Speed Up Your Tests with `setUpTestData()`

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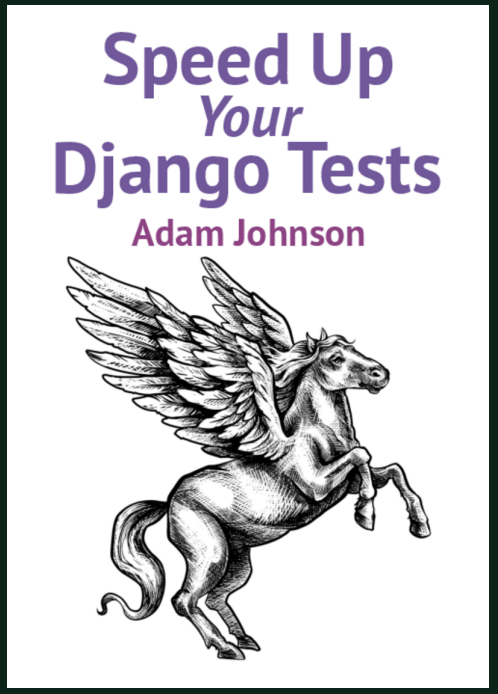
🖐 Five part talk

1. unittest's `setUp*` & `tearDown*` methods
2. Django's unittest extensions
3. `setUpTestData()`
4. Django 3.2's `setUpTestData()` isolation
5. How to convert a `TestCase` to use `setUpTestData()`

✍️ Based on my Blog & Book



33% off during Djangocon Europe

Part One

unittest's `setUp*` & `tearDown*` methods

 Per-test: `setUp()`, `tearDown()`

 Per-`TestCase`: `setUpClass()`, `tearDownClass()`

🔍 *por exemplo:*

```
class MyTests(TestCase):
    @classmethod
    def setUpClass(cls):
        super().setUpClass()
        cls.conn = acme.connect()

    @classmethod
    def tearDownClass(cls):
        cls.conn.close()
        super().tearDownClass()

    def setUp(self):
        super().setUp()
        self.user = make_user(self.conn)

    def tearDown(self):
        self.user.delete()
        super().tearDown()
```

💪 *Robust use:*

```
class MyTests(TestCase):
  def setUp(self):
      super().setUp()
      self.user = make_user(self.conn)

  def tearDown(self):
      if hasattr(self, "user"):
          self.user.delete()
      super().tearDown()
```

💡 *...or:*

🧪 `self.addCleanup(func)`

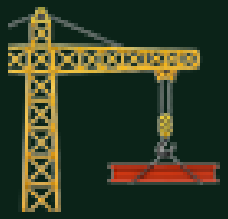
📦 `cls.addClassCleanup(func)` - Python 3.8+

✍️Terse & 💪 Robust:

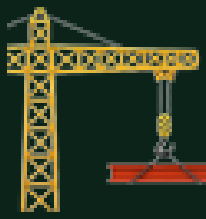
```
class MyTests(TestCase):
    @classmethod
    def setUpClass(cls):
        super().setUpClass()
        cls.conn = acme.connect()
        self.addClassCleanup(cls.conn.close)

    def setUp(self):
        super().setUp()
        self.user = make_user(self.conn)
        self.addCleanup(self.user.delete)
```

`TestCase` lifecycle

1. `setUpClass()`
2. *Per test:*
    i. `setUp()`
    ii. *run test*
    iii. `tearDown()`
    iv. `addCleanup()` functions
3. `tearDownClass()`
4. `addClassCleanup()` functions



Part Two



Django's unittest extensions

unittest.TestCase

SimpleTestCase

TransactionTestCase

TestCase

()

(LiveServerTestCase)

`SimpleTestCase`

- Blocks DB access
- Adds some assertion methods
- Does Django's own per-test setup *outside of* `setUp()`

`TransactionTestCase`

- Allows DB access
- Rolls back DB's by wiping and re-adding fixture data (slow)
- Use to test code that commits transactions

`TestCase`

- Rolls back DB's with **per-class** and **per-test** transactions
- `setUpClass()` calls ✨`setUpTestData()`✨
- (Many more features!)

