Django Two-Factor Authentication Documentation

Release 1.9.1

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Complete Two-Factor Authentication for Django. Built on top of the one-time password framework django-otp and Django's built-in authentication framework `django.contrib.auth` for providing the easiest integration into most Django projects. Inspired by the user experience of Google's Two-Step Authentication, allowing users to authenticate through call, text messages (SMS) or by using a token generator app like Google Authenticator.

Contents:

CHAPTER 1

Requirements

1.1 Django

Modern Django versions are supported. Currently this list includes Django 1.11, 2.1, and 2.2.

1.2 Python

The following Python versions are supported: 2.7, 3.4, 3.5, 3.6 and 3.7 with a limit to what Django itself supports. As support for older Django versions is dropped, the minimum version might be raised. See also What Python version can I use with Django?.

1.3 django-otp

This project is used for generating one-time passwords. Version 0.6.x and above are supported.

1.4 django-formtools

Formerly known as `django.contrib.formtools`, it has been separated from Django 1.8 into a new package. Version 1.0 is supported.

CHAPTER 2

Installation

You can install from PyPI using `pip` to install `django-two-factor-auth` and its dependencies:

```
$ pip install django-two-factor-auth
```

2.1 Setup

Add the following apps to the `INSTALLED_APPS`:

```
INSTALLED_APPS = (
    ...
    'django_otp',
    'django_otp.plugins.otp_static',
    'django_otp.plugins.otp_totp',
    'two_factor',
)
```

Add the `django-otp` middleware to your `MIDDLEWARE`. Make sure it comes after `AuthenticationMiddleware`:

```
MIDDLEWARE = (
    ...
    'django.contrib.auth.middleware.AuthenticationMiddleware',
    'django_otp.middleware.OTPMiddleware',
    ...
)
```

Point to the new login pages in your `settings.py`:

```
LOGIN_URL = 'two_factor:login'

# this one is optional
LOGIN_REDIRECT_URL = 'two_factor:profile'
```

Add the routes to your project url configuration:

```
from two_factor.urls import urlpatterns as tf_urls
urlpatterns = [
   url(r'', include(tf_urls)),
    ...
]
```

Warning: Be sure to remove any other login routes, otherwise the two-factor authentication might be circumvented. The admin interface should be automatically patched to use the new login method.

2.2 Yubikey Setup

In order to support Yubikeys, you have to install a plugin for *django-otp*:

```
$ pip install django-otp-yubikey
```

Add the following app to the `INSTALLED_APPS`:

```
INSTALLED_APPS = (
    ...
    'otp_yubikey',
)
```

This plugin also requires adding a validation service, through wich YubiKeys will be verified. Normally, you'd use the YubiCloud for this. In the Django admin, navigate to `YubiKey validation services` and add an item. Django Two-Factor Authentication will identify the validation service with the name `default`. The other fields can be left empty, but you might want to consider requesting an API ID along with API key and using SSL for communicating with YubiCloud.

You could also do this using Django's *manage.py shell*:

```
$ python manage.py shell
```

```
>>> from otp_yubikey.models import ValidationService
>>> ValidationService.objects.create(
...     name='default', use_ssl=True, param_sl='', param_timeout=''
... )
<ValidationService: default>
```

CHAPTER 3

Configuration

3.1 General Settings

`TWO_FACTOR_PATCH_ADMIN` (default: `True`) Whether the Django admin is patched to use the default login view.

> **Warning:** The admin currently does not enforce one-time passwords being set for admin users.

`TWO_FACTOR_CALL_GATEWAY` (default: `None`) Which gateway to use for making phone calls. Should be set to a module or object providing a `make_call` method. Currently two gateways are bundled:

- `'two_factor.gateways.twilio.gateway.Twilio'` for making real phone calls using Twilio.
- `'two_factor.gateways.fake.Fake'` for development, recording tokens to the default logger.

`TWO_FACTOR_SMS_GATEWAY` (default: `None`) Which gateway to use for sending text messages. Should be set to a module or object providing a `send_sms` method. Currently two gateways are bundled:

- `'two_factor.gateways.twilio.gateway.Twilio'` for sending real text messages using Twilio.
- `'two_factor.gateways.fake.Fake'` for development, recording tokens to the default logger.

