Django productivity tips and tricks

by Simone

Europython 2011

Firenze

ract

I will show in this talk some tips, tricks and best practices for some recurring patterns in the django application development.

This is not a list of tools and applications but rather a homemade summary of code snippets and design best practices.
All in all, the goal is: no mistakes and go faster.

Topics include: python, users, forms, jquery, virtualenv, distribute, buildbot, etc. ...

Simone Federici

www.k-tech.it

Part 1°

know the environment

1° use linux

Questions?

2° install Terminator as shell

VCS

environment

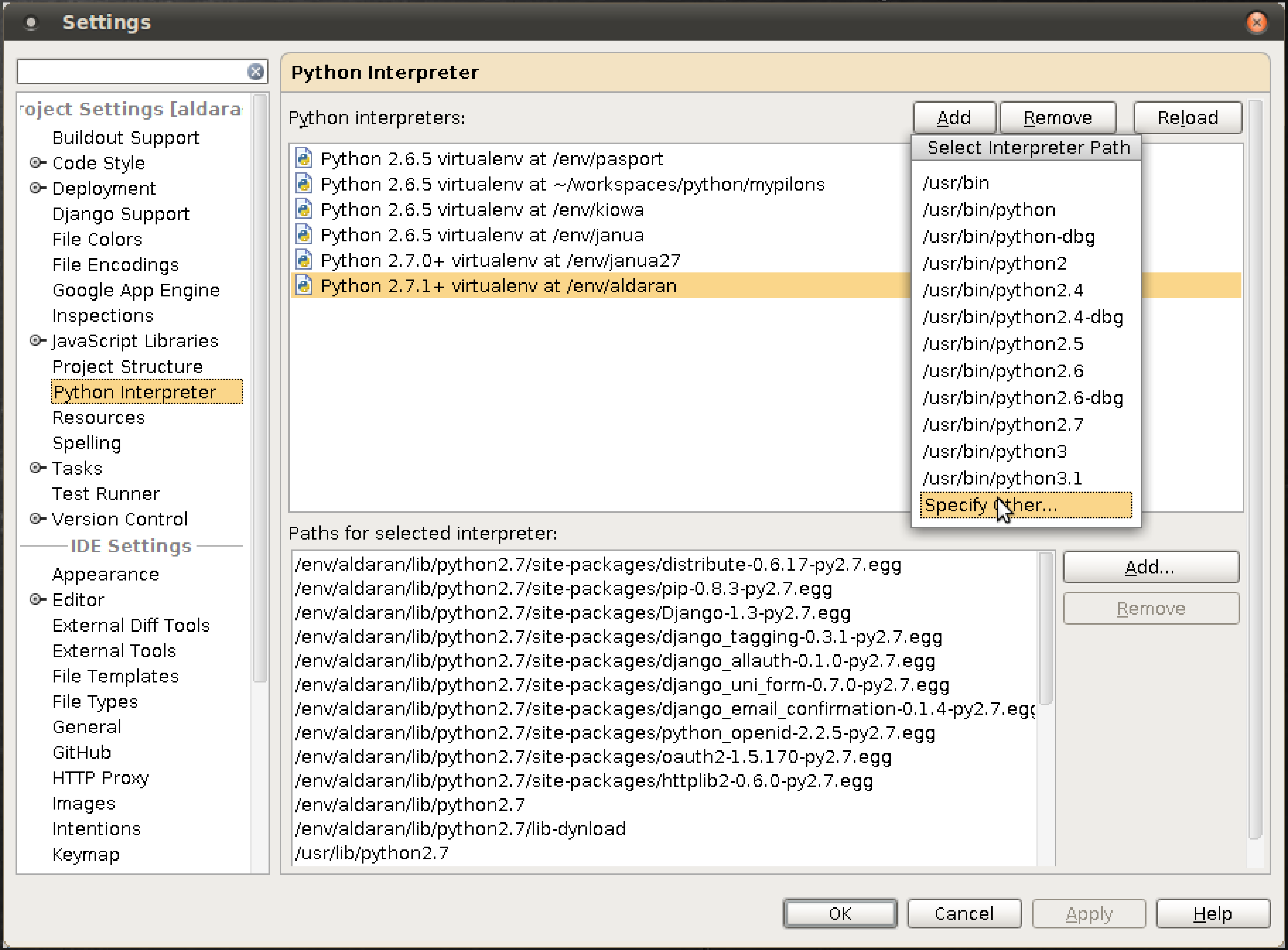
```
$ virtualenv /env/ep2011/ --python=python2.7
                                  [--no-site-packages]
```

- Development Environment
- IDE - Python Interpreter
- Continuos Integration
- Production

```
$ source /env/ep2011/bin/activate
(ep2011)$ easy_install "django==1.3"
or
(ep2011)$ pip install django
```

system library or virtualized?

```
(ep2011)$ easy_install PIL
(ep2011)$ easy_install ipython

(ep2011)$ cd rrdtools/
(ep2011)$ ./configure --prefix=/env/ep2011/
(ep2011)$ make && make install

$ source /env/ep2011/bin/activate
(ep2011)$ export LD_LIBRARY_PATH=/env/ep2011/lib/
```



Python Interpreter

Python interpreters:

```
Python 2.6.5 virtualenv at /env/pasport
Python 2.6.5 virtualenv at ~/workspaces/python/mypilons
Python 2.6.5 virtualenv at /env/kiowa
Python 2.6.5 virtualenv at /env/janua
Python 2.7.0+ virtualenv at /env/janua27
Python 2.7.1+ virtualenv at /env/aldaran
```

```
/usr/bin
/usr/bin/python
/usr/bin/python-dbg
/usr/bin/python2
/usr/bin/python2.4
/usr/bin/python2.4-dbg
/usr/bin/python2.5
/usr/bin/python2.6
/usr/bin/python2.6-dbg
/usr/bin/python2.7
/usr/bin/python3
/usr/bin/python3.1
Specify other...
```

Paths for selected interpreter:

```
/env/aldaran/lib/python2.7/site-packages/distribute-0.6.17-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/pip-0.8.3-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/Django-1.3-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/django_tagging-0.3.1-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/django_allauth-0.1.0-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/django_uni_form-0.7.0-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/django_email_confirmation-0.1.4-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/python_openid-2.2.5-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/oauth2-1.5.170-py2.7.egg
/env/aldaran/lib/python2.7/site-packages/httplib2-0.6.0-py2.7.egg
/env/aldaran/lib/python2.7
/env/aldaran/lib/python2.7/lib-dynload
/usr/lib/python2.7
```

pycharm - settings- python interpreter

packages utils

```
(ep2011)$ easy_install yolk
(ep2011)$ yolk -l
Django       - 1.3     - active
PIL          - 1.1.7   - active
Python       - 2.7.1+  - active development (/usr/lib/python2.7/lib
ipython      - 0.10.2  - active
pip          - 0.8.3   - active
py-rrdtool   - 0.2.1   - active
setuptools   - 0.6c11  - active
wsgiref      - 0.1.2   - active development (/usr/lib/python2.7)
yolk         - 0.4.1   - active
```

```
# see the updates available in pypi
(ep2011)$ yolk -U
pip 0.8.3 (1.0.1)
py-rrdtool 0.2.1 (1.0b1)
```

django apps

```
(ep2011)$ easy_install django-allauth
```

[auto dependency discovery]

