django-cryptography Documentation

Release 0.4

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Contents

A set of primitives for easily encrypting data in Django, wrapping the Python Cryptography library. Also provided is a drop in replacement for Django's own cryptographic primitives, using Cryptography as the backend provider.

CHAPTER 1

Why another encryption library for Django?

The motivation for making django-cryptography was from the general frustration of existing solutions. Libraries such as django-cryptographic-fields and django-crypto-fields do not allow a way to easily work with custom fields, being limited to their own provided subset. As well as many others lacking Python 3 and modern Django support.

1.1 Installation

1.1.1 Requirements

- Python (2.7, 3.5, 3.6, 3.7, 3.8)
- Cryptography (2.0+)
- Django (1.11, 2.1, 2.2)

```
pip install django-cryptography
```

1.2 Settings

1.2.1 CRYPTOGRAPHY_BACKEND

Default: `cryptography.hazmat.backends.default_backend()`

1.2.2 CRYPTOGRAPHY_DIGEST

Default: `cryptography.hazmat.primitives.hashes.SHA256`

The digest algorithm to use for signing and key generation.

1.2.3 CRYPTOGRAPHY_KEY

Default: `None`

When value is `None` a key will be derived from `SECRET_KEY`. Otherwise the value will be used for the key.

1.2.4 CRYPTOGRAPHY_SALT

Default: `'django-cryptography'`

1.2.5 Drop-in Replacements

SIGNING_BACKEND

The default can be replaced with a a Cryptography based version.

```
SIGNING_BACKEND = 'django_cryptography.core.signing.TimestampSigner'
```

1.3 Fields

1.3.1 Constants

1.3.2 Helpers

1.4 Migrating existing data

See also:

If you are unfamiliar with migrations in Django, please consult the Django Migrations documentation.

To migrate an unencrypted database field to an encrypted field the following steps must be followed. Each step is labeled with its Django migration type of schema or data.

1. Rename existing field using a prefix such as `old_` (schema)
2. Add new encrypted field with name of the original field (schema)
3. Copy data from the old field into the new field (data)
4. Remove the old field (schema)

The steps are illustrated bellow for the following model:

```
class EncryptedCharModel(models.Model):
    field = encrypt(models.CharField(max_length=15))
```

Create the initial migration for the *EncryptedCharModel*.

```
class Migration(migrations.Migration):

    initial = True

    dependencies = []
```

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```
    operations = [
        migrations.CreateModel(
            name='EncryptedCharModel',
            fields=[
                ('id', models.AutoField(
                    auto_created=True,
                    primary_key=True,
                    serialize=False,
                    verbose_name='ID')),
                ('field', models.CharField(max_length=15)),
            ],
        ),
    ]
```

Rename the old field by pre-fixing as `old_field` from `field`

```
class Migration(migrations.Migration):

    dependencies = [
        ('fields', '0001_initial'),
    ]

    operations = [
        migrations.RenameField(
            model_name='encryptedcharmodel',
            old_name='field',
            new_name='old_field',
        ),
    ]
```

Add the new encrypted field using the original name from our field.

```
class Migration(migrations.Migration):

    dependencies = [
        ('fields', '0002_rename_fields'),
    ]

    operations = [
        migrations.AddField(
            model_name='encryptedcharmodel',
            name='field',
            field=django_cryptography.fields.encrypt(
                models.CharField(default=None, max_length=15)),
            preserve_default=False,
        ),
    ]
```

Copy the data from the old field into the new field using the ORM. Providing forwards and reverse methods will allow restoring the field to its unencrypted form.

```
def forwards_encrypted_char(apps, schema_editor):
    EncryptedCharModel = apps.get_model("fields", "EncryptedCharModel")

    for row in EncryptedCharModel.objects.all():
```

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```
        row.field = row.old_field
        row.save(update_fields=["field"])


def reverse_encrypted_char(apps, schema_editor):
    EncryptedCharModel = apps.get_model("fields", "EncryptedCharModel")

    for row in EncryptedCharModel.objects.all():
        row.old_field = row.field
        row.save(update_fields=["old_field"])


class Migration(migrations.Migration):

    dependencies = [
        ("fields", "0003_add_encrypted_fields"),
    ]

    operations = [
        migrations.RunPython(forwards_encrypted_char, reverse_encrypted_char),
    ]
```

Delete the old field now that the data has been copied into the new field

```
class Migration(migrations.Migration):

    dependencies = [
        ('fields', '0004_migrate_data'),
    ]

    operations = [
        migrations.RemoveField(
            model_name='encryptedcharmodel',
            name='old_field',
        ),
    ]
```

1.5 Cryptography by example

Using symmetrical encryption to store sensitive data in the database. Wrap the desired model field with `encrypt()` to easily protect its contents.

```
from django.db import models

from django_cryptography.fields import encrypt


class MyModel(models.Model):
    name = models.CharField(max_length=50)
    sensitive_data = encrypt(models.CharField(max_length=50))
```

The data will now be automatically encrypted when saved to the database. `encrypt()` uses an encryption that allows for bi-directional data retrieval.

1.6 Releases

1.6.1 0.4 - 2020-01-28

- Dropped Django 1.8 and 2.0 support
- Fixed Django 3.0 deprecation warning
- Fixed migration test cases

1.6.2 0.3 - 2017-12-19

- Fixed issue with Django migration generation
- Added initial support for Django 2.0
- Dropped Python 3.3 support

1.6.3 0.2 - 2016-12-06

- Refactored `EncryptedField` into `encrypt()` decorator.

1.6.4 0.1 - 2016-05-21

- Initial release

CHAPTER 2

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