`LOGIN_URL` Should point to the login view provided by this application as described in setup. This login view handles password authentication followed by a one-time password exchange if enabled for that account. This can be a URL path or URL name as defined in the Django documentation.

See also LOGIN_URL.

`LOGIN_REDIRECT_URL` This application provides a basic page for managing one's account. This view is entirely optional and could be implemented in a custom view. This can be a URL path or URL name as defined in the Django documentation.

See also LOGIN_REDIRECT_URL.

LOGOUT_REDIRECT_URL Should point to a view that the user is redirected to after loging out. It was added in Django 1.10, and also adapted by this application. This can be a URL path or URL name as defined in the Django documentation.

See also LOGOUT_REDIRECT_URL.

TWO_FACTOR_QR_FACTORY The default generator for the QR code images is set to SVG. This does not require any further dependencies, however it does not work on IE8 and below. If you have PIL, Pillow or pyimaging installed you may wish to use PNG images instead.

- `'qrcode.image.pil.PilImage'` may be used for PIL/Pillow
- `'qrcode.image.pure.PymagingImage'` may be used for pyimaging

For more QR factories that are available see python-qrcode.

TWO_FACTOR_TOTP_DIGITS (default: 6) The number of digits to use for TOTP tokens, can be set to 6 or 8. This setting will be used for tokens delivered by phone call or text message and newly configured token generators. Existing token generator devices will not be affected.

> **Warning:** The Google Authenticator app does not support 8 digit codes (see the upstream ticket). Don't set this option to 8 unless all of your users use a 8 digit compatible token generator app.

PHONENUMBER_DEFAULT_REGION (default: None) The default region for parsing phone numbers. If your application's primary audience is a certain country, setting the region to that country allows entering phone numbers without that country's country code.

3.2 Twilio Gateway

To use the Twilio gateway, you need first to install the Twilio client:

```
$ pip install twilio
```

Next, add additional urls to your config:

```
# urls.py
from two_factor.gateways.twilio.urls import urlpatterns as tf_twilio_urls
urlpatterns = [
    url(r'', include(tf_twilio_urls)),
    ...
]
```

Additionally, you need to enable the `ThreadLocals` middleware:

```
MIDDLEWARE = (
    ...

    # Always include for two-factor auth
    'django_otp.middleware.OTPMiddleware',

    # Include for twilio gateway
    'two_factor.middleware.threadlocals.ThreadLocals',
)
```

class two_factor.gateways.twilio.gateway.**Twilio**

Gateway for sending text messages and making phone calls using Twilio.

All you need is your Twilio Account SID and Token, as shown in your Twilio account dashboard.

TWILIO_ACCOUNT_SID Should be set to your account's SID.

TWILIO_AUTH_TOKEN Should be set to your account's authorization token.

TWILIO_CALLER_ID Should be set to a verified phone number. Twilio differentiates between numbers verified for making phone calls and sending text messages.

3.3 Fake Gateway

class `two_factor.gateways.fake.`**Fake**

Prints the tokens to the logger. You will have to set the message level of the `two_factor` logger to `INFO` for them to appear in the console. Useful for local development. You should configure your logging like this:

```
LOGGING = {
    'version': 1,
    'disable_existing_loggers': False,
    'handlers': {
        'console': {
            'level': 'DEBUG',
            'class': 'logging.StreamHandler',
        },
    },
    'loggers': {
        'two_factor': {
            'handlers': ['console'],
            'level': 'INFO',
        }
    }
}
```

CHAPTER 4

Implementing

Users can opt-in to enhanced security by enabling two-factor authentication. There is currently no enforcement of a policy, it is entirely optional. However, you could override this behaviour to enforce a custom policy.

4.1 Limiting access to certain views

For increased security views can be limited to two-factor-enabled users. This allows you to secure certain parts of the website. Doing so requires a decorator, class mixin or a custom inspection of a user's session.