Contributor for external library [DEVELOP]

```
(ep2011)$ svn co http://svn.os4d.org/svn/djangodevtools/
(ep2011)$ cd djangodevtools/
(ep2011)$ python2.7 setup.py develop
```

```
...
Creating
/env/ep2011/lib/python2.7/site-packages/djangodevtools.egg-link
Adding oauth2 1.1.3 to easy-install.pth file
....
```

development

```
(ep2011)$ yolk -a
...
CherryPy        - 3.2.0            - active
Pygments        - 1.4              - active
coverage        - 3.5b1            - active
django-allauth  - 0.1.0            - active
django-email-confirmation - 0.1.4 - active
django-uni-form - 0.7.0            - active
djangodevtools  - 0.3.0dev-r101    - active development
 (/home/aldaran/workspaces/django/djangodevtools-readonly/trunk)
epydoc          - 3.0.1            - active
httplib2        - 0.6.0            - active
oauth2          - 1.5.170          - active
pyflakes        - 0.4.0            - active
python-openid   - 2.2.5            - active
...
```

bash scripts - virtualenv

YES

```
#!/usr/bin/env python
...
```

NO

```
#!/env/ep2011/bin/python2.7
#!/usr/local/bin/python2.7
#!/opt/python2.7/bin/python
...
```

bash autocompletion

```
(ep2011)$ source django-trunk/extras/django_bash_completion
(ep2011)$ django-admin.py s TAB
shell           sqlcustom        sqlreset             syncdb
sql             sqlflush         sqlsequencereset
sqlall          sqlindexes       startapp
sqlclear        sqlinitialdata   startproject

(ep2011)$ django-admin.py start TAB
startapp        startproject

(ep2011)$ django-admin.py startproject ep2011
```

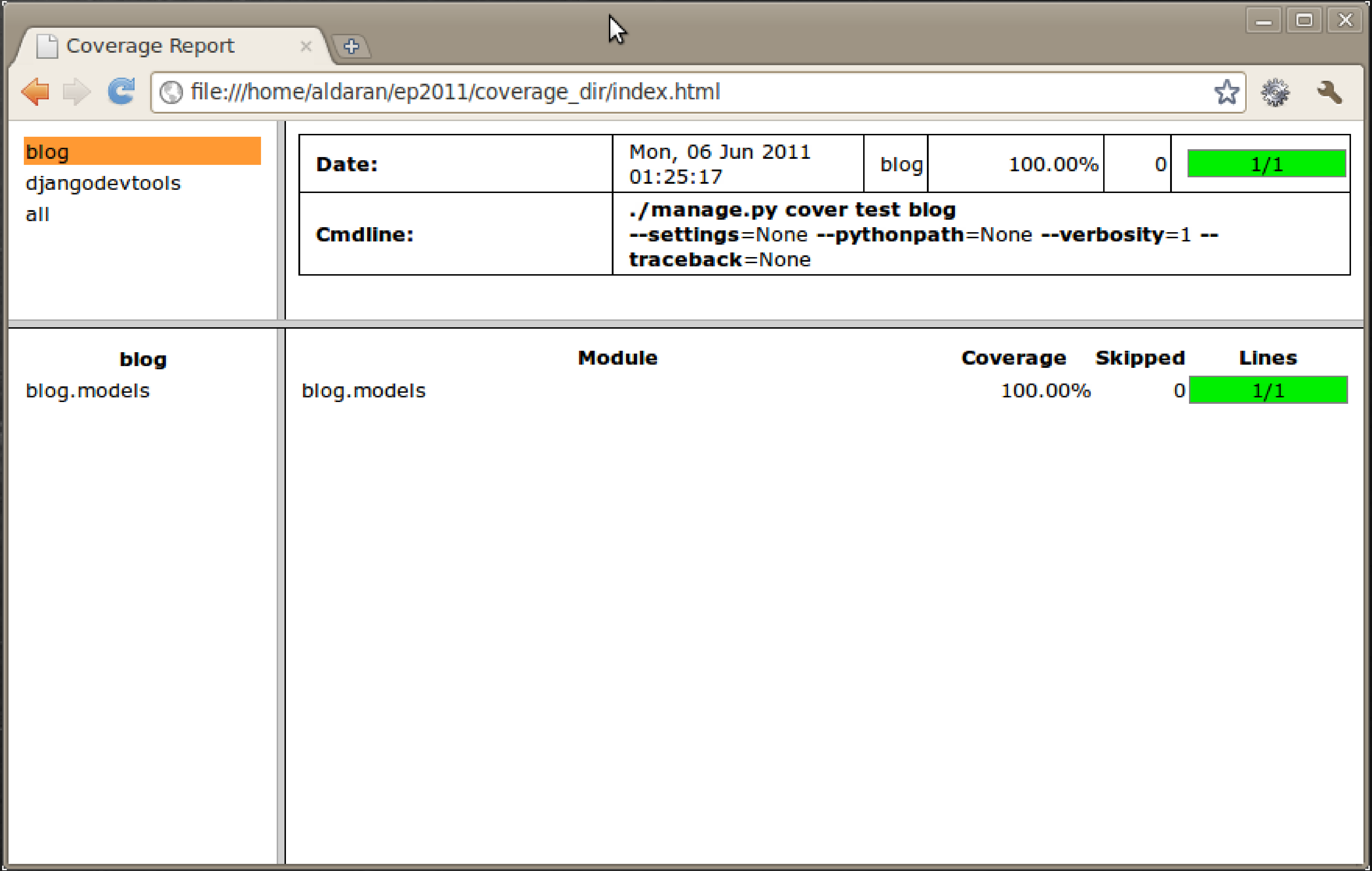
source env.sh

```
(ep2011)$ django-admin.py startproject ep2011
(ep2011)$ cd ep2011/

(ep2011)$ cat > env.sh << EOF
> #!/bin/bash
[Ctrl+r]
> source /env/ep2011/bin/activate
> export LD_LIBRARY_PATH=/env/ep2011/lib/
> source django-trunk/extras/django_bash_completion
> EOF

(ep2011)$ ls
env.sh   settings.py   urls.py   __init__.py   manage.py
```

./manage.py startapp blog

```
(ep2011)$ ./manage.py test blog
Creating test database for alias 'default'...
.
----------------------------------------------------------------------
Ran 1 test in 0.000s

OK
Destroying test database for alias 'default'...
```

```
(ep2011)$ ./manage.py cover test blog
Save coverage data in: /home/aldaran/ep2011/coverage_dir
Creating test database for alias 'default'...
.
----------------------------------------------------------------------
Ran 1 test in 0.000s

OK
Destroying test database for alias 'default'...
```



