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A Complete Beginner's Guide to Django - Part 5

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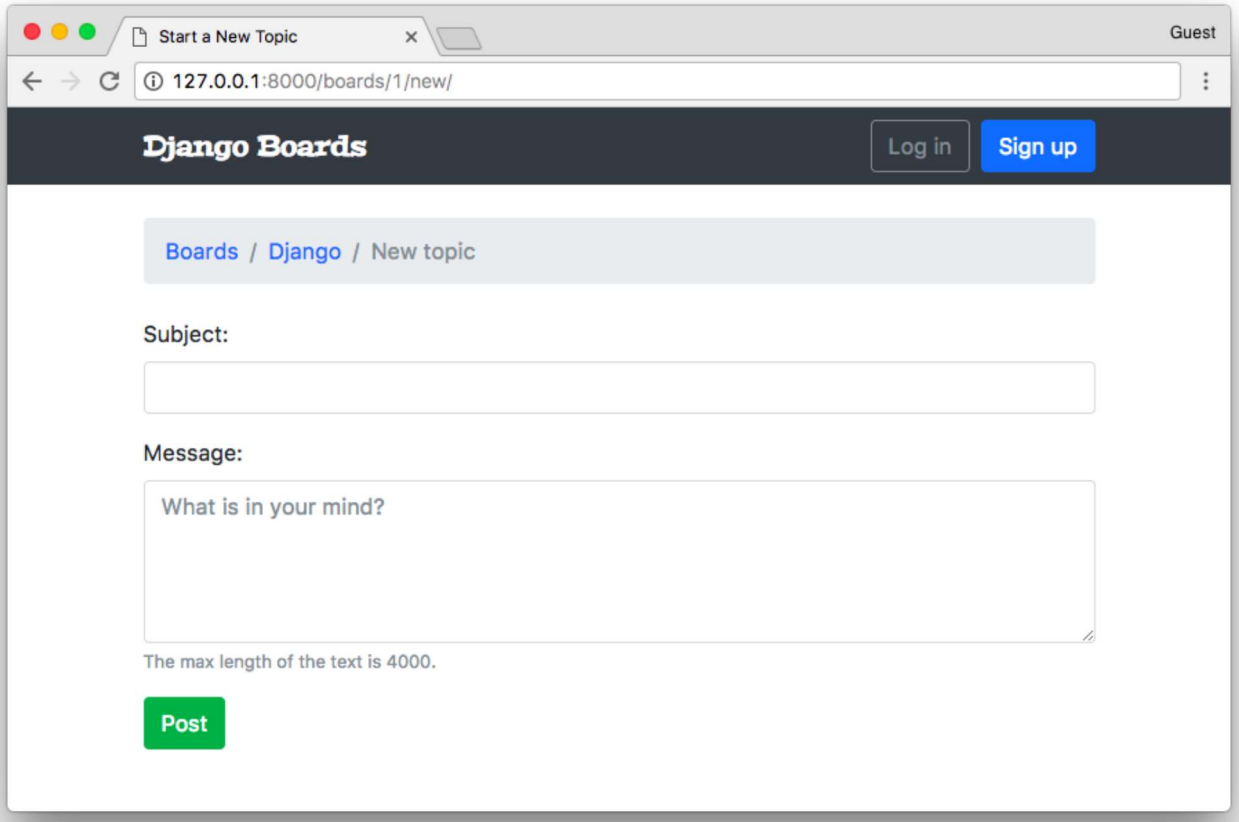
Introduction

Welcome to the 5th part of the tutorial series! In this tutorial, we are going to learn more about protecting views against unauthorized users and how to access the authenticated user in the views and forms. We are also going to implement the topic posts listing view and the reply view. Finally, we are going to explore some features of Django ORM and have a brief introduction to migrations.

Protecting Views

We have to start protecting our views against non-authorized users. So far we have the following view to start new posts:



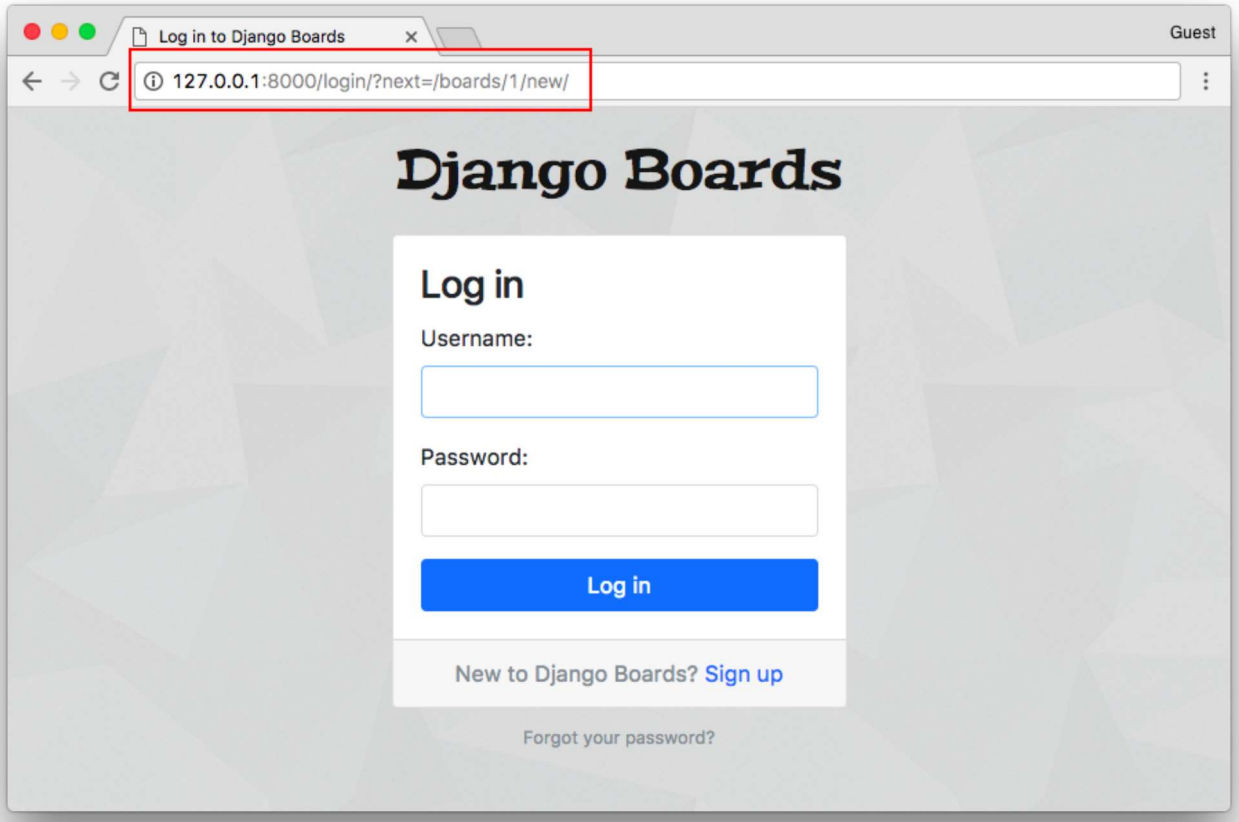
In the picture above the user is not logged in, and even though they can see the page and the form.

Django has a built-in *view decorator* to avoid that issue:

boards/views.py (view complete file contents)

```
from django.contrib.auth.decorators import login_required

@login_required
def new_topic(request, pk):
    # ...
```

From now on, if the user is not authenticated they will be redirected to the login page:



Notice the query string **?next=/boards/1/new/**. We can improve the log in template to make use of the **next** variable and improve the user experience.

Configuring Login Next Redirect

templates/login.html (view complete file contents)

```
<form method="post" novalidate>
  {% csrf_token %}
  <input type="hidden" name="next" value="{{ next }}">
  {% include 'includes/form.html' %}
  <button type="submit" class="btn btn-primary btn-block">Log in</button>
</form>
```

Then if we try to log in now, the application will direct us back to where we were.

So the **next** parameter is part of a built-in functionality.

Login Required Tests

Let's now add a test case to make sure this view is protected by the `@login_required` decorator. But first, let's do some refactoring in the **boards/tests/test_views.py** file.

Let's split the **test_views.py** into three files:

- **test_view_home.py** will include the **HomeTests** class (view complete file contents)
- **test_view_board_topics.py** will include the **BoardTopicsTests** class (view complete file contents)
- **test_view_new_topic.py** will include the **NewTopicTests** class (view complete file contents)

```
myproject/
 |-- myproject/
 |    |-- accounts/
 |    |-- boards/
 |    |    |-- migrations/
 |    |    |-- templatetags/
 |    |    |-- tests/
 |    |    |    |-- __init__.py
 |    |    |    |-- test_templatetags.py
 |    |    |    |-- test_view_home.py          <-- here
 |    |    |    |-- test_view_board_topics.py  <-- here
 |    |    |    +-- test_view_new_topic.py     <-- and here
 |    |    |-- __init__.py
 |    |    |-- admin.py
 |    |    |-- apps.py
 |    |    |-- models.py
 |    |    +-- views.py
 |    |-- myproject/
 |    |-- static/
 |    |-- templates/
 |    |-- db.sqlite3
 |    +-- manage.py
 +-- venv/
```

Run the tests to make sure everything is working.

New let's add a new test case in the **test_view_new_topic.py** to check if the view is decorated with `@login_required`:

boards/tests/test_view_new_topic.py (view complete file contents)

```
from django.test import TestCase
from django.urls import reverse
from ..models import Board

class LoginRequiredNewTopicTests(TestCase):
    def setUp(self):
        Board.objects.create(name='Django', description='Django board.')
        self.url = reverse('new_topic', kwargs={'pk': 1})
        self.response = self.client.get(self.url)

    def test_redirection(self):
        login_url = reverse('login')
        self.assertRedirects(self.response, '{login_url}?next={url}'.format(login_url=login_url,
```

In the test case above we are trying to make a request to the **new topic** view without being authenticated. The expected result is for the request be redirected to the login view.