4.1.1 Decorator

You can use django-otp's built-in *otp_required()* decorator to limit access to two-factor-enabled users:

```
from django_otp.decorators import otp_required

@otp_required
def my_view(request):
    pass
```

4.1.2 Mixin

The mixin *OTPRequiredMixin* can be used to limit access to class-based views (CBVs):

```
class ExampleSecretView(OTPRequiredMixin, TemplateView):
    template_name = 'secret.html'
```

4.1.3 Custom

The method `is_verified()` is added through django-otp's *OTPMiddleware* which can be used to check if the user was logged in using two-factor authentication:

```
def my_view(request):
    if request.user.is_verified():
        # user logged in using two-factor
        pass
    else:
        # user not logged in using two-factor
        pass
```

4.2 Enforcing two-factor

Forcing users to enable two-factor authentication is not implemented. However, you could create your own custom policy.

4.3 Admin Site

By default the admin login is patched to use the login views provided by this application. Patching the admin is required as users would otherwise be able to circumvent OTP verification. See also `TWO_FACTOR_PATCH_ADMIN`. Be aware that certain packages include their custom login views, for example *django.contrib.admindocs*. When using said packages, OTP verification can be circumvented. Thus however the normal admin login view is patched, OTP might not always be enforced on the admin views. See the next paragraph on how to do this.

In order to only allow verified users (enforce OTP) to access the admin pages, you have to use a custom admin site. You can either use *AdminSiteOTPRequired* or *AdminSiteOTPRequiredMixin*. See also the Django documentation on Hooking AdminSite instances into your URLconf.

If you want to enforce two factor authentication in the admin and use the default admin site (e.g. because 3rd party packages register to `django.contrib.admin.site`) you can monkey patch the default `AdminSite` with this. In your `urls.py`:

```
from django.contrib import admin
from two_factor.admin import AdminSiteOTPRequired

admin.site.__class__ = AdminSiteOTPRequired

urlpatterns = [
    url(r'^admin/', admin.site.urls),
    ...
]
```

4.4 Signals

When a user was successfully verified using a OTP, the signal *user_verified* is sent. The signal includes the user, the device used and the request itself. You can use this signal for example to warn a user when one of his backup tokens was used:

```
from django.dispatch import receiver
from two_factor.compat import get_current_site
from two_factor.signals import user_verified


@receiver(user_verified)
def test_receiver(request, user, device, **kwargs):
    current_site = get_current_site(request)
    if device.name == 'backup':
        message = 'Hi %(username)s,\n\n'\
                  'You\'ve verified yourself using a backup device '\
                  'on %(site_name)s. If this wasn\'t you, your '\
                  'account might have been compromised. You need to '\
                  'change your password at once, check your backup '\
                  'phone numbers and generate new backup tokens.'\
                  % {'username': user.get_username(),
                     'site_name': current_site.name}
        user.email_user(subject='Backup token used', message=message)
```

CHAPTER 5

Management Commands

5.1 Status

class two_factor.management.commands.two_factor_status.**Command**(*stdout=None*, *stderr=None*, *no_color=False*, *force_color=False*)

Command to check two-factor authentication status for certain users.

The command accepts any number of usernames, and will list if OTP is enabled or disabled for those users.

Example usage:

```
manage.py two_factor_status bouke steve
bouke: enabled
steve: disabled
```

5.2 Disable

class two_factor.management.commands.two_factor_disable.**Command**(*stdout=None*, *stderr=None*, *no_color=False*, *force_color=False*)

Command for disabling two-factor authentication for certain users.

The command accepts any number of usernames, and will remove all OTP devices for those users.

Example usage:

```
manage.py two_factor_disable bouke steve
```

CHAPTER 6

Class Reference

6.1 Admin Site

class two_factor.admin.**AdminSiteOTPRequired**(*name='admin'*)

AdminSite enforcing OTP verified staff users.

class two_factor.admin.**AdminSiteOTPRequiredMixin**

Mixin for enforcing OTP verified staff users.

Custom admin views should either be wrapped using `admin_view()` or use `has_permission()` in order to secure those views.

6.2 Decorators

django_otp.decorators.**otp_required**(*view=None*, *redirect_field_name='next'*, *login_url=None*, *if_configured=False*)

Similar to `login_required()`, but requires the user to be verified. By default, this redirects users to `OTP_LOGIN_URL`.