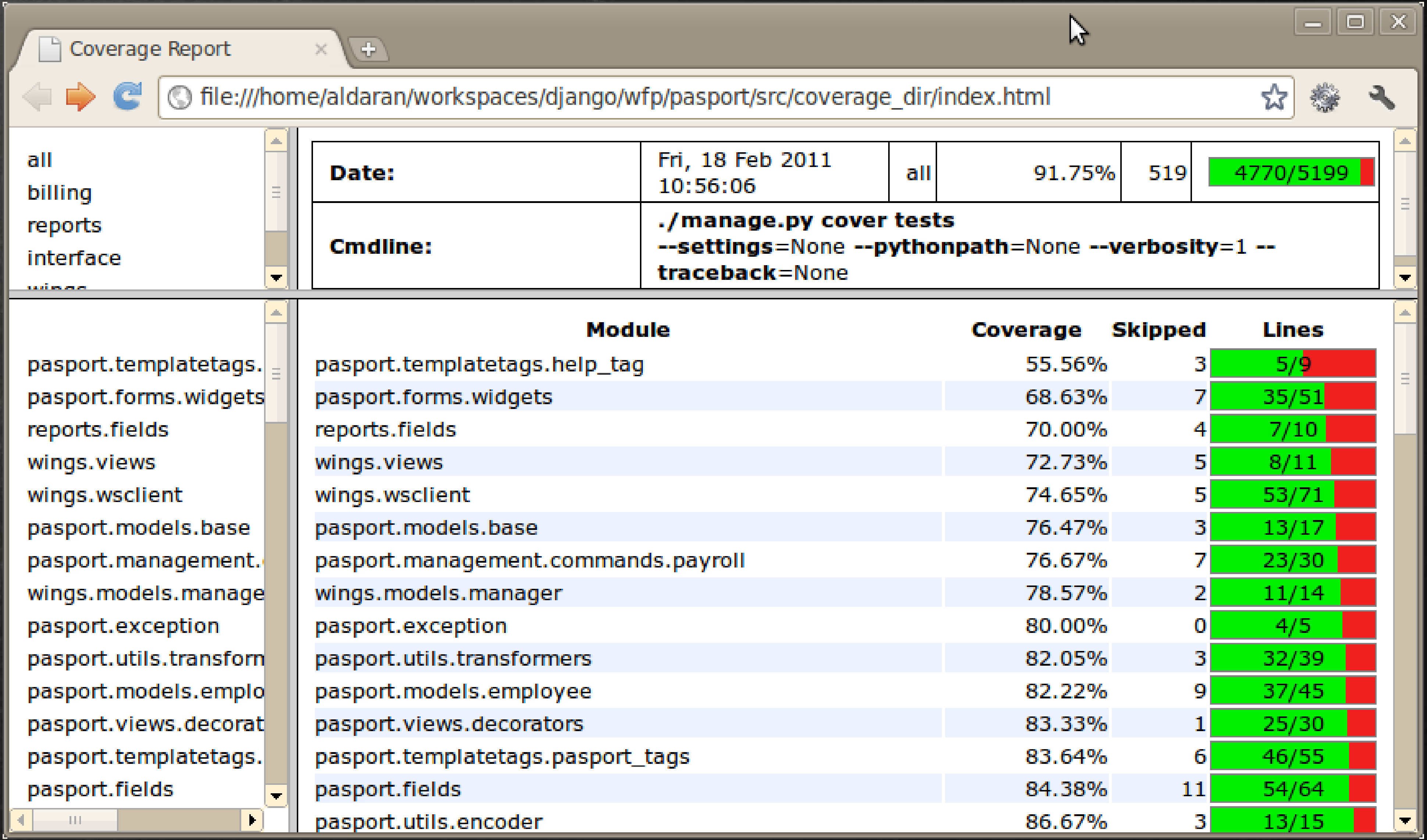
Date:	Mon, 06 Jun 2011 01:25:17	blog	100.00%	0	1/1
Cmdline:	**./manage.py cover test blog --settings**=None **--pythonpath**=None **--verbosity**=1 **--traceback**=None				

blog

blog.models

Module	Coverage	Skipped	Lines
blog.models	100.00%	0	1/1

djangodevtools - coverage report



Coverage Report
file:///home/aldaran/workspaces/django/wfp/pasport/src/coverage_dir/index.html
all
billing
reports
interface

Date:	Fri, 18 Feb 2011 10:56:06	all	91.75%	519	4770/5199
Cmdline:	**./manage.py cover tests --settings**=None **--pythonpath**=None **--verbosity**=1 **--traceback**=None				

Module	Coverage	Skipped	Lines
pasport.templatetags.help_tag	55.56%	3	5/9
pasport.forms.widgets	68.63%	7	35/51
reports.fields	70.00%	4	7/10
wings.views	72.73%	5	8/11
wings.wsclient	74.65%	5	53/71
pasport.models.base	76.47%	3	13/17
pasport.management.commands.payroll	76.67%	7	23/30
wings.models.manager	78.57%	2	11/14
pasport.exception	80.00%	0	4/5
pasport.utils.transformers	82.05%	3	32/39
pasport.models.employee	82.22%	9	37/45
pasport.views.decorators	83.33%	1	25/30
pasport.templatetags.pasport_tags	83.64%	6	46/55
pasport.fields	84.38%	11	54/64
pasport.utils.encoder	86.67%	3	13/15

