exists, any installation logic or dependencies contained therein are handled.

This option is useful for web application deployments where the package is expected contain the virtual environment to support an application which itself may be installed via some other means – typically, by the packages `./debian/<packagename>.install` file, possibly into a directory structure unrelated to the location of the virtual environment.

**--pypi-url** <URL>

Deprecated since version 1.0: Use `--index-url` instead.

**--no-test**

Deprecated since version 1.0: This option has no effect. See `--setuptools-test`.

## Advanced usage

To provide command line options to `dh_virtualenv` sequence the override mechanism of the debhelper is the best tool.

Following `debian/rules` will provide `http://example.com` as additional Python Package Index URI:

```
#!/usr/bin/make -f

%:
    dh $@ --with python-virtualenv

override_dh_virtualenv:
    dh_virtualenv --extra-index-url http://example.com
```

## Experimental buildsystem support

**Important:** Following chapters describe a completely experimental functionality of `dh-virtualenv`.

Starting with version 0.9 of `dh-virtualenv`, there is a `buildsystem` alternative. The main difference in use is that instead of the `--with python-virtualenv` option, `--buildsystem=dh_virtualenv` is passed to debhelper. The `debian/rules` file should look like this:

```
#!/usr/bin/make -f

%:
    dh $@ --buildsystem=dh_virtualenv
```

Using the `buildsystem` instead of the part of the sequence (in other words, instead of the `--with python-virtualenv`) one can get more flexibility into the build process.

Flexibility comes from the fact that `buildsystem` will have individual steps for configure, build, test and install and those can be overridden by adding `override_dh_auto_<STEP>` target into the `debian/rules` file. For example:

```
#!/usr/bin/make -f

%:
    dh $@ --buildsystem=dh_virtualenv

override_dh_auto_test:
    py.test test/
```

In addition the separation of build and install steps makes it possible to use `debian/install` files to include built files into the Debian package. This is not possible with the sequencer addition.

The build system honors the `DH_VIRTUALENV_INSTALL_ROOT` environment variable. Following other environment variables can be used to customise the functionality:

### DH\_VIRTUALENV\_ARGUMENTS

Pass given extra arguments to the `virtualenv` command

For example:

```
export DH_VIRTUALENV_ARGUMENTS="--no-site-packages --always-copy"
```

The default is to create the virtual environment with `--no-site-packages`.

**DH\_REQUIREMENTS\_FILE**

New in version 1.0.

Override the location of requirements file. See `--requirements`.

**DH\_UPGRADE\_PIP**

New in version 1.0.

Force upgrade of the `pip` tool by setting `DH_UPGRADE_PIP` to empty (latest version) or specific version. For example:

**DH\_UPGRADE\_SETUPTOOLS**

New in version 1.0.

Force upgrade of `setuptools` by setting `DH_UPGRADE_SETUPTOOLS` to empty (latest version) or specific version.

**DH\_UPGRADE\_WHEEL**

New in version 1.0.

Force upgrade of `wheel` by setting `DH_UPGRADE_WHEEL` to empty (latest version) or specific version.

**DH\_PIP\_EXTRA\_ARGS**

New in version 1.0.

Pass additional parameters to the `pip` command. For example:

```
export DH_PIP_EXTRA_ARGS="--no-index --find-links=./requirements/wheels"
```



## CHAPTER 5

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### Indices and tables

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