Parameters **if_configured** (*bool*) – If `True`, an authenticated user with no confirmed OTP devices will be allowed. Default is `False`.

two_factor.views.utils.**class_view_decorator**(*function_decorator*)

Converts a function based decorator into a class based decorator usable on class based Views.

Can't subclass the *View* as it breaks inheritance (super in particular), so we monkey-patch instead.

From: http://stackoverflow.com/a/8429311/58107

6.3 Models

class two_factor.models.**PhoneDevice**(**args*, ***kwargs*)

Model with phone number and token seed linked to a user.

class django_otp.plugins.otp_static.models.**StaticDevice**(**args*, ***kwargs*)

A static `Device` simply consists of random tokens shared by the database and the user. These are frequently used as emergency tokens in case a user's normal device is lost or unavailable. They can be consumed in any order; each token will be removed from the database as soon as it is used.

This model has no fields of its own, but serves as a container for `StaticToken` objects.

token_set

The RelatedManager for our tokens.

class django_otp.plugins.otp_static.models.**StaticToken**(**args*, ***kwargs*)

A single token belonging to a `StaticDevice`.

device

ForeignKey: A foreign key to `StaticDevice`.

token

CharField: A random string up to 16 characters.

class django_otp.plugins.otp_totp.models.**TOTPDevice**(**args*, ***kwargs*)

A generic TOTP `Device`. The model fields mostly correspond to the arguments to `django_otp.oath.totp()`. They all have sensible defaults, including the key, which is randomly generated.

key

CharField: A hex-encoded secret key of up to 40 bytes. (Default: 20 random bytes)

step

PositiveSmallIntegerField: The time step in seconds. (Default: 30)

t0

BigIntegerField: The Unix time at which to begin counting steps. (Default: 0)

digits

PositiveSmallIntegerField: The number of digits to expect in a token (6 or 8). (Default: 6)

tolerance

PositiveSmallIntegerField: The number of time steps in the past or future to allow. For example, if this is 1, we'll accept any of three tokens: the current one, the previous one, and the next one. (Default: 1)

drift

SmallIntegerField: The number of time steps the prover is known to deviate from our clock. If `OTP_TOTP_SYNC` is `True`, we'll update this any time we match a token that is not the current one. (Default: 0)

last_t

BigIntegerField: The time step of the last verified token. To avoid verifying the same token twice, this will be updated on each successful verification. Only tokens at a higher time step will be verified subsequently. (Default: -1)

6.4 Middleware

class django_otp.middleware.**OTPMiddleware**(*get_response=None*)

This must be installed after `AuthenticationMiddleware` and performs an analogous function. Just as AuthenticationMiddleware populates `request.user` based on session data, OTPMiddleware populates

`request.user.otp_device` to the `Device` object that has verified the user, or `None` if the user has not been verified. As a convenience, this also installs `user.is_verified()`, which returns `True` if `user.otp_device` is not `None`.

6.5 Signals

`two_factor.signals.`**`user_verified`**

Sent when a user is verified against a OTP device. Provides the following arguments:

sender The class sending the signal (`'two_factor.views.core'`).

user The user that was verified.

device The OTP device that was used.

request The `HttpRequest` in which the user was verified.

6.6 Template Tags

`two_factor.templatetags.two_factor.`**`device_action`**(*device*)

Generates an actionable text for a `PhoneDevice`.

Examples:

- Send text message to *+31 * ******58*
- Call number *+31 * ******58*

`two_factor.templatetags.two_factor.`**`format_phone_number`**(*number*)

Formats a phone number in international notation. :param number: str or phonenumber object :return: str

`two_factor.templatetags.two_factor.`**`mask_phone_number`**(*number*)

Masks a phone number, only first 3 and last 2 digits visible.

Examples:

- *+31 * ******58*

Parameters **number** – str or phonenumber object

Returns str

6.7 Views

class `two_factor.views.`**`LoginView`**(***kwargs*)

View for handling the login process, including OTP verification.