djangodevtools - a better example

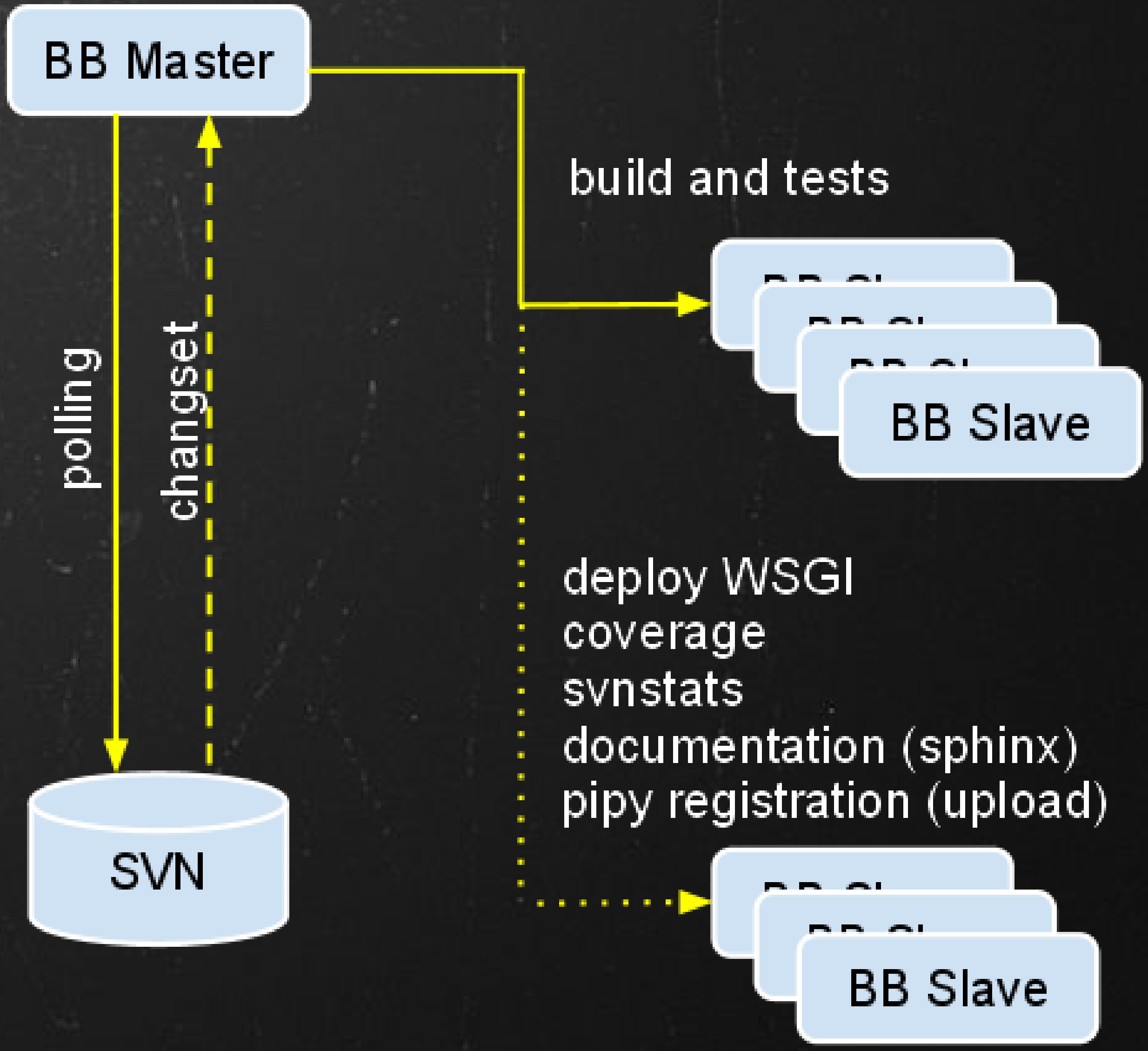
distribute & pypi

setup.py

```
#!/usr/bin/env python
from setuptools import setup
#from distutils.core import setup
setup(
      name='blog',
      version='1.0',
      description = 'Sample Blog app',
      author = 'Simone',
      author_email = 's.federici@k-tech.it',
      packages=['blog',],
      install_requires=[
        'distribute',
        'docutils==0.7',
        'sphinx==1.0.5',
        'python_dateutil==1.5',
        'djangodevtools'
      ],
)
```

```
$ ./setup.py develop
$ ./setup.py install
$ ./setup.py register
$ ./setup.py upload
```

CI - http://trac.buildbot.net/



http://code.google.com/p/django-buildbot/

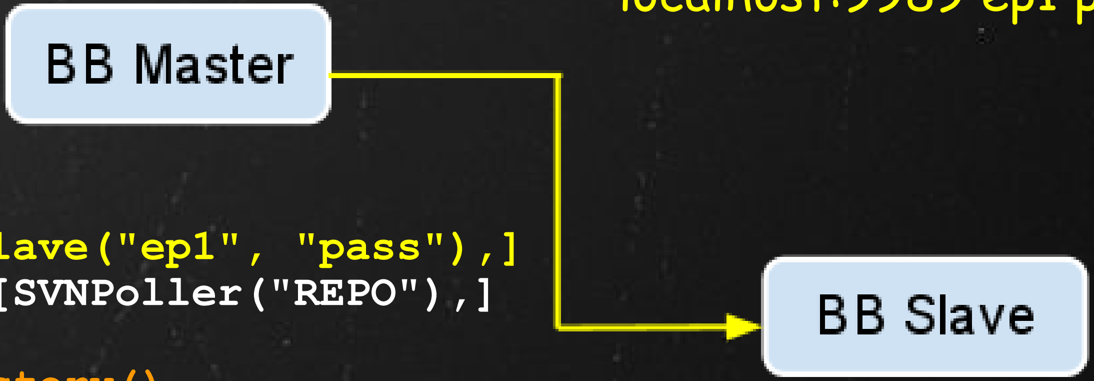
buildbot

```
$ virtualenv /env/bb/
$ source /env/bb/bin/activate
$ easy_install buildbot
```

```
$ virtualenv /env/bbslave
$ source /env/bbslave/bin/activate
$ easy_install buildbot-slave
```

```
$ buildbot create-master /env/bb/master
```

```
$ buildslave create-slave slave
    localhost:9989 ep1 pass
```



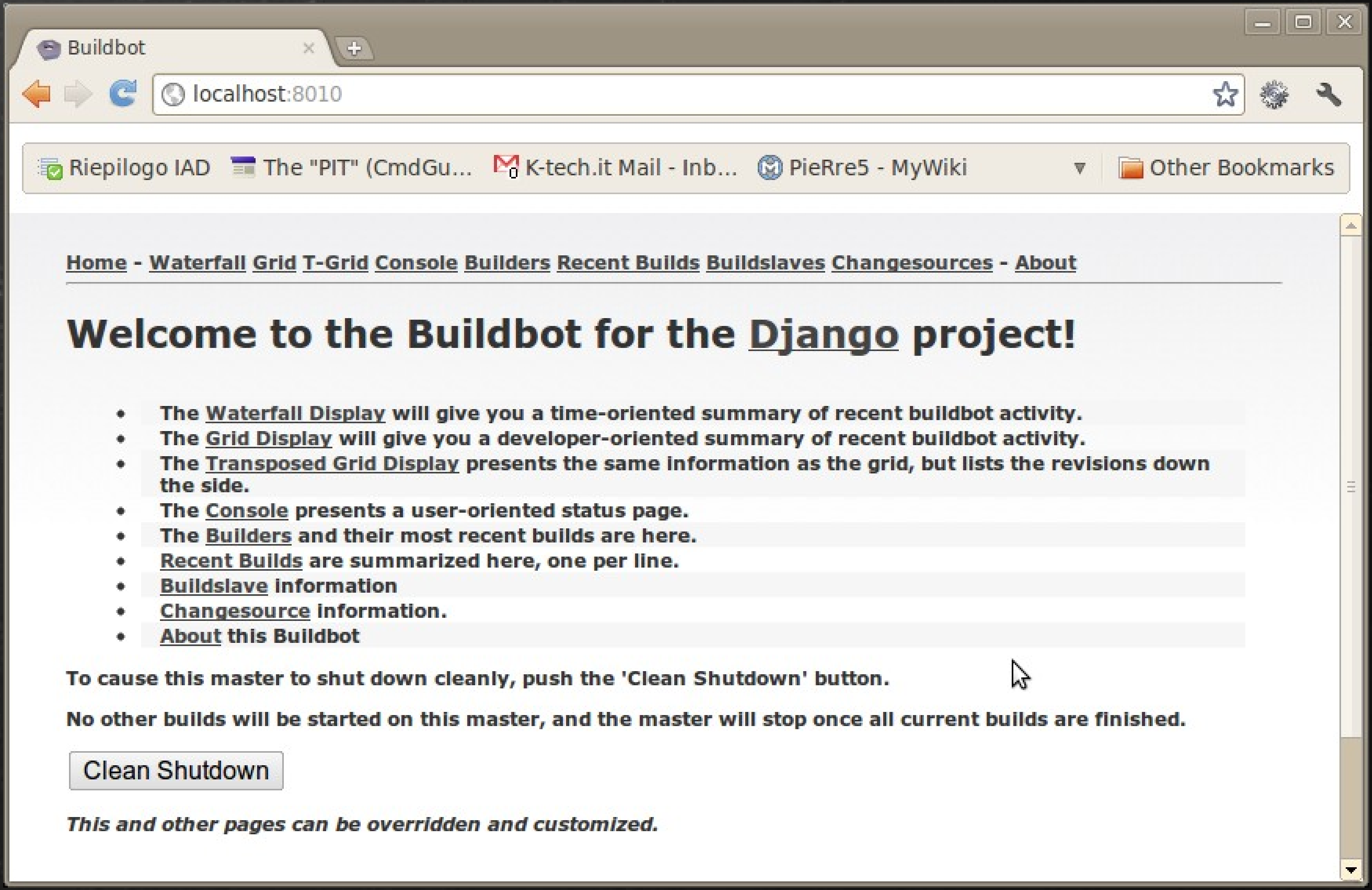
vi master.cfg

```
c['slaves'] = [BuildSlave("ep1", "pass"),]
c['change_source'] = [SVNPoller("REPO"),]
c['builders'] = ...
  f = factory.BuildFactory()
  f.addStep(source.SVN, mode='update', ...)
  f.addStep(FileDownload, mastersrc="x", ..)
  f.addStep(shell.ShellCommand, command=...)
c['schedulers'] = ...
```

```
$ buildbot start /env/bb/master/
```

```
$ buildslave start /env/bbslave/slave/
```