Accessing the Authenticated User

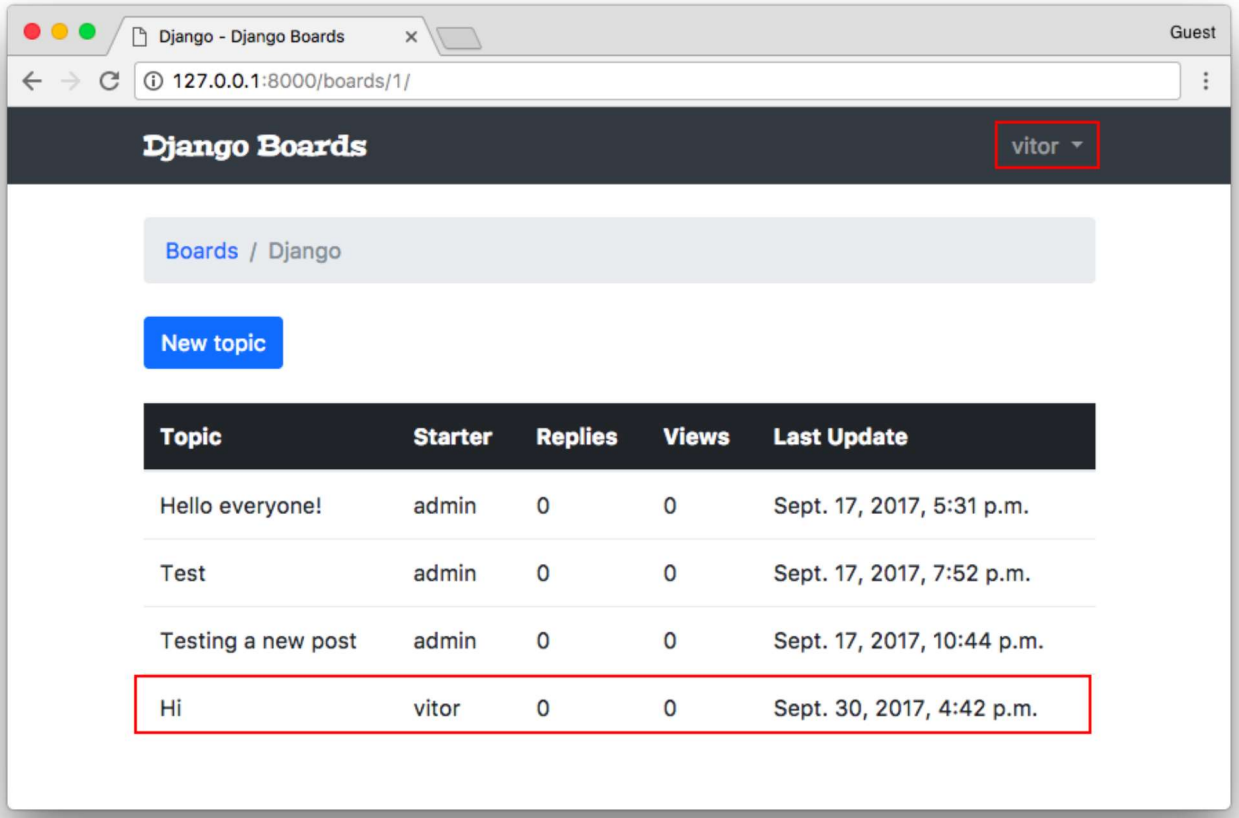
Now we can improve the **new_topic** view and this time set the proper user, instead of just querying the database and picking the first user. That code was temporary because we had no way to authenticate the user. But now we can do better:

boards/views.py (view complete file contents)

```
from django.contrib.auth.decorators import login_required
from django.shortcuts import get_object_or_404, redirect, render

from .forms import NewTopicForm
from .models import Board, Post

@login_required
def new_topic(request, pk):
    board = get_object_or_404(Board, pk=pk)
    if request.method == 'POST':
        form = NewTopicForm(request.POST)
        if form.is_valid():
            topic = form.save(commit=False)
            topic.board = board
```

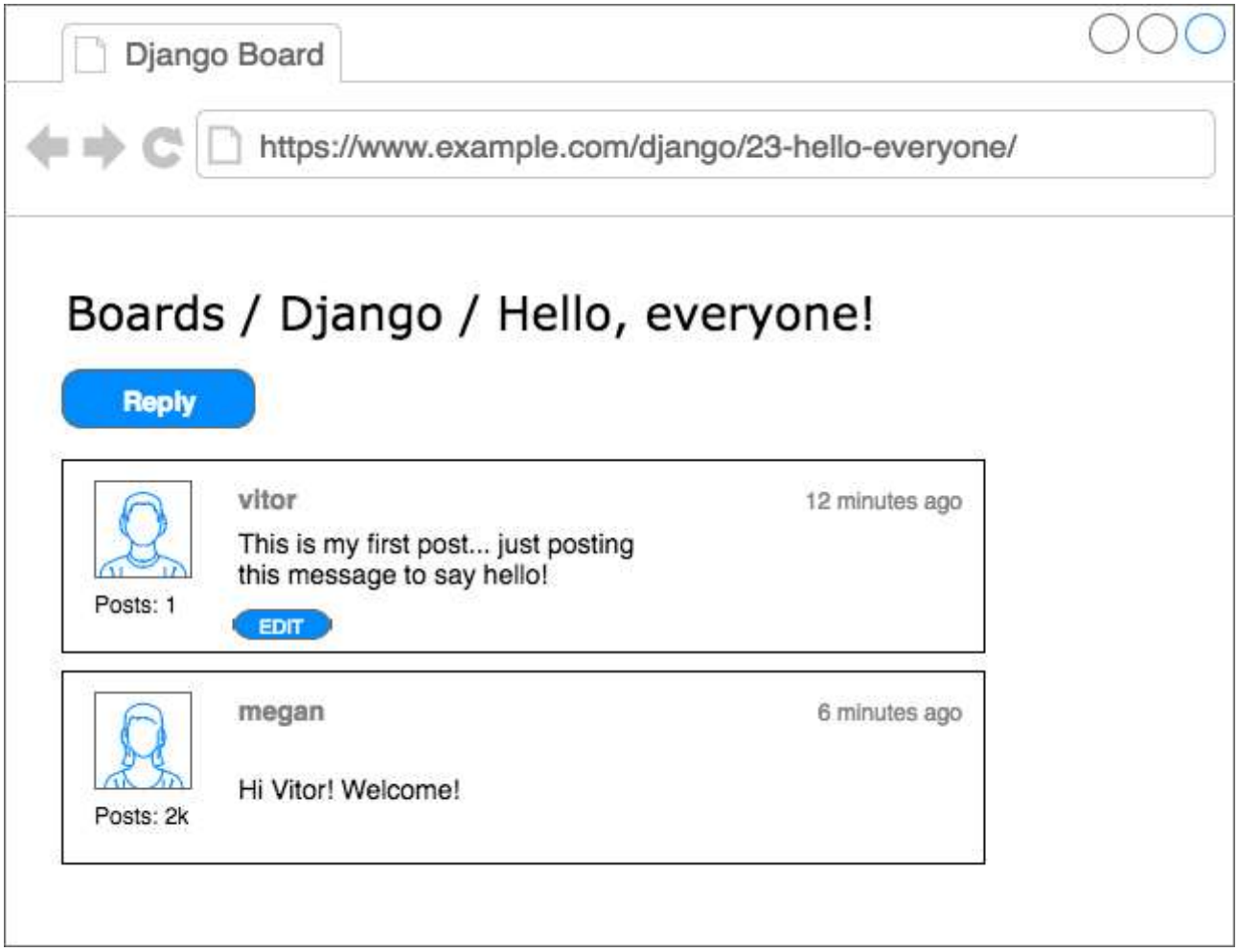
```
            topic.starter = request.user  # <- here
            topic.save()
            Post.objects.create(
                message=form.cleaned_data.get('message'),
                topic=topic,
                created_by=request.user  # <- and here
            )
            return redirect('board_topics', pk=board.pk)  # TODO: redirect to the created topic p
    else:
        form = NewTopicForm()
    return render(request, 'new_topic.html', {'board': board, 'form': form})
```

We can do a quick test here by adding a new topic:



Topic Posts View

Let's take the time now to implement the posts listing page, accordingly to the wireframe below:



First, we need a route:

myproject/urls.py (view complete file contents)

```
url(r'^boards/(?P<pk>\d+)/topics/(?P<topic_pk>\d+)/$', views.topic_posts, name='topic_posts'),
```

Observe that now we are dealing with two keyword arguments: `pk` which is used to identify the Board, and now we have the `topic_pk` which is used to identify which topic to retrieve from the database.

The matching view would be like this:

boards/views.py (view complete file contents)

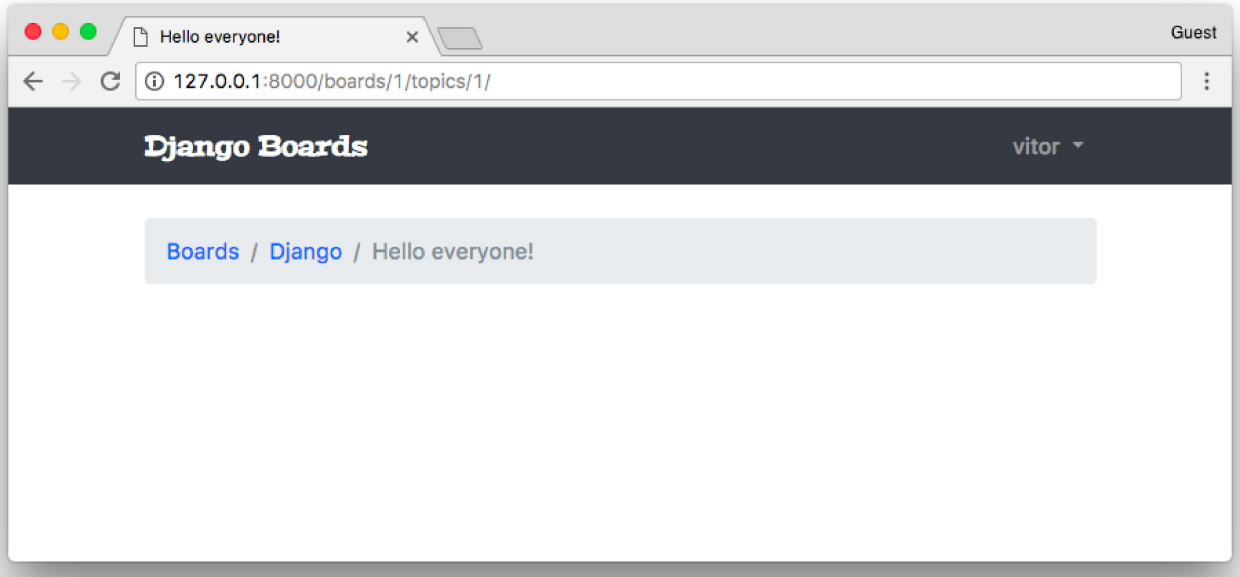
```
from django.shortcuts import get_object_or_404, render
from .models import Topic

def topic_posts(request, pk, topic_pk):
    topic = get_object_or_404(Topic, board__pk=pk, pk=topic_pk)
    return render(request, 'topic_posts.html', {'topic': topic})
```

Note that we are indirectly retrieving the current board. Remember that the topic model is related to the board model, so we can access the current board. You will see in the next snippet:

templates/topic_posts.html (view complete file contents)

```
{% extends 'base.html' %}

{% block title %}{{ topic.subject }}{% endblock %}

{% block breadcrumb %}
  <li class="breadcrumb-item"><a href="{% url 'home' %}">Boards</a></li>
  <li class="breadcrumb-item"><a href="{% url 'board_topics' topic.board.pk %}">{{ topic.board.na
  <li class="breadcrumb-item active">{{ topic.subject }}</li>
{% endblock %}

{% block content %}

{% endblock %}
```

Observe that now instead of using `board.name` in the template, we are navigating through the topic properties, using `topic.board.name`.