The login process is composed like a wizard. The first step asks for the user's credentials. If the credentials are correct, the wizard proceeds to the OTP verification step. If the user has a default OTP device configured, that device is asked to generate a token (send sms / call phone) and the user is asked to provide the generated token. The backup devices are also listed, allowing the user to select a backup device for verification.

class `two_factor.views.`**`SetupView`**(***kwargs*)

View for handling OTP setup using a wizard.

The first step of the wizard shows an introduction text, explaining how OTP works and why it should be enabled. The user has to select the verification method (generator / call / sms) in the second step. Depending on the method selected, the third step configures the device. For the generator method, a QR code is shown which can be scanned using a mobile phone app and the user is asked to provide a generated token. For call and sms methods, the user provides the phone number which is then validated in the final step.

class `two_factor.views.`**`SetupCompleteView`**(***kwargs*)
View congratulation the user when OTP setup has completed.

class `two_factor.views.`**`BackupTokensView`**(***kwargs*)
View for listing and generating backup tokens.

A user can generate a number of static backup tokens. When the user loses its phone, these backup tokens can be used for verification. These backup tokens should be stored in a safe location; either in a safe or underneath a pillow ;-).

class `two_factor.views.`**`PhoneSetupView`**(***kwargs*)
View for configuring a phone number for receiving tokens.

A user can have multiple backup `PhoneDevice` for receiving OTP tokens. If the primary phone number is not available, as the battery might have drained or the phone is lost, these backup phone numbers can be used for verification.

class `two_factor.views.`**`PhoneDeleteView`**(***kwargs*)
View for removing a phone number used for verification.

class `two_factor.views.`**`ProfileView`**(***kwargs*)
View used by users for managing two-factor configuration.

This view shows whether two-factor has been configured for the user's account. If two-factor is enabled, it also lists the primary verification method and backup verification methods.

class `two_factor.views.`**`DisableView`**(***kwargs*)
View for disabling two-factor for a user's account.

6.8 View Mixins

class `two_factor.views.mixins.`**`OTPRequiredMixin`**
View mixin which verifies that the user logged in using OTP.

Note: This mixin should be the left-most base class.

`get_login_url`()
Returns login url to redirect to.

`get_verification_url`()
Returns verification url to redirect to.

`login_url = None`
If `raise_anonymous` is set to *False*, this defines where the user will be redirected to. Defaults to `two_factor:login`.

`raise_anonymous = False`
Whether to raise PermissionDenied if the user isn't logged in.

`raise_unverified = False`
Whether to raise PermissionDenied if the user isn't verified.

`redirect_field_name = 'next'`
URL query name to use for providing the destination URL.

`verification_url = None`
If `raise_unverified` is set to *False*, this defines where the user will be redirected to. If set to `None`, an explanation will be shown to the user on why access was denied.

CHAPTER 7

Release Notes

7.1 1.7.0

- New: Support for Django 2.0.
- Dropped Django <1.11 support.
- Fix: Do not list phone method if it is not supported (#225).
- Pass request kwarg to authentication form (#227).

7.2 1.6.2

- Fix: Twilio client 6.0 usage (#211).
- Updated translation: Russian.

7.3 1.6.1

- Support Twilio client 6.0 (#203).
- Fix: Fixed redirect_to after successful login (#204).
- Updated translation: Norwegian Bokmål.

7.4 1.6.0

- New: Support for Django 1.11 (#188).
- Dropped Django 1.9 support.

- Fix: Allow setting `LOGIN_REDIRECT_URL` to a URL (#192).
- Fix: `DisableView` should also take `success_url` parameter (#187).

7.5 1.5.0

- New: Django 1.10's MIDDLEWARE support.
- New: Allow `success_url` overrides from `urls.py`.
- New: Autofocus token input during authentication.
- New translations: Polish, Italian, Hungarian, Finnish and Danish.
- Renamed `redirect_url` properties to `success_url` to be consistent with Django.
- Dropped Python 3.2 and 3.3 support.
- Fix: Allow Firefox users to enter backup tokens (#177).
- Fix: Allow multiple requests for QR code (#99).
- Fix: Don't add phone number without gateway (#92).
- Fix: Redirect to 2FA profile page after removing a phone (#159).