welcome page - buildbot



Home - Waterfall Grid T-Grid Console Builders Recent Builds Buildslaves Changesources - About

Welcome to the Buildbot for the Django project!

- The Waterfall Display will give you a time-oriented summary of recent buildbot activity.
- The Grid Display will give you a developer-oriented summary of recent buildbot activity.
- The Transposed Grid Display presents the same information as the grid, but lists the revisions down the side.
- The Console presents a user-oriented status page.
- The Builders and their most recent builds are here.
- Recent Builds are summarized here, one per line.
- Buildslave information
- Changesource information.
- About this Buildbot

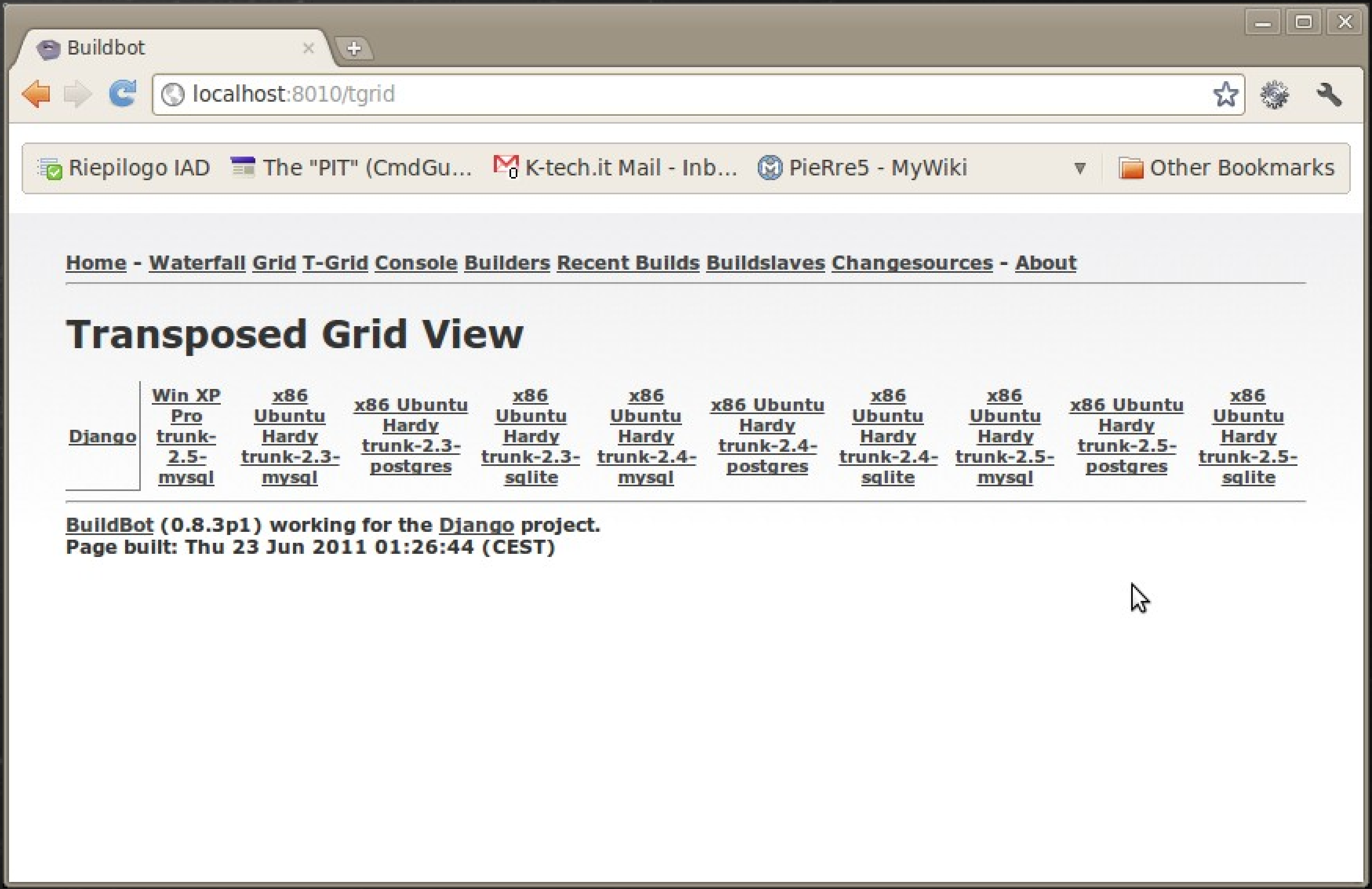
To cause this master to shut down cleanly, push the 'Clean Shutdown' button.

No other builds will be started on this master, and the master will stop once all current builds are finished.

Clean Shutdown

This and other pages can be overridden and customized.

Grid view - buildbot



Home - Waterfall Grid T-Grid Console Builders Recent Builds Buildslaves Changesources - About

Transposed Grid View

Django	Win XP Pro trunk-2.5-mysql	x86 Ubuntu Hardy trunk-2.3-mysql	x86 Ubuntu Hardy trunk-2.3-postgres	x86 Ubuntu Hardy trunk-2.3-sqlite	x86 Ubuntu Hardy trunk-2.4-mysql	x86 Ubuntu Hardy trunk-2.4-postgres	x86 Ubuntu Hardy trunk-2.4-sqlite	x86 Ubuntu Hardy trunk-2.5-mysql	x86 Ubuntu Hardy trunk-2.5-postgres	x86 Ubuntu Hardy trunk-2.5-sqlite

BuildBot (0.8.3p1) working for the Django project.
Page built: Thu 23 Jun 2011 01:26:44 (CEST)

alias django command

enabled in settings_local.py [svn:ignore]

$ vi settings.py

```
try:
    from settings_local import *
except:
    print "No settings_local found!"
```

$ vi settings_local.py

```
DEBUG=True
from djangodevtools import manage_enable_alias
manage_enable_alias()
```

```
$ ./manage.py alias mycmd='reset blog --noinput ; syncdb --noinput'
$ ./manage.py mycmd
```