Now let's create a new test file for the **topic_posts** view:

boards/tests/test_view_topic_posts.py

```
from django.contrib.auth.models import User
from django.test import TestCase
from django.urls import resolve, reverse
```

```
from ..models import Board, Post, Topic
from ..views import topic_posts


class TopicPostsTests(TestCase):
    def setUp(self):
        board = Board.objects.create(name='Django', description='Django board.')
        user = User.objects.create_user(username='john', email='john@doe.com', password='123')
        topic = Topic.objects.create(subject='Hello, world', board=board, starter=user)
        Post.objects.create(message='Lorem ipsum dolor sit amet', topic=topic, created_by=user)
        url = reverse('topic_posts', kwargs={'pk': board.pk, 'topic_pk': topic.pk})
        self.response = self.client.get(url)

    def test_status_code(self):
        self.assertEquals(self.response.status_code, 200)

    def test_view_function(self):
        view = resolve('/boards/1/topics/1/')
        self.assertEquals(view.func, topic_posts)
```

Note that the test setup is starting to get more complex. We can create mixins or an abstract class to reuse the code as needed. We can also use a third party library to setup some test data, to reduce the boilerplate code.

Also, by now we already have a significant amount of tests, and it's gradually starting to run slower. We can instruct the test suite just to run tests from a given app:

```
python manage.py test boards
```

```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
......................
----------------------------------------------------------------------
Ran 23 tests in 1.246s

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

We could also run only a specific test file:

```
python manage.py test boards.tests.test_view_topic_posts
```

```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
..
----------------------------------------------------------------------
```

```
Ran 2 tests in 0.129s

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

Or just a specific test case:

```
python manage.py test boards.tests.test_view_topic_posts.TopicPostsTests.test_status_code
```

```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
.
----------------------------------------------------------------------
Ran 1 test in 0.100s

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

Cool, right?

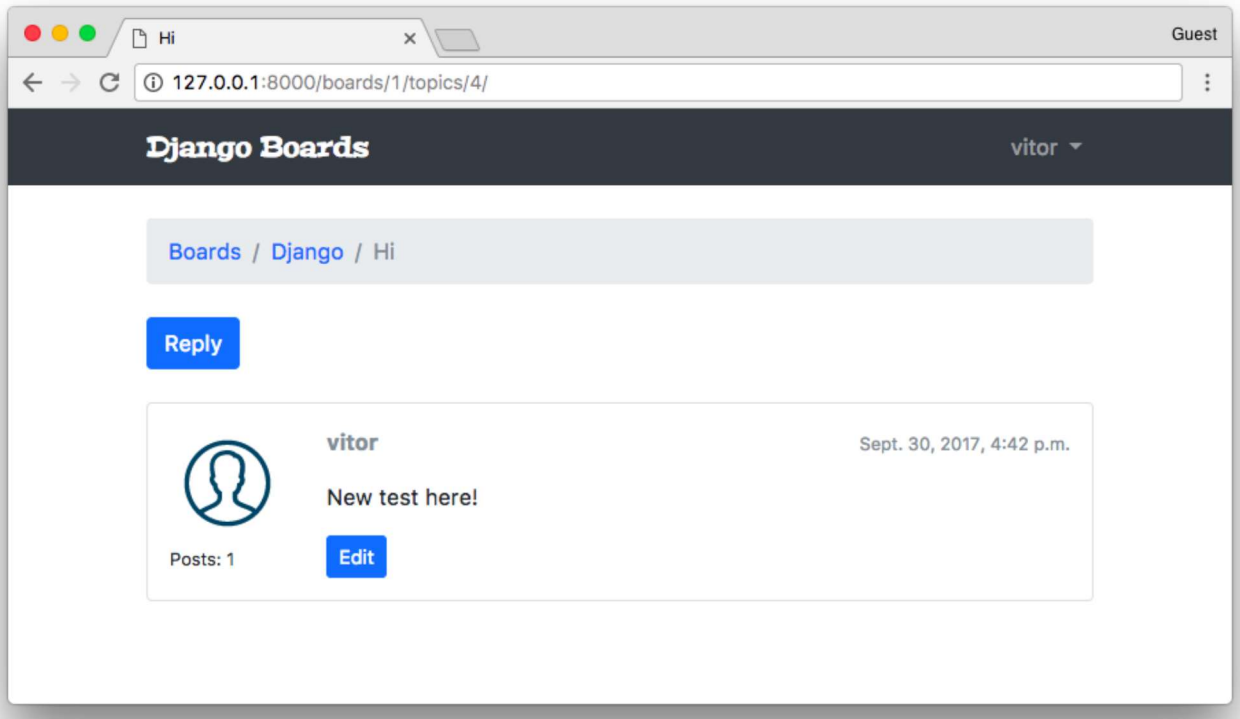
Let's keep moving forward.

Inside the **topic_posts.html**, we can create a for loop iterating over the topic posts:

templates/topic_posts.html

```
{% extends 'base.html' %}

{% load static %}

{% block title %}{{ topic.subject }}{% endblock %}

{% block breadcrumb %}
  <li class="breadcrumb-item"><a href="{% url 'home' %}">Boards</a></li>
  <li class="breadcrumb-item"><a href="{% url 'board_topics' topic.board.pk %}">{{ topic.board.na
  <li class="breadcrumb-item active">{{ topic.subject }}</li>
{% endblock %}

{% block content %}

  <div class="mb-4">
    <a href="#" class="btn btn-primary" role="button">Reply</a>
  </div>

  {% for post in topic.posts.all %}
    <div class="card mb-2">
      <div class="card-body p-3">
        <div class="row">
          <div class="col-2">
```

```
            <img src="{% static 'img/avatar.svg' %}" alt="{{ post.created_by.username }}" class="
            <small>Posts: {{ post.created_by.posts.count }}</small>
          </div>
          <div class="col-10">
            <div class="row mb-3">
              <div class="col-6">
                <strong class="text-muted">{{ post.created_by.username }}</strong>
              </div>
              <div class="col-6 text-right">
                <small class="text-muted">{{ post.created_at }}</small>
              </div>
            </div>
            {{ post.message }}
            {% if post.created_by == user %}
              <div class="mt-3">
                <a href="#" class="btn btn-primary btn-sm" role="button">Edit</a>
              </div>
            {% endif %}
          </div>
        </div>
      </div>
    </div>
  {% endfor %}

{% endblock %}
```



Since right now we don't have a way to upload a user picture, let's just have an empty image.

I downloaded a free image from IconFinder and saved in the **static/img** folder of the project.

We still haven't really explored Django's ORM, but the code `{{ post.created_by.posts.count }}` is executing a `select count` in the database. Even though the result is correct, it is a bad approach. Right now it's causing several unnecessary queries in the database. But hey, don't worry about that right now. Let's focus on how we interact with the application. Later on, we are going to improve this code, and how to diagnose heavy queries.

Another interesting point here is that we are testing if the current post belongs to the authenticated user: `{% if post.created_by == user %}`. And we are only showing the edit button for the owner of the post.

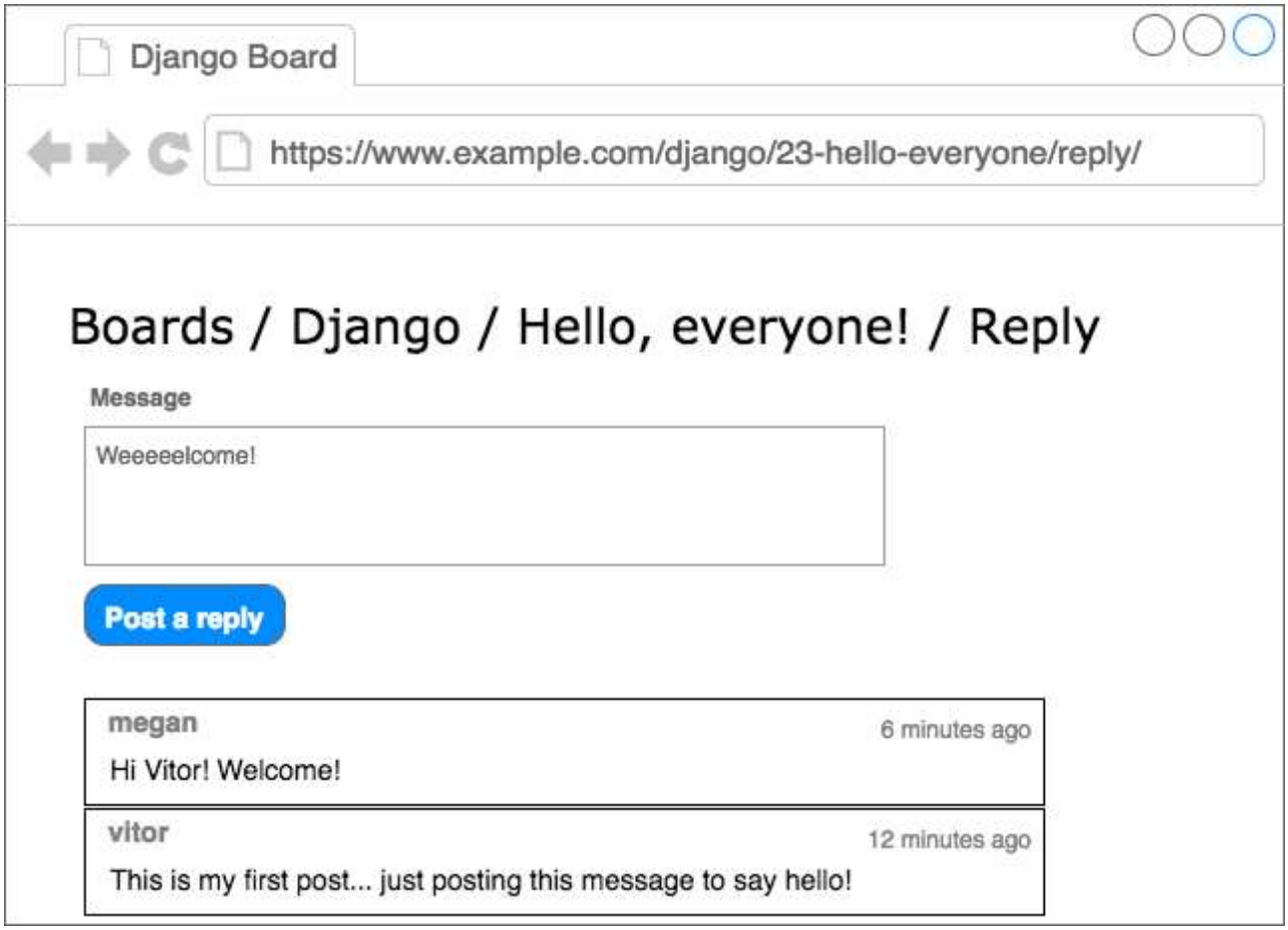
Since we now have the URL route to the topic posts listing, update the **topics.html** template with the link:

templates/topics.html (view complete file contents)

```
{% for topic in board.topics.all %}
  <tr>
    <td><a href="{% url 'topic_posts' board.pk topic.pk %}">{{ topic.subject }}</a></td>
    <td>{{ topic.starter.username }}</td>
    <td>0</td>
    <td>0</td>
    <td>{{ topic.last_updated }}</td>
  </tr>
{% endfor %}
```

Reply Post View

Let's implement now the reply post view so that we can add more data and progress with the implementation and tests.



New URL route:

myproject/urls.py (view complete file contents)

```
url(r'^boards/(?P<pk>\d+)/topics/(?P<topic_pk>\d+)/reply/$', views.reply_topic, name='reply_topic
```

Create a new form for the post reply:

boards/forms.py (view complete file contents)

```
from django import forms
from .models import Post

class PostForm(forms.ModelForm):
    class Meta:
        model = Post
        fields = ['message', ]
```

A new view protected by `@login_required` and with a simple form processing logic:

boards/views.py (view complete file contents)

```
from django.contrib.auth.decorators import login_required
from django.shortcuts import get_object_or_404, redirect, render
from .forms import PostForm
from .models import Topic

@login_required
def reply_topic(request, pk, topic_pk):
    topic = get_object_or_404(Topic, board__pk=pk, pk=topic_pk)
    if request.method == 'POST':
        form = PostForm(request.POST)
        if form.is_valid():
            post = form.save(commit=False)
            post.topic = topic
            post.created_by = request.user
            post.save()
            return redirect('topic_posts', pk=pk, topic_pk=topic_pk)
    else:
        form = PostForm()
    return render(request, 'reply_topic.html', {'topic': topic, 'form': form})
```

Also take the time to update the return redirect of the **new_topic** view function (marked with the comment **# TODO**).