7.6 1.4.0

- New: Support for Django 1.10 (#157).
- Fix: Enable autodoc builds in documentation (#164).
- Fix: Support named urls in `LOGIN_URL`, `LOGIN_REDIRECT_URL` and `LOGOUT_URL` (#153).

7.7 1.3.1

- Fix: KeyError when trying to login (#102).
- Fix: Migration fails with custom user model without username field.
- Fix: Added missing migrations.
- Fix: Spurious migrations on Python 3.
- Require django-otp 0.3.4 and above for better Python 3 compatibility.

7.8 1.3.0

- New feature: Added support for Django 1.9.
- New feature: Use phonenumbers library to validate phone number format.
- New feature: Use django-phonenumber-field for storing phone number in E.164 format.
- Use AppConfig for patching admin.
- Reduced number of tox test environments.

- Removed support for Django 1.7 and below.
- Fix: Catch gateway errors.
- Fix: Use raw_id_fields on admin site form.
- Fix: Skip test that hits bug in Python 2.7.10.
- Fix: Import changed in django-otp 0.3.?.

7.9 1.2.2

- Allow django-otp 0.3.x as well as 0.2.x.

7.10 1.2.1

- Fix: Resolved an issue with django_otp 0.3.2 and higher.

7.11 1.2.0

- Fix: Issue with migrations on Py3 (#87).
- Fix: Fixed failing migration on Django 1.7.0 (#83).
- Fix: Issue with pip unable to install package.
- Dropped support for Django 1.5 and 1.6.
- Added support for Django 1.8.

7.12 1.1.1

- Fix: Resolved a warning from Django 1.7 migrations (#80).

7.13 1.1.0

- New feature: Django 1.7 migrations.
- New feature: Optional support for 8 digit codes (#79).
- Renamed management commands (#77).
- Fix: If the login view state was reset, an exception was raised (#65).
- Fix: Off-screen buttons in default template were visibile on screens with high resolution (#76).

7.14 1.0.0

- New translations: German, Spanish, French, Swedish and Portuguese (Brazil).
- New feature: Support for Django 1.7.
- New feature: Management commands.
- New feature: Support for YubiKeys.
- New feature: Support for custom user model (Django 1.5+) (#39).
- Auto-login after completing setup (#44).
- Advise to add backup devices after setup (#49).
- Documentation about securing admindocs (#66).
- Mitigate voicemail hack (#54).
- Fire signal when user is verified.
- Fix: Cannot generate QR code for unicode characters (#69).
- Fix: Secure sensitive post parameters (#62).
- Fix: Login wizard should handle changing passwords (#63).
- Fix: Always cast the token to an int before verification (#60).
- Fix: Add URL encoding to otpauth URL (#52).
- Fix: Use two_factor:login instead of LOGIN_URL (#55).

7.15 0.5.0

- #32 – Make the auth method label capitalization more consistent.
- #31 – Set an error code for phone_number_validator.
- #30 – Don't transmit token seed through GET parameters.
- #29 – Generate QR codes locally.
- #27 – South migrations to support custom user model.

7.16 0.4.0

- Fixed #26 – Twilio libraries are required.

7.17 0.3.1

- Fixed #25 – Back-up tokens cannot be used for login.

7.18 0.3.0

- #18 – Optionally enforce OTP for admin views.
- New translation: Simplified Chinese.

7.19 0.2.3

- Two new translations: Hebrew and Arabic.

7.20 0.2.2

- Allow changing Twilio call language.

7.21 0.2.1

- Allow overriding instructions in the template.
- Allow customization of the redirect query parameter.
- Faster backup token generating.

7.22 0.2.0

This is a major upgrade, as the package has been rewritten completely. Upgrade to this version with care and make backups of your database before running the South migrations. See installation instructions for installing the new version; update your template customizations and run the database migrations.

I would love to hear your feedback on this application. If you run into problems, please file an issue on GitHub, or contribute to the project by forking the repository and sending some pull requests.

This application is currently translated into English, Dutch, Hebrew, Arabic, German, Chinese, Spanish, French, Swedish, Portuguese (Brazil), Polish, Italian, Hungarian, Finnish and Danish. You can contribute your own language using Transifex.

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