[manage.cfg is shared by all the team members]

easy_install uWSGI

```
$ vi /env/ep2011/ep11.ini
[uwsgi]
virtualenv = /env/ep2011
pythonpath = /apps/ep2011
env = DJANGO_SETTINGS_MODULE=ep11.settings
module = django.core.handlers.wsgi:WSGIHandler()
master = true
processes = 7
harakiri = 60
max-requests = 5000
memory-report = true
socket = 127.0.0.1:3031
```

```
$ uwsgi --ini /env/ep2011/ep11.ini
```

```
<Location />
    SetHandler uwsgi-handler
    uWSGISocket 127.0.0.1:3031
</Location>
```

more....

```
$ uwsgi --ini /env/ep2011/ep11.ini --http :8000

# leave a backdoor for broken new release
$ uwsgi --ini /env/ep2011/ep11.ini --auto-snapshot=2

# after the release (with easy_install)
$ kill -HUP $pid #reload app

# URGENT! My release is broken
$ kill -URG $pid #restore old app

# vi easy-install.pth (downgrade your release)

# others tips
$ kill -TERM $pid # brutal reload
```

$ vi ep11_uwsgi.py

```
import uwsgi
import os
os.environ['DJANGO_SETTINGS_MODULE'] = 'ep11.settings'
from django.core.handlers.wsgi import WSGIHandler
application = WSGIHandler()

import ep11.handlers
uwsgi.register_signal(98, '', ep11.handlers.clear_sessions)

# clear sessions every 24 hours
uwsgi.add_cron(98, 0, 23, -1, -1, -1) # 23.00 every day
```

[http://projects.unbit.it/uwsgi/wiki/SignalFramework]

$ vi /env/ep2011/ep11.ini

```
[uwsgi]
#module = django.core.handlers.wsgi:WSGIHandler()
module = ep11_uwsgi
```

uWSGI + django + clustering

```
$ uwsgi --emperor=/vassals
$ uwsgi --emperor="/env/*/*.ini"
```

django docs:
[https://code.djangoproject.com/ticket/16057]

deploy multiple apps
[http://projects.unbit.it/uwsgi/wiki/Emperor]

Clustering
[http://projects.unbit.it/uwsgi/wiki/Clustering]

Part 2°

coding...

extends user tips

```
class EPUser(User):
    nickname = models.CharField(max_length=50)

    def get_profile(self):
        try:
            ret = super(EPUser, self).get_profile()
        except UserProfile.DoesNotExist:
            ret  = UserProfile.objects.create(user=self)
        return ret
```

[post_save is not always a good compromise]

- `AUTH_PROFILE_MODULE="blog.UserProfile"`
- `AUTHENTICATION_BACKENDS = ('ep11.backends.EPModelBackend',)`
  [can be used also a middleware but it does 2 queries]
- COMMAND: ep11/management/commands/createsuperuser.py
  [can be also create an admin action "make EPUser"]

brutal monkey patch

- better don't touch the user TABLE and MODEL

```
_original_get_profile = User.get_profile

def _get_or_create_profile(user):
    try:
        ret = _original_get_profile(user)
    except UserProfile.DoesNotExist:
        ret  = UserProfile.objects.create(user=user)
    return ret

# monkey patch
User.get_profile = _get_or_create_profile
```

better using proxy on the fly

```
class EPUser(User):
    class Meta:
        proxy = True
    def get_profile(self):
        if not hasattr(self, '_profile_cache'):
            self._profile_cache, _n = UserProfile.objects.get_or_create(user=self)
        return self._profile_cache


class EPUserMiddleware(object):
    def process_request(self, request):
        if request.user:
            if request.user.is_authenticated():
                request.user.__class__ = EPUser
            else:
                request.user.get_profile = lambda: None


MIDDLEWARE_CLASSES = (
      ...
      'django.contrib.auth.middleware.AuthenticationMiddleware',
      'ep11.blog.midleware.EPUserMiddleware',
      ..
)
```

model form factory

```
from django.forms.models import modelform_factory
EPUserForm = modelform_factory(EPUser, fields=['username', 'email'])



def CustomLogicValidationForm(models.ModelForm):
    def clean_username(self):
        username = self.cleaned_data['username']
        if "aldaran" == username:
            raise forms.ValidationError("aldaran is a super username!")
        return username


EPUserForm2 = modelform_factory(EPUser,
form=CustomLogicValidationForm, fields=['username', 'email'])
```

autosave user form

```
class Author(models.Model):
    name = models.CharField(max_length=50)
    user = models.ForeignKey(EPUser)
    __unicode__ = lambda x: x.name

def autosave_userform_factory(user, Model, form=forms.ModelForm):
    class InnerForm(form):
        class Meta:
            model = Model
            exclude = ("user",)
        def save(self, commit=True):
            self.instance.user = user
            return super(InnerForm, self).save(commit=commit)
    InnerForm.__name__ = "%sForm" % Model.__name__
    return InnerForm

>>> user = EPUser.objects.all()[0]
>>> AutoSaveUserForm = autosave_userform_factory(user, Author)

>>> form = AutoSaveUserForm(data={"name":"Federici"})
>>> form.is_valid()
True
>>> form.save()
<Author: Federici>
>>> form.instance.user
<EPUser: aldaran>
```

filter authors form [+ autosave]