```
@login_required
def new_topic(request, pk):
    board = get_object_or_404(Board, pk=pk)
    if request.method == 'POST':
        form = NewTopicForm(request.POST)
        if form.is_valid():
            topic = form.save(commit=False)
            # code suppressed ...
            return redirect('topic_posts', pk=pk, topic_pk=topic.pk)  # <- here
    # code suppressed ...
```

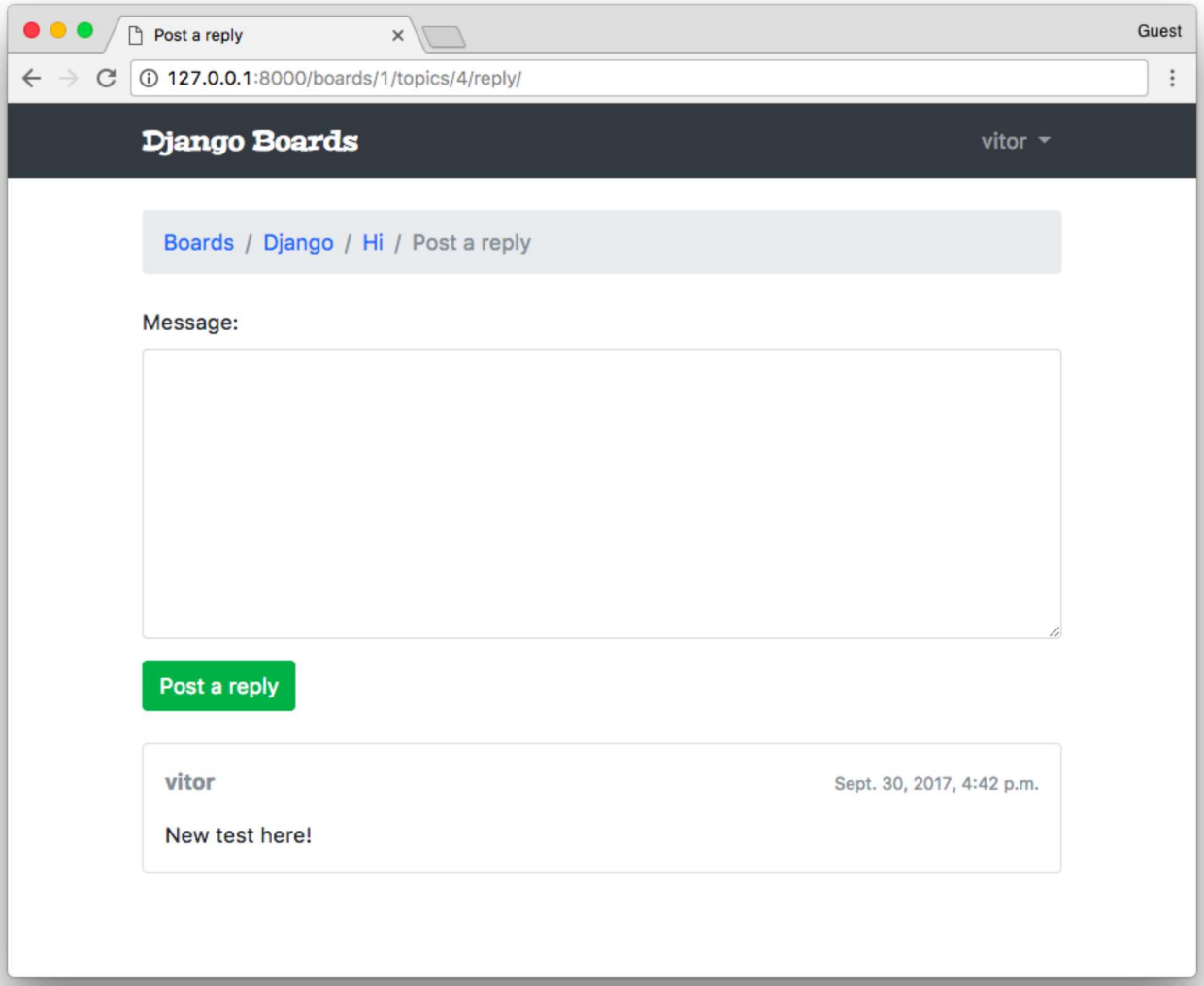
Very important: in the view **reply_topic** we are using `topic_pk` because we are referring to the keyword argument of the function, in the view **new_topic** we are using `topic.pk` because a `topic` is an object (Topic model instance) and `.pk` we are accessing the `pk` property of the Topic model instance. Small detail, big difference.

The first version of our template:

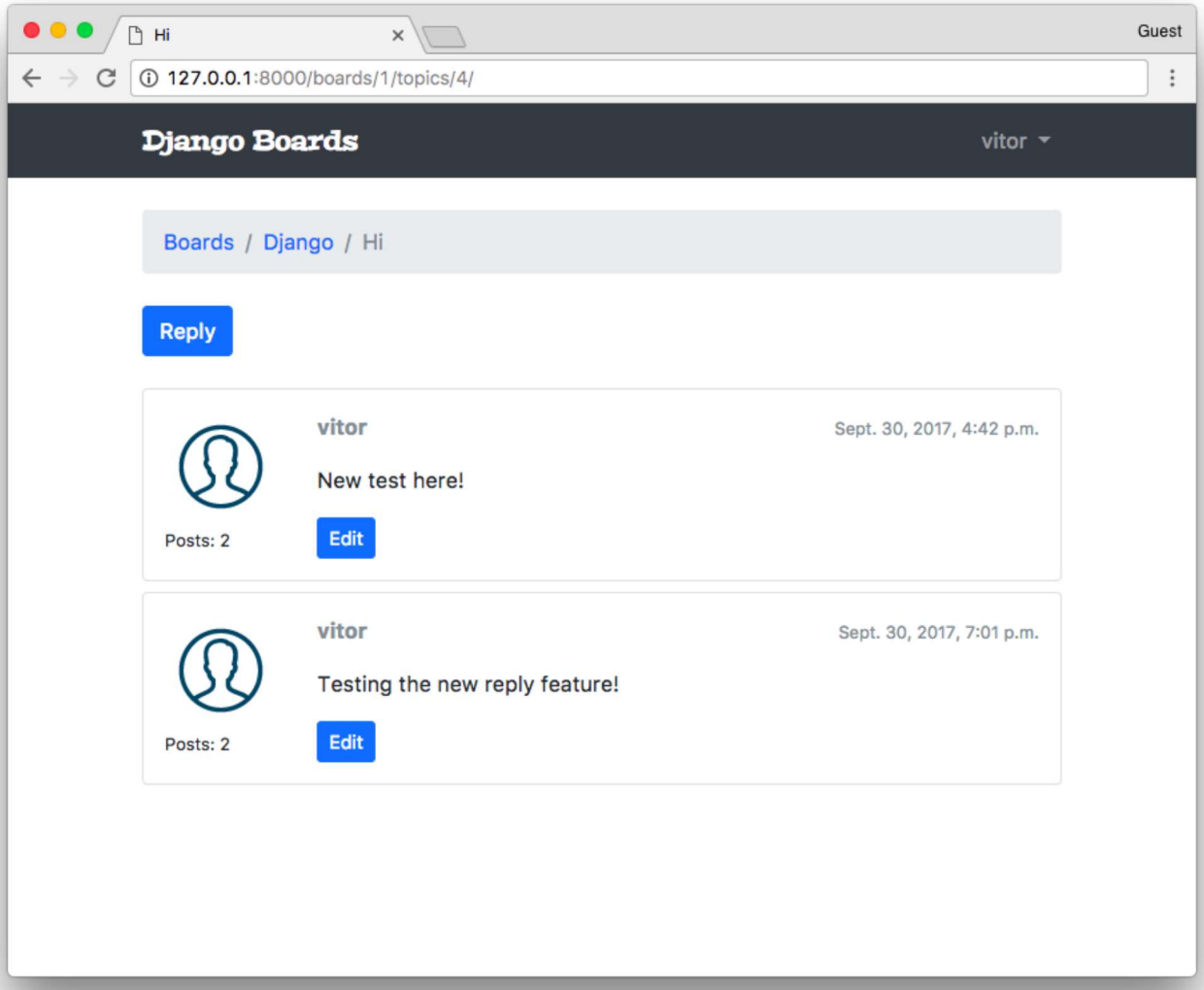
templates/reply_topic.html

```
{% extends 'base.html' %}

{% load static %}

{% block title %}Post a reply{% endblock %}
```

```
{% block breadcrumb %}
  <li class="breadcrumb-item"><a href="{% url 'home' %}">Boards</a></li>
  <li class="breadcrumb-item"><a href="{% url 'board_topics' topic.board.pk %}">{{ topic.board.na
  <li class="breadcrumb-item"><a href="{% url 'topic_posts' topic.board.pk topic.pk %}">{{ topic.
  <li class="breadcrumb-item active">Post a reply</li>
{% endblock %}

{% block content %}

  <form method="post" class="mb-4">
    {% csrf_token %}
    {% include 'includes/form.html' %}
    <button type="submit" class="btn btn-success">Post a reply</button>
  </form>

  {% for post in topic.posts.all %}
    <div class="card mb-2">
      <div class="card-body p-3">
        <div class="row mb-3">
          <div class="col-6">
            <strong class="text-muted">{{ post.created_by.username }}</strong>
          </div>
          <div class="col-6 text-right">
            <small class="text-muted">{{ post.created_at }}</small>
          </div>
        </div>
        {{ post.message }}
      </div>
    </div>
  {% endfor %}