Django's `TestCase` lifecycle

1. `setUpClass()`: tx begin
2. `setUpClass()`: `setUpTestData()`
3. *Per test:*
    i. `_pre_setup()`: tx begin
    ii. *run test*
    iii. `_post_teardown()`: tx rollback
4. `tearDownClass()`: tx rollback

Part Three

`setUpTestData()`

So, `setUpTestData()`

- Called by `setUpClass()`
- `@classmethod`
- Default empty - yours don't need to call `super()`

Before:

```
class MyTests(TestCase):
    def setUp(self):
      self.book = Book.objects.create(title="1984")

    ...
```

After:

```
class MyTests(TestCase):
    @classmethod
    def setUpTestData(cls):
      cls.book = Book.objects.create(title="1984")

    ...
```

⚖️ Comparison

- Data creation in `setUp()`: N times
- Data creation in `setUpTestData()`: ✨***once***✨

🏇 *Muito rápido!* 🏇

Part Four

Django 3.2's `setUpTestData()` isolation

Take these tests:

```
class MyTests(TestCase):
    @classmethod
    def setUpTestData(cls):
        cls.book = Book.objects.create(title="Meditations")

    def test_that_changes_title(self):
        self.book.title = "Antifragile"

    def test_that_reads_title_from_db(self):
        db_title = Book.objects.get().title
        assert db_title == "Meditations"

    def test_that_reads_in_memory_title(self):
        assert self.book.title == "Meditations"
```

⚠️ *Django < 3.2* ⚠️

```
$ ./manage.py test example.core.tests
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
.F.
======================================================================
FAIL: test_that_reads_in_memory_title (example.core.tests.MyTests)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "/.../example/core/tests.py", line 19, in test_that_reads_in_m
    assert self.book.title == "Meditations"
AssertionError

----------------------------------------------------------------------
Ran 3 tests in 0.002s

FAILED (failures=1)
Destroying test database for alias 'default'...
```

- Database changes rolled back by transaction
- In-memory changes not rolled back
- Docs: re-query in each test - slow and verbose 😢

👉 django-testdata: automatic per-test copying

```
from testdata import wrap_testdata

class MyTests(TestCase):
    @classmethod
    @wrap_testdata
    def setUpTestData(cls):
        cls.book = Book.objects.create(title="Meditations")

    ...
```

 django-testdata merged in Django 3.2 

```python
class MyTests(TestCase):
    @classmethod
    def setUpTestData(cls):
        cls.book = Book.objects.create(title="Meditations")

    ...
```

Thanks Simon Charette! 👍

Part Five

How to convert a `TestCase` to use `setUpTestData()`

🍀 Four steps

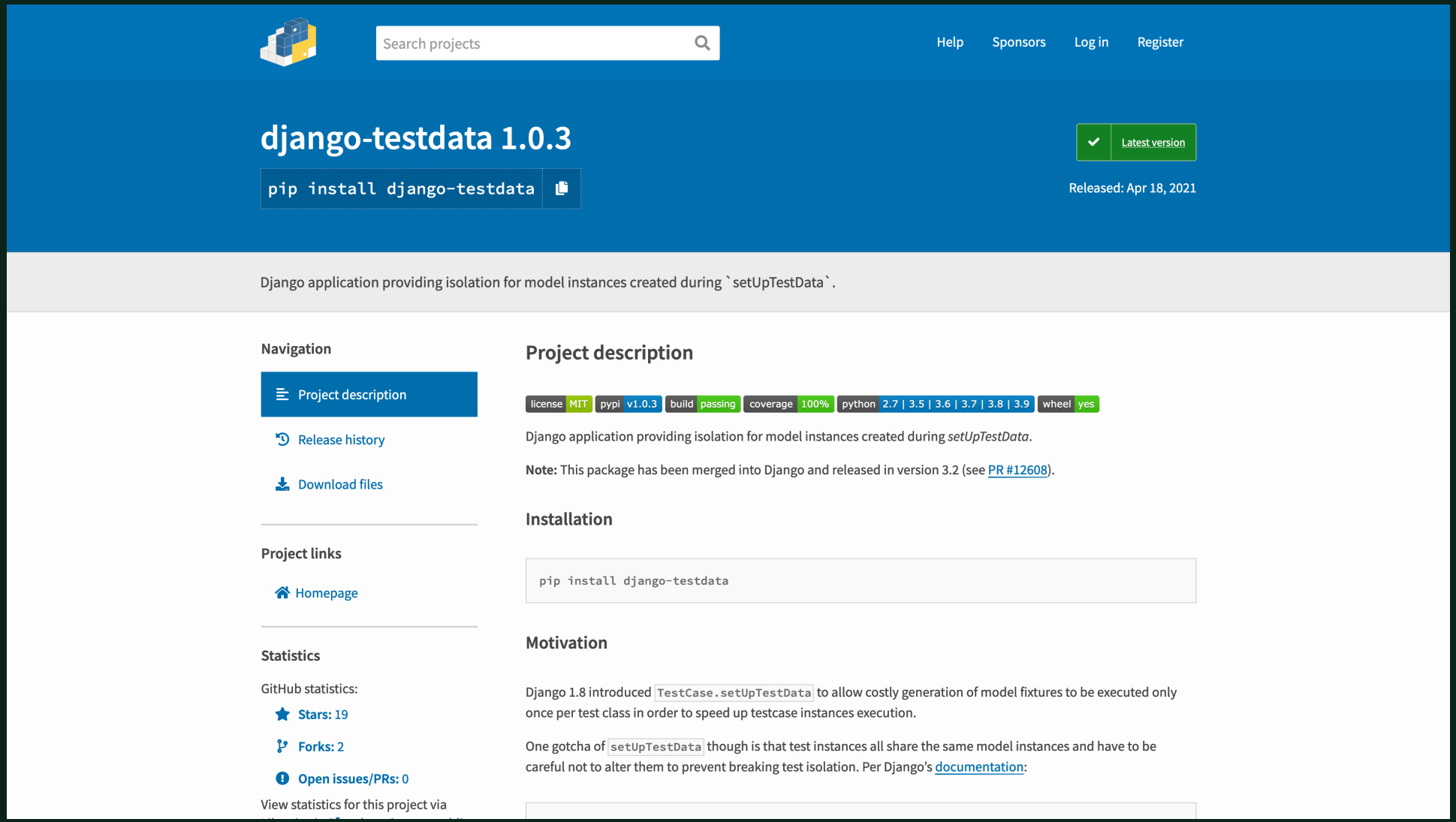
✍️ Blog post: **How to convert a TestCase from setUp() to setUpTestData()**