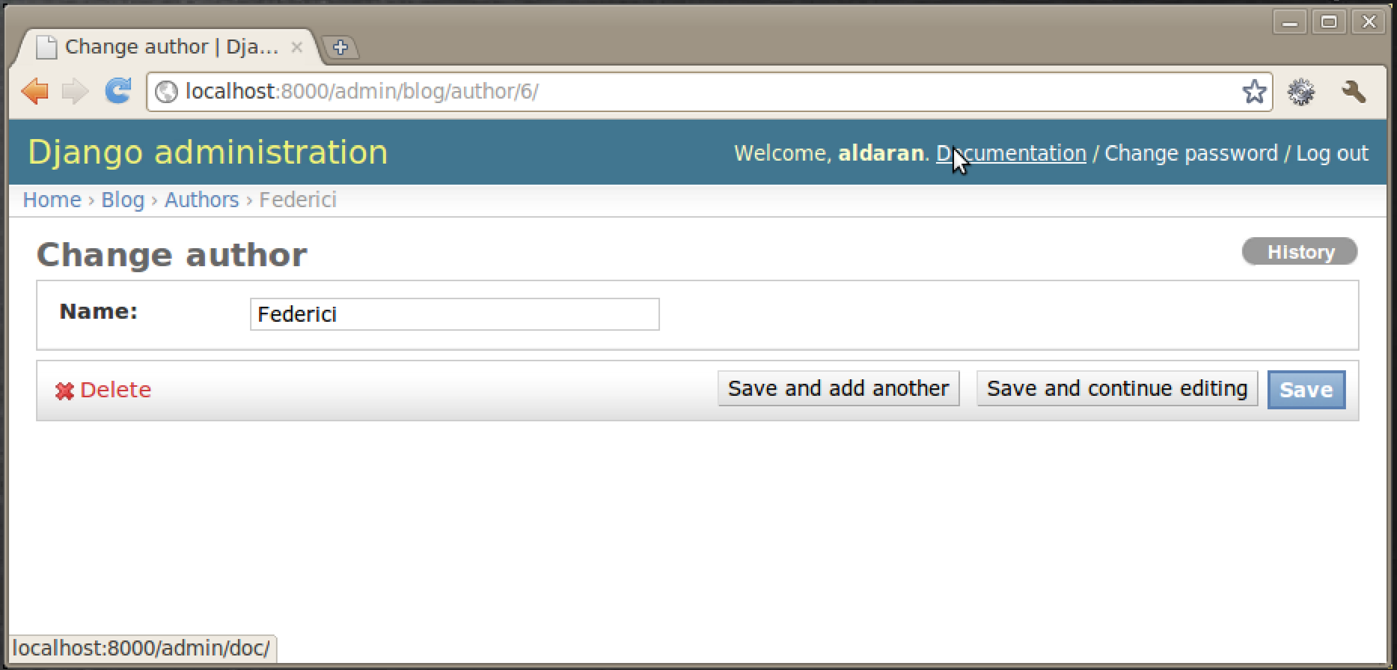
```
class Post(models.Model):
    author = models.ForeignKey(Author)
    title = models.CharField(max_length=100)
    user = models.ForeignKey(EPUser)
    __unicode__ = lambda x: x.title

def filter_author_form_factory(user, Model, form=forms.ModelForm):
    class InnerForm(form):
        author = forms.ModelChoiceField(user.author_set.all())
    InnerForm.__name__ = "Filter%sForm" % Model.__name__
    return InnerForm

>>> user = EPUser.objects.all()[0]
>>> AutoSaveUserForm = autosave_userform_factory(user, Post)
>>> Form = filter_author_form_factory(user, Post, form=AutoSaveUserForm)

>>> form = Form({"title":"Sample", "author": Author.objects.exclude(user=user)[0].pk})
>>> form.errors
{'author': [u'Select a valid choice. That choice is not one of the available choices.']}

>>> form = Form({"title":"Sample", "author": user.author_set.all()[0].pk})
>>> form.is_valid()
True
>>> form.save()
<Post: Sample>
```

form in admin

```
def _check_user_permission(_elf, request, obj=None):
    return not obj or obj.user == request.user

class AutosaveUserAdmin(admin.ModelAdmin):
    def get_form(self, request, obj=None, **kwargs):
        Form = kwargs.get("form", self.form)
        kwargs.update( form=autosave_userform_factory(
                                »  request.user, self.model, form=Form))
                                »
        return super(AutosaveUserAdmin, self).get_form(request, obj, **kwargs)

    def queryset(self, request):
        return super(AutosaveUserAdmin, self).queryset(request)
                                »                    .filter(user=request.user)

    has_delete_permission = has_change_permission = _check_user_permission



class AuthorAdmin(AutosaveUserAdmin):
    list_display = ('name', 'user')


admin.site.register(Author, AuthorAdmin)
```

form in admin

```
class PostAdmin(AutosaveUserAdmin):
    list_display = ('title', 'author', 'user')
    fields = ["title", "author"]
    def get_form(self, request, obj=None, **kwargs):
        Form = kwargs.get("form", self.form)
        kwargs.update(
          form=filter_author_form_factory(
                                  request.user, self.model, form=Form))

        return super(PostAdmin, self).get_form(request, obj, **kwargs)

admin.site.register(Post, PostAdmin)
```



Change author | Dja...

localhost:8000/admin/blog/author/6/

Django administration

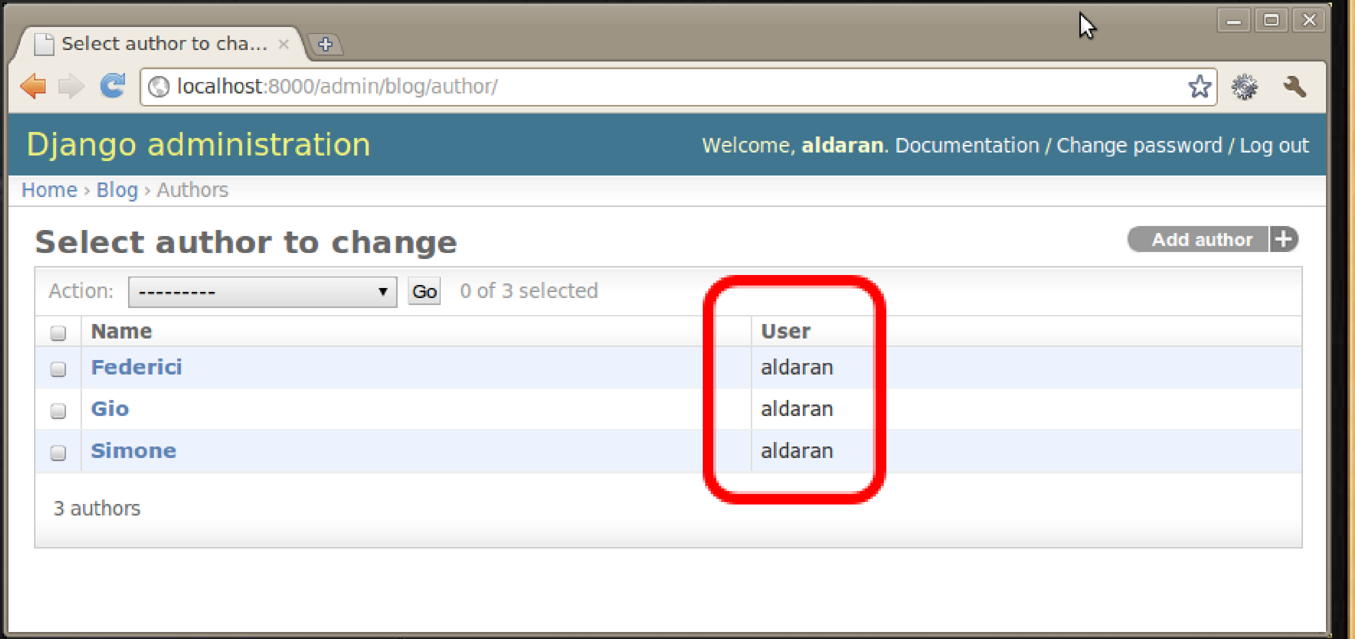
Welcome, **aldaran**. Documentation / Change password / Log out

Home › Blog › Authors › Federici

Change author

Name: Federici

localhost:8000/admin/doc/



Select author to cha...