{% endblock %}
```



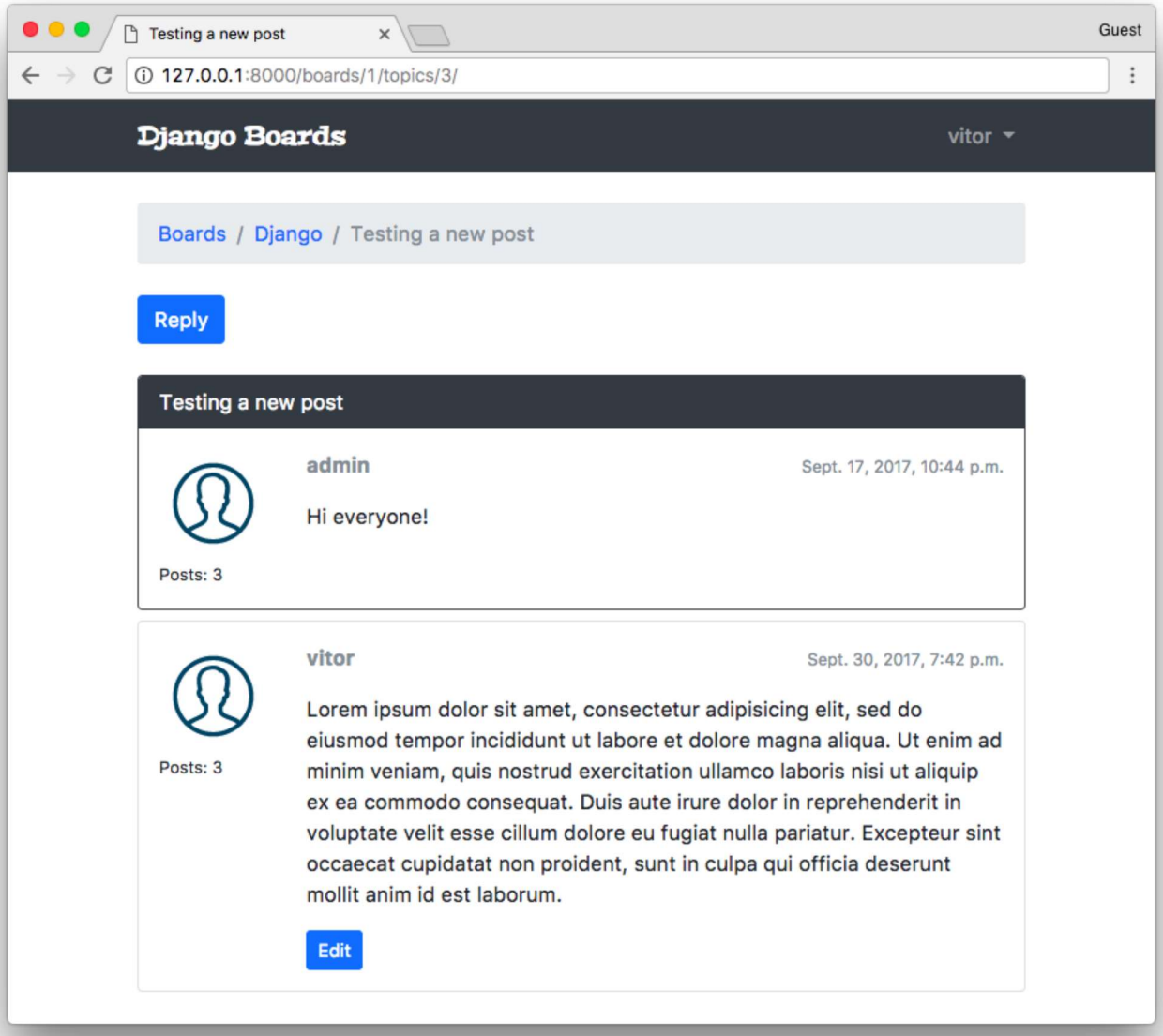
Then after posting a reply, the user is redirected back to the topic posts:



We could now change the starter post, so to give it more emphasis in the page:

templates/topic_posts.html (view complete file contents)

```
{% for post in topic.posts.all %}
  <div class="card mb-2 {% if forloop.first %}border-dark{% endif %}">
    {% if forloop.first %}
      <div class="card-header text-white bg-dark py-2 px-3">{{ topic.subject }}</div>
    {% endif %}
    <div class="card-body p-3">
      <!-- code suppressed -->
    </div>
  </div>
{% endfor %}
```



Now for the tests, pretty standard, just like we have been doing so far. Create a new file **test_view_reply_topic.py** inside the **boards/tests** folder:

boards/tests/test_view_reply_topic.py (view complete file contents)

```
from django.contrib.auth.models import User
from django.test import TestCase
from django.urls import reverse
from ..models import Board, Post, Topic
from ..views import reply_topic

class ReplyTopicTestCase(TestCase):
    '''
    Base test case to be used in all `reply_topic` view tests
    '''
    def setUp(self):
        self.board = Board.objects.create(name='Django', description='Django board.')
        self.username = 'john'
        self.password = '123'
```

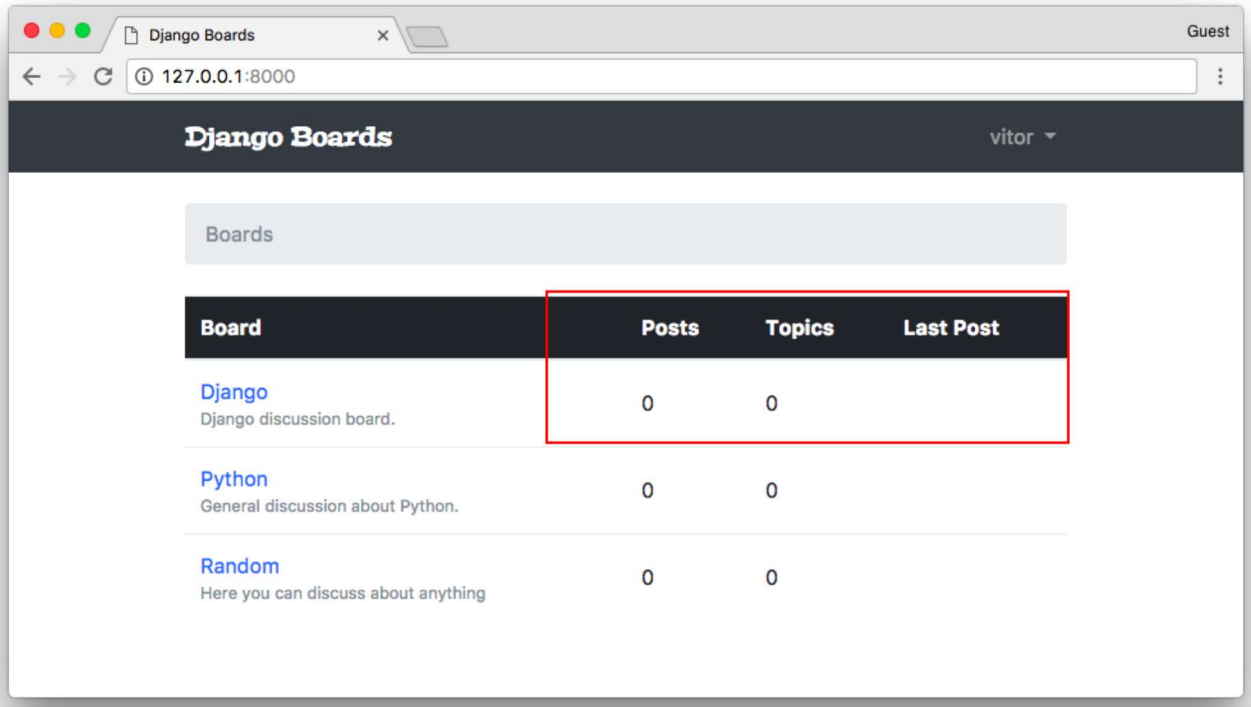
```
        user = User.objects.create_user(username=self.username, email='john@doe.com', password=se
        self.topic = Topic.objects.create(subject='Hello, world', board=self.board, starter=user)
        Post.objects.create(message='Lorem ipsum dolor sit amet', topic=self.topic, created_by=us
        self.url = reverse('reply_topic', kwargs={'pk': self.board.pk, 'topic_pk': self.topic.pk}

class LoginRequiredReplyTopicTests(ReplyTopicTestCase):
    # ...

class ReplyTopicTests(ReplyTopicTestCase):
    # ...

class SuccessfulReplyTopicTests(ReplyTopicTestCase):
    # ...

class InvalidReplyTopicTests(ReplyTopicTestCase):
    # ...
```

The essence here is the custom test case class **ReplyTopicTestCase**. Then all the four classes will extend this test case.

First, we test if the view is protected with the `@login_required` decorator, then check the HTML inputs, status code. Finally, we test a valid and an invalid form submission.

QuerySets

Let's take the time now to explore some of the models' API functionalities a little bit. First, let's improve the home view:



We have three tasks here:

- Display the posts count of the board;
- Display the topics count of the board;
- Display the last user who posted something and the date and time.

Let's play with the Python terminal first, before we jump into the implementation.

Since we are going to try things out in the Python terminal, it's a good idea to define a `__str__` method for all our models.

boards/models.py (view complete file contents)

```
from django.db import models
from django.utils.text import Truncator

class Board(models.Model):
    # ...
    def __str__(self):
        return self.name

class Topic(models.Model):
    # ...
    def __str__(self):
        return self.subject

class Post(models.Model):
```

```
    # ...
    def __str__(self):
        truncated_message = Truncator(self.message)
        return truncated_message.chars(30)
```

In the Post model we are using the **Truncator** utility class. It's a convenient way to truncate long strings into an arbitrary string size (here we are using 30).

Now let's open the Python shell terminal:

```
python manage.py shell

# First get a board instance from the database
board = Board.objects.get(name='Django')
```

The easiest of the three tasks is to get the current topics count, because the Topic and Board are directly related:

```
board.topics.all()
<QuerySet [<Topic: Hello everyone!>, <Topic: Test>, <Topic: Testing a new post>, <Topic: Hi>]>

board.topics.count()
4
```

That's about it.

Now the number of *posts* within a *board* is a little bit trickier because Post is not directly related to Board.

```
from boards.models import Post

Post.objects.all()
<QuerySet [<Post: This is my first topic.. :-)>, <Post: test.>, <Post: Hi everyone!>,
  <Post: New test here!>, <Post: Testing the new reply feature!>, <Post: Lorem ipsum dolor sit am
  <Post: hi there>, <Post: test>, <Post: Testing..>, <Post: some reply>, <Post: Random random.>
]>

Post.objects.count()
11
```

Here we have 11 posts. But not all of them belongs to the "Django" board.

Here is how we can filter it:

```
from boards.models import Board, Post

board = Board.objects.get(name='Django')

Post.objects.filter(topic__board=board)
<QuerySet [<Post: This is my first topic.. :-)>, <Post: test.>, <Post: hi there>,
  <Post: Hi everyone!>, <Post: Lorem ipsum dolor sit amet,...>, <Post: New test here!>,
  <Post: Testing the new reply feature!>
]>

Post.objects.filter(topic__board=board).count()
7
```

The double underscores `topic__board` is used to navigate through the models' relationships. Under the hoods, Django builds the bridge between the Board - Topic - Post, and build a SQL query to retrieve just the posts that belong to a specific board.

Now our last mission is to identify the last post.