🔁 Repeat across code base for great gains

🔍 *por exemplo:*

```
class IndexTests(TestCase):
    def setUp(self):
        self.book = Book.objects.create(title="1984")
        self.user = User.objects.create_user(
            username="tester",
            email="test@example.com",
        )
        self.client.force_login(self.user)

    def test_one(self):
        ...

    def test_two(self):
        ...
```

0️⃣ Install django-testdata on Django < 3.2



1️⃣ Run the target test case

```
$ ./manage.py test --keepdb example.core.tests.IndexTests
Using existing test database for alias 'default'...
System check identified no issues (0 silenced).
..
----------------------------------------------------------------------
Ran 2 tests in 0.015s

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

2️⃣ Add a stub `setUpTestData()`

```
 class IndexTests(TestCase):
+    @classmethod
+    def setUpTestData(cls):
+
     def setUp(self):
         self.book = Book.objects.create(title="1984")
         self.user = User.objects.create_user(
```

2️⃣ ...on Django < 3.2:

```
+from testdata import wrap_testdata

 from example.core.models import Book


 class IndexTests(TestCase):
+    @classmethod
+    @wrap_testdata
+    def setUpTestData(cls):
+
     def setUp(self):
         self.book = Book.objects.create(title="1984")
         self.user = User.objects.create_user(
```

3️⃣ Move data creation

```
class IndexTests(TestCase):
     @classmethod
     def setUpTestData(cls):
+        cls.book = Book.objects.create(title="1984")
+        cls.user = User.objects.create_user(
+            username="tester",
+            email="test@example.com",
+        )

     def setUp(self):
-        self.book = Book.objects.create(title="1984")
-        self.user = User.objects.create_user(
-            username="tester", email="test@example.com"
-        )
         self.client.force_login(self.user)

     def test_one(self):
```

3️⃣ Move data creation

```
class IndexTests(TestCase):
    @classmethod
    def setUpTestData(cls):
        cls.book = Book.objects.create(title="1984")
        cls.user = User.objects.create_user(
            username="tester",
            email="test@example.com",
        )

    def setUp(self):
        self.client.force_login(self.user)

    def test_one(self):
        ...

    def test_two(self):
        ...
```

4️⃣ Re-run tests

```
$ ./manage.py test --keepdb example.core.tests.IndexTests
Using existing test database for alias 'default'...
System check identified no issues (0 silenced).
..
----------------------------------------------------------------------
Ran 2 tests in 0.012s

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

✅✅

🎉 Enjoy N ➡️ 1 performance gain

Thank you! 

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- me@adamj.eu
- github.com/adamchainz/talk-speed-up-your-tests-with-setuptestdata