localhost:8000/admin/blog/author/

Django administration

Welcome, **aldaran**. Documentation / Change password / Log out

Home › Blog › Authors

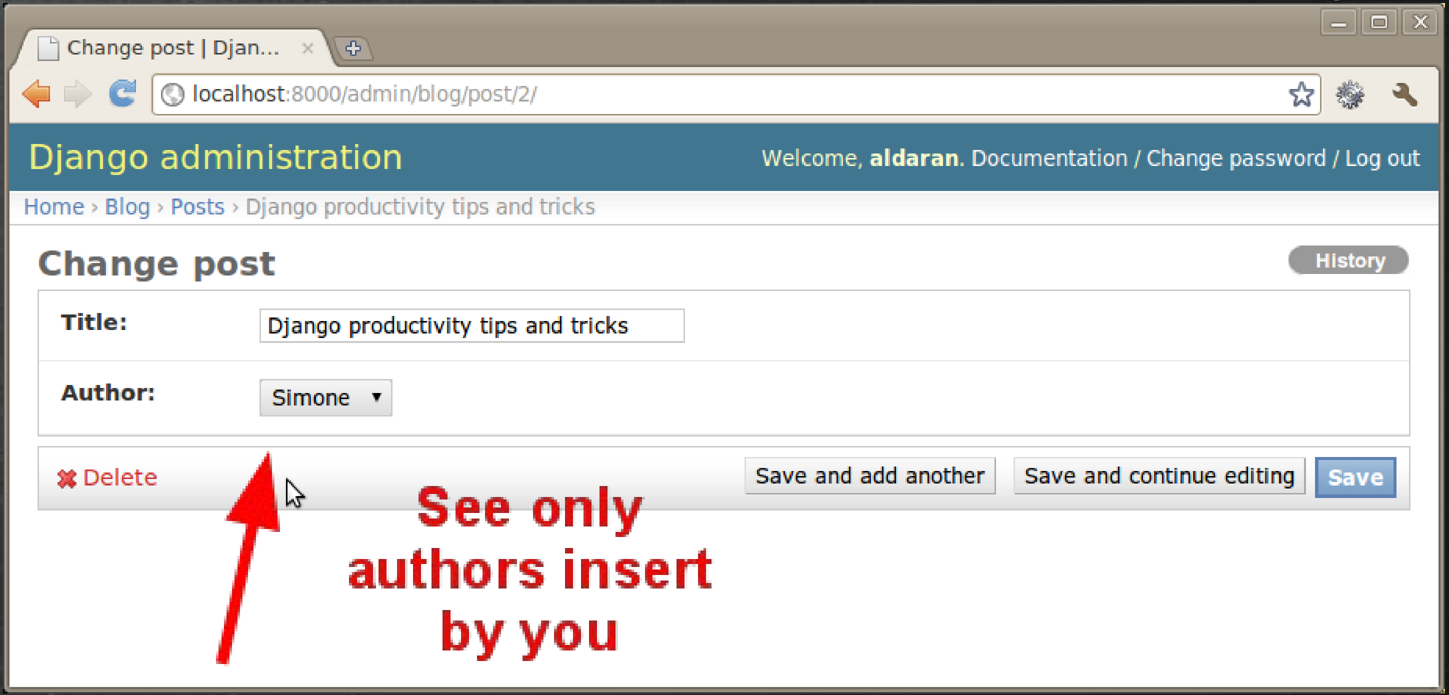
Select author to change

Action: ---------- Go 0 of 3 selected

Name	User
Federici	aldaran
Gio	aldaran
Simone	aldaran

3 authors

AuthorAdmin - AutoSaveForm


Change post | Djan...

localhost:8000/admin/blog/post/2/

Django administration

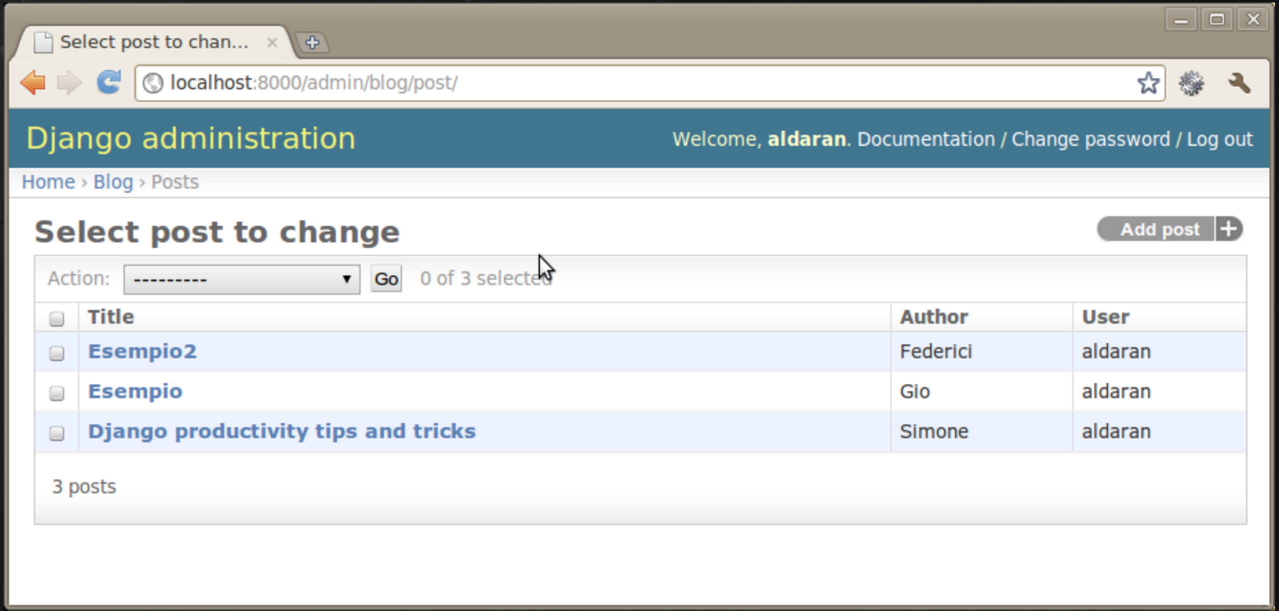
Welcome, **aldaran**. Documentation / Change password / Log out

Home › Blog › Posts › Django productivity tips and tricks

Change post

History

Title:	Django productivity tips and tricks
Author:	Simone


Select post to chan...

localhost:8000/admin/blog/post/

Django administration

Welcome, **aldaran**. Documentation / Change password / Log out

Home › Blog › Posts

Select post to change

0 of 3 selected

Title	Author	User
Esempio2	Federici	aldaran
Esempio	Gio	aldaran
Django productivity tips and tricks	Simone	aldaran

3 posts

PostAdmin - AutoSaveForm - Filter Authors

jquery + REST + json

- form widgets:
  - autocomplete
  - timeentry - mouse gestures
  - colorpicker, date range, etc...
- jquery-ui
  - datatable, tablesort, pagination, etc...
  - fullcalendar, drag and drop, ecc...
  - dialog, fancybox, ajax-form

[after all this is another talk...]

www.k-tech.it

Questions?

s.federici@k-tech.it

References

http://www.k-tech.it/
http://pypi.python.org/pypi/virtualenv
https://www.djangoproject.com/
http://pypi.python.org/pypi/setuptools
http://www.pythonware.com/products/pil/
http://ipython.scipy.org/
http://oss.oetiker.ch/rrdtool/
http://www.jetbrains.com/pycharm/
http://pypi.python.org/pypi/yolk
http://pypi.python.org/pypi/django-allauth
http://www.os4d.org/djangodevtools
http://nedbatchelder.com/code/coverage/
http://packages.python.org/distribute/
http://trac.buildbot.net/
http://code.google.com/p/django-buildbot/
http://projects.unbit.it/uwsgi/
http://jquery.com/
http://jqueryui.com/
http://django-rest-framework.org/
http://docs.jquery.com/Plugins
http://arshaw.com/fullcalendar/