```
# order by the `created_at` field, getting the most recent first
Post.objects.filter(topic__board=board).order_by('-created_at')
<QuerySet [<Post: testing>, <Post: new post>, <Post: hi there>, <Post: Lorem ipsum dolor sit amet
  <Post: Testing the new reply feature!>, <Post: New test here!>, <Post: Hi everyone!>,
  <Post: test.>, <Post: This is my first topic.. :-)>
]>

# we can use the `first()` method to just grab the result that interest us
Post.objects.filter(topic__board=board).order_by('-created_at').first()
<Post: testing>
```

Sweet. Now we can implement it.

boards/models.py (view complete file contents)

```
from django.db import models

class Board(models.Model):
    name = models.CharField(max_length=30, unique=True)
    description = models.CharField(max_length=100)

    def __str__(self):
        return self.name

    def get_posts_count(self):
        return Post.objects.filter(topic__board=self).count()

    def get_last_post(self):
        return Post.objects.filter(topic__board=self).order_by('-created_at').first()
```

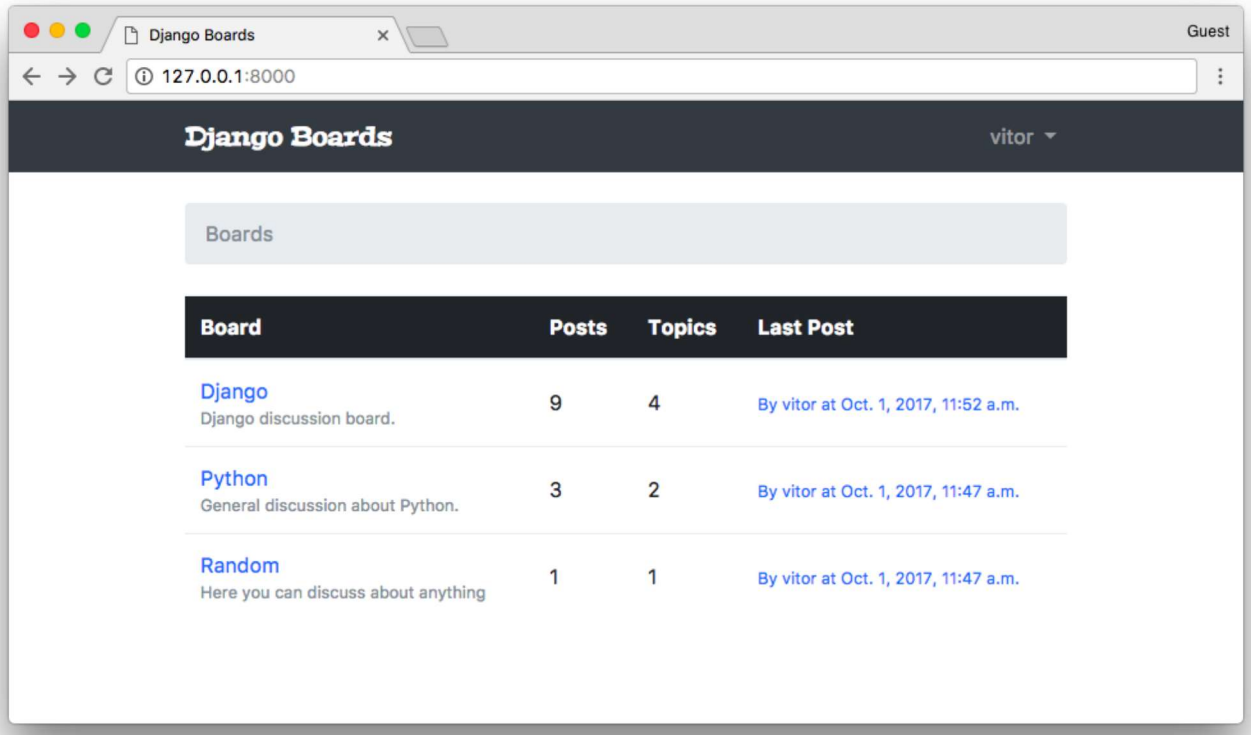
Observe that we are using `self`, because this method will be used by a Board instance. So that means we are using this instance to filter the QuerySet.

Now we can improve the home HTML template to display this brand new information:

templates/home.html

```
{% extends 'base.html' %}

{% block breadcrumb %}
  <li class="breadcrumb-item active">Boards</li>
{% endblock %}

{% block content %}
  <table class="table">
    <thead class="thead-inverse">
      <tr>
        <th>Board</th>
        <th>Posts</th>
        <th>Topics</th>
        <th>Last Post</th>
      </tr>
    </thead>
    <tbody>
      {% for board in boards %}
        <tr>
          <td>
            <a href="{% url 'board_topics' board.pk %}">{{ board.name }}</a>
            <small class="text-muted d-block">{{ board.description }}</small>
          </td>
          <td class="align-middle">
            {{ board.get_posts_count }}
          </td>
          <td class="align-middle">
            {{ board.topics.count }}
          </td>
          <td class="align-middle">
            {% with post=board.get_last_post %}
              <small>
                <a href="{% url 'topic_posts' board.pk post.topic.pk %}">
                  By {{ post.created_by.username }} at {{ post.created_at }}
                </a>
              </small>
            {% endwith %}
          </td>
        </tr>
      {% endfor %}
    </tbody>
  </table>
{% endblock %}
```

And that's the result for now:



Run the tests:

```
python manage.py test
```

```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
.....................................................EEE.....................
======================================================================
ERROR: test_home_url_resolves_home_view (boards.tests.test_view_home.HomeTests)
----------------------------------------------------------------------
django.urls.exceptions.NoReverseMatch: Reverse for 'topic_posts' with arguments '(1, '')' not fou

======================================================================
ERROR: test_home_view_contains_link_to_topics_page (boards.tests.test_view_home.HomeTests)
----------------------------------------------------------------------
django.urls.exceptions.NoReverseMatch: Reverse for 'topic_posts' with arguments '(1, '')' not fou

======================================================================
ERROR: test_home_view_status_code (boards.tests.test_view_home.HomeTests)
----------------------------------------------------------------------
django.urls.exceptions.NoReverseMatch: Reverse for 'topic_posts' with arguments '(1, '')' not fou

----------------------------------------------------------------------
Ran 80 tests in 5.663s
```

```
FAILED (errors=3)
Destroying test database for alias 'default'...
```

It seems like we have a problem with our implementation here. The application is crashing if there are no posts.

templates/home.html

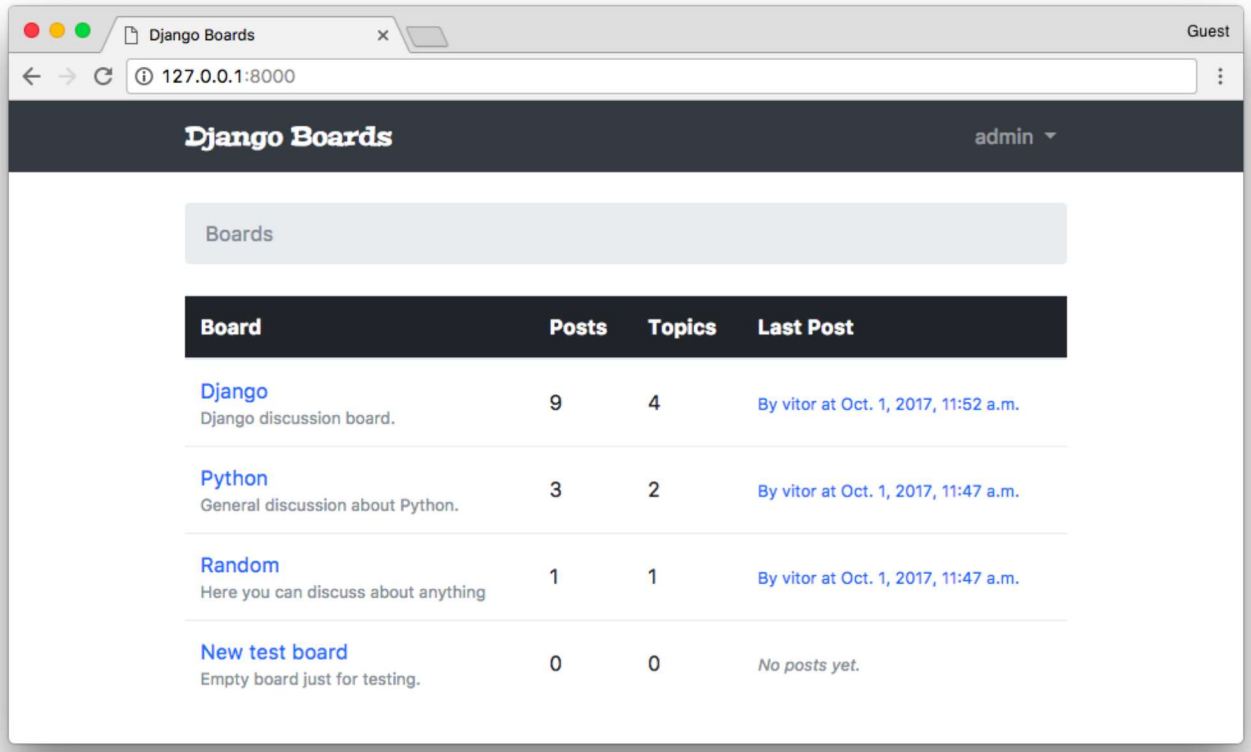
```
{% with post=board.get_last_post %}
  {% if post %}
    <small>
      <a href="{% url 'topic_posts' board.pk post.topic.pk %}">
        By {{ post.created_by.username }} at {{ post.created_at }}
      </a>
    </small>
  {% else %}
    <small class="text-muted">
      <em>No posts yet.</em>
    </small>
  {% endif %}
{% endwith %}
```

Run the tests again:

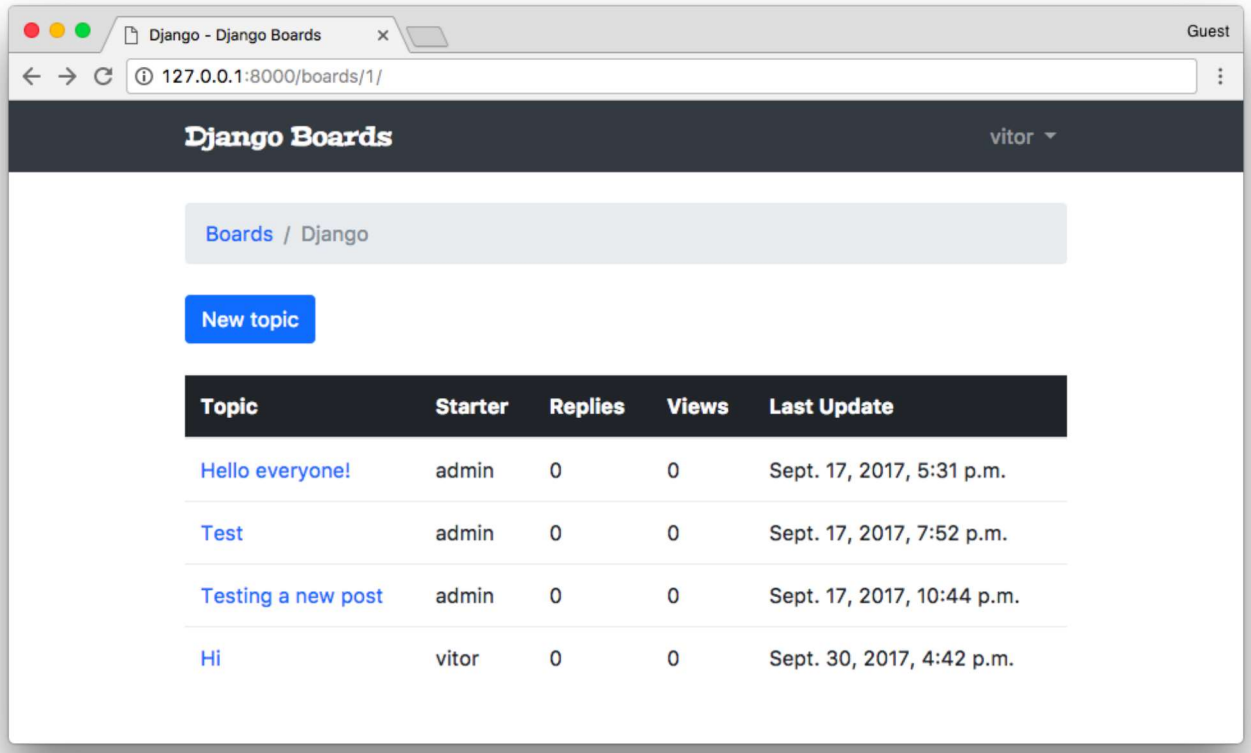
```
python manage.py test
```

```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
.....................................................................
----------------------------------------------------------------------
Ran 80 tests in 5.630s

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

I added a new board with no messages just to check the “empty message”:



Now it's time to improve the topics listing view.



I will show you another way to include the count, this time to the number of replies, in a more effective way.

As usual, let's try first with the Python shell:

```
python manage.py shell
```

```
from django.db.models import Count
from boards.models import Board

board = Board.objects.get(name='Django')

topics = board.topics.order_by('-last_updated').annotate(replies=Count('posts'))

for topic in topics:
    print(topic.replies)

2
4
2
1
```

Here we are using the `annotate` QuerySet method to generate a new "column" on the fly. This new column, which will be translated into a property, accessible via `topic.replies` contain the count of posts a given topic has.

We can do just a minor fix because the replies should not consider the starter topic (which is also a Post instance).

So here is how we do it:

```
topics = board.topics.order_by('-last_updated').annotate(replies=Count('posts') - 1)

for topic in topics:
    print(topic.replies)

1
3
1
0
```

Cool, right?

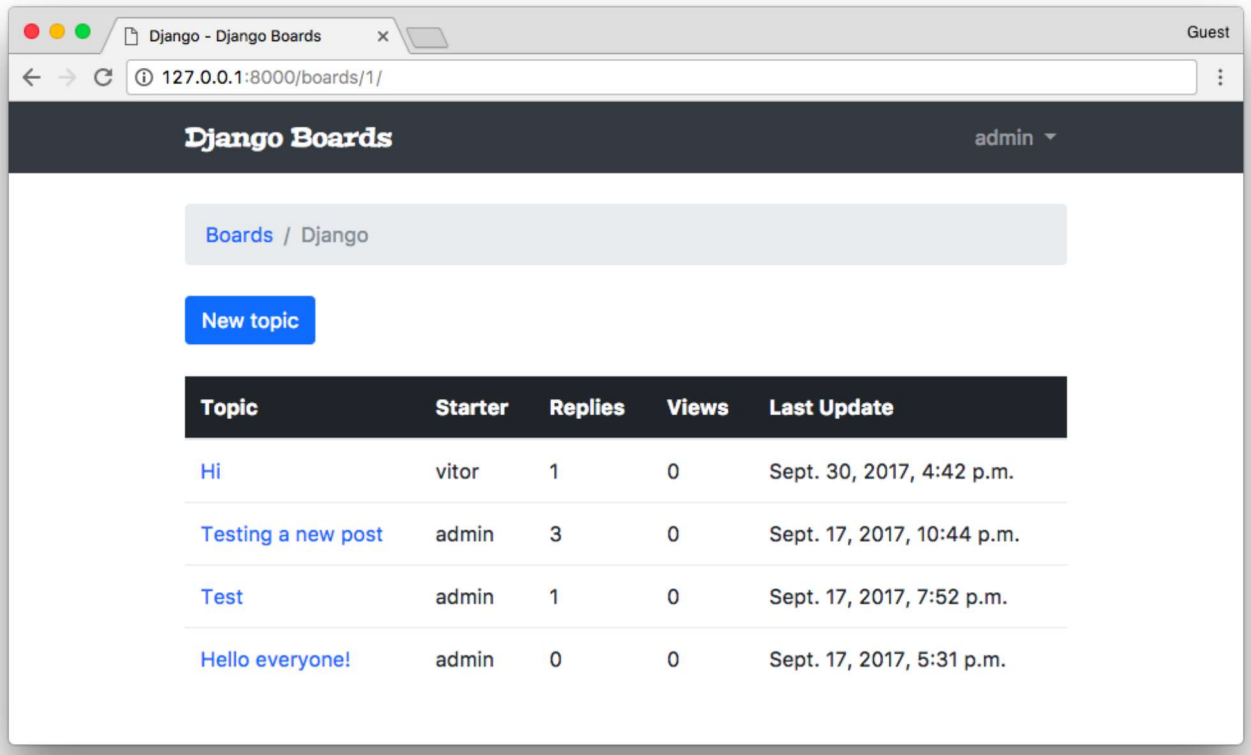
boards/views.py (view complete file contents)

```
from django.db.models import Count
from django.shortcuts import get_object_or_404, render
from .models import Board

def board_topics(request, pk):
```

```
    board = get_object_or_404(Board, pk=pk)
    topics = board.topics.order_by('-last_updated').annotate(replies=Count('posts') - 1)
    return render(request, 'topics.html', {'board': board, 'topics': topics})
```

templates/topics.html (view complete file contents)

```
{% for topic in topics %}
  <tr>
    <td><a href="{% url 'topic_posts' board.pk topic.pk %}">{{ topic.subject }}</a></td>
    <td>{{ topic.starter.username }}</td>
    <td>{{ topic.replies }}</td>
    <td>0</td>
    <td>{{ topic.last_updated }}</td>
  </tr>
{% endfor %}
```



Next step now is to fix the *views* count. But for that, we will need to create a new field.

Migrations

Migration is a fundamental part of Web development with Django. It's how we evolve our application's models keeping the models' files synchronized with the database.

When we first run the command `python manage.py migrate` Django grab all migration files and generate the database schema.

When Django applies a migration, it has a special table called **django_migrations**. In this table, Django registers all the applied migrations.

So if we try to run the command again:

```
python manage.py migrate
```

```
Operations to perform:
  Apply all migrations: admin, auth, boards, contenttypes, sessions
Running migrations:
  No migrations to apply.
```

Django will know there's nothing to do.

Let's create a migration by adding a new field to the Topic model:

boards/models.py (view complete file contents)

```
class Topic(models.Model):
    subject = models.CharField(max_length=255)
    last_updated = models.DateTimeField(auto_now_add=True)
    board = models.ForeignKey(Board, related_name='topics')
    starter = models.ForeignKey(User, related_name='topics')
    views = models.PositiveIntegerField(default=0)  # <- here

    def __str__(self):
        return self.subject
```

Here we added a `PositiveIntegerField`. Since this field is going to store the number of page views, a negative page view wouldn't make sense.

Before we can use our new field, we have to update the database schema. Execute the `makemigrations` command:

```
python manage.py makemigrations

Migrations for 'boards':
  boards/migrations/0003_topic_views.py
    - Add field views to topic
```

The `makemigrations` command automatically generated the **0003_topic_views.py** file, which will be used to modify the database, adding the **views** field.

Now apply the migration by running the command `migrate`:

```
python manage.py migrate

Operations to perform:
  Apply all migrations: admin, auth, boards, contenttypes, sessions
Running migrations:
  Applying boards.0003_topic_views... OK
```

Now we can use it to keep track of the number of views a given topic is receiving:

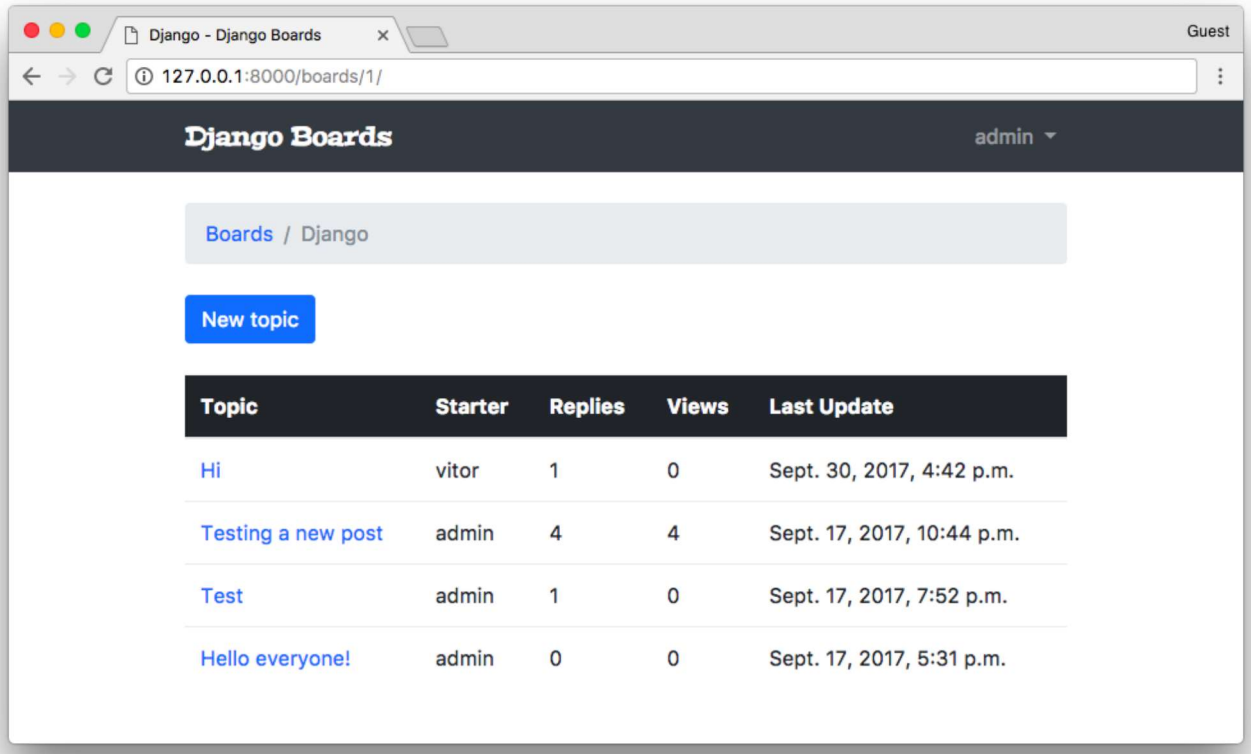
boards/views.py (view complete file contents)

```
from django.shortcuts import get_object_or_404, render
from .models import Topic

def topic_posts(request, pk, topic_pk):
    topic = get_object_or_404(Topic, board__pk=pk, pk=topic_pk)
    topic.views += 1
    topic.save()
    return render(request, 'topic_posts.html', {'topic': topic})
```

templates/topics.html (view complete file contents)

```
{% for topic in topics %}
  <tr>
    <td><a href="{% url 'topic_posts' board.pk topic.pk %}">{{ topic.subject }}</a></td>
    <td>{{ topic.starter.username }}</td>
    <td>{{ topic.replies }}</td>
    <td>{{ topic.views }}</td>  <!-- here -->
    <td>{{ topic.last_updated }}</td>
  </tr>
{% endfor %}
```

Now open a topic and refresh the page a few times, and see if it's counting the page views:



Conclusions

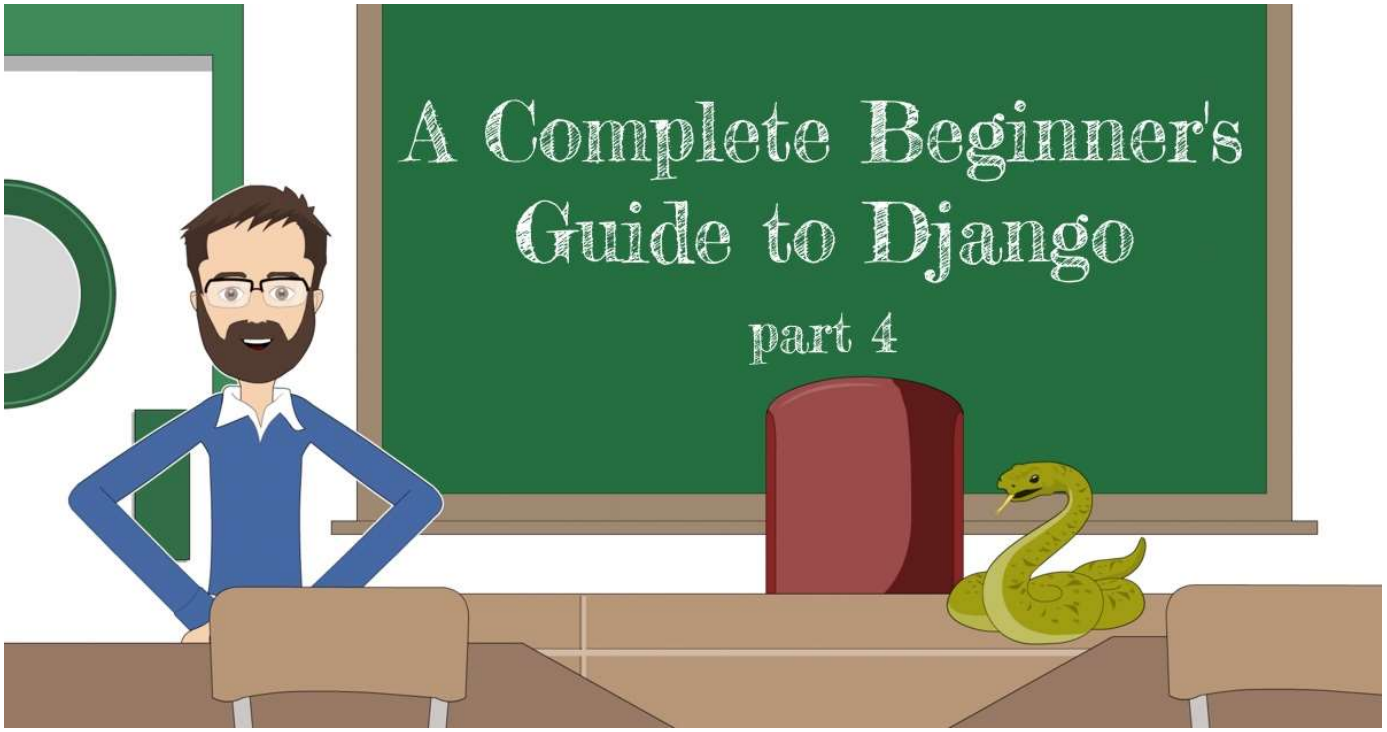
In this tutorial, we made some progress in the development of the Web boards functionalities. There are a few things left to implement: the edit post view, the “my account” view for the user to update their names, etc. After those two views, we are going to enable markdown in the posts and implement pagination in both topic listing and topic replies listing.

The next tutorial will be focused on using class-based views to solve those problems. And after that, we are going to learn how to deploy our application to a Web server.

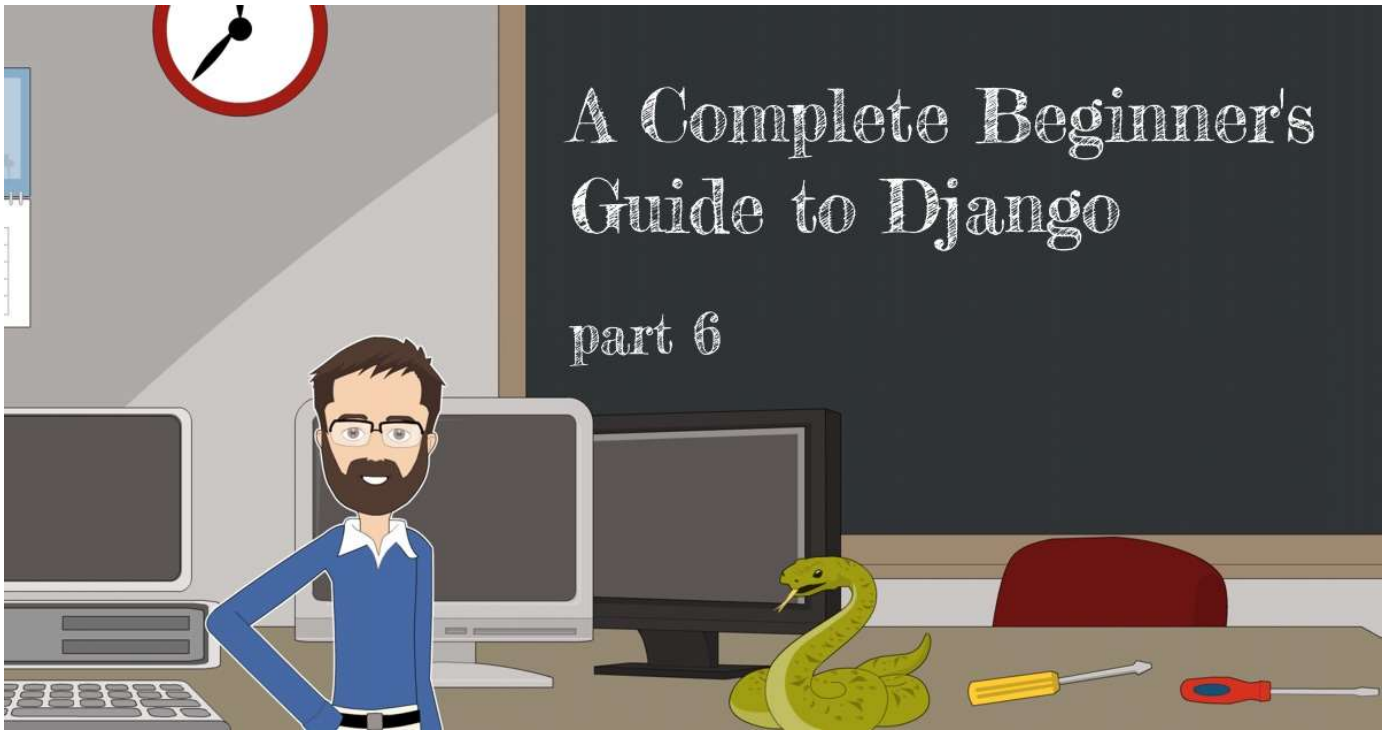
I hope you enjoyed the fifth part of this tutorial series! The sixth part is coming out next week, on Oct 9, 2017. If you would like to get notified when the fifth part is out, you can subscribe to our mailing list.

The source code of the project is available on GitHub. The current state of the project can be found under the release tag **v0.5-lw**. The link below will take you to the right place:

https://github.com/sibtc/django-beginners-guide/tree/v0.5-lw



← Part 4 - Authentication



Part 6 - Class-Based Views →

python django guide beginners orm migrations

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LOG IN WITH OR SIGN UP WITH DISQUS ?

Name

Pavlo Olshansky • 2 years ago

Hi, Vitor.
Thanks for your tutorial, it's really great!
Wait for your next tutorials. Hope this will be smth like CBV, permissions or DRF. This will be really helpful

55 ^ v • Reply • Share ›

Pelle Gøeg • 2 years ago

Hi,

Thanks for som excellent tutorials on django!

Your use of tests in the tutorial is really usefull, and because of the testing I found an error ind your text, I couldn't understand and my project still worked ,-)

In your refactoring of the board test, you forget to mention that you add a new code line in NewTopicTests.setUp() where you are logging in to submit the new topic, the file on github is correct though.

Line missing:
self.client.login(username='john', password='123')

Looking forward to read the next chapters.

3 ^ v • Reply • Share ›

Baïmi Badjoua Fidele • 2 years ago

Thank you very sir, four your fantastic tutorial. God bless you.

2 ^ v • Reply • Share ›

Vitor Freitas Mod → Baïmi Badjoua Fidele • 2 years ago

Thanks, Baïmi!

^ v • Reply • Share ›

feedersticks • 2 years ago • edited

Thank you Vitor for making these tutorials! It's so comprehensive that it also fills my hollow soul.

Btw if there's anyway to donate or help you maintain this awesome blog, please share the details. Thanks!!

1 • Reply • Share ›

ERICK MWAZONGA • 2 years ago

I enjoyed this tutorial. Would you elaborate on why it is necessary to use form.save(commit=False).

1 • Reply • Share ›

Vitor Freitas Mod ERICK MWAZONGA • 2 years ago

When we call `form.save()`, it will automatically "commit" the operation, triggering the save method of the model class.
The thing is, for the Topic model, the "board" and "starter" fields are non-nullable at the database level. Which means if we save the form without providing a "board" and "starter" value, it will throw an exception.
So what we do is, save the form changing the commit flag to False so it will prepare all the model fields, then we provide the extra data which is mandatory (board and starter) and manually save the topic calling `topic.save()`

2 • Reply • Share ›

ERICK MWAZONGA Vitor Freitas • 2 years ago

Thanks

• Reply • Share ›

nazeer • 9 months ago

error:

Page not found (404)
Request Method: GET
Request URL: http://127.0.0.1:8000/boards/1/topics/1/
Raised by: boards.views.topic_posts
No Topic matches the given query.

url.py
url(r'^boards/(?P<pk>\d+)/topics/(?P<topic_pk>\d+)/$', views.topic_posts, name='topic_posts')

def topic_posts(request, pk, topic_pk):
topic = get_object_or_404(Topic, board__pk=pk, pk=topic_pk)
return render(request, 'topic_posts.html', {'topic': topic})

please help any body iam getting error at board__pk

• Reply • Share ›

nazeer • 9 months ago

hii sir,thank q so much, its great tutorial

• Reply • Share ›

Roberto D'Ambrosio • 10 months ago

Thanks Vitor for this amazing tutorial!

I wondering if someone can help me with the QuerySets part.
I get lost when we have to call the python shell.

>>>python manage.py shell

First get a board instance from the database
>>>board = Board.objects.get(name='Django')

I receive this error:
NameError: name 'Board' is not defined

I don't know exactly what i'm doing wrong,
I open the shell directly within the virtual environment. Should I import the Board as module before the definition of the new object? Any suggestion?

Thanks

Reply • Share ›

Bruno Vermeulen ➚ Roberto D'Ambrosio • 9 months ago • edited

import the Board object once you get into the shell, as so:

>>>from boards.models import Board
>>>
>>>board = Board.objects.get(name='Django')

Reply • Share ›

Bruno Vermeulen • 10 months ago • edited

A great tutorial, but gee it is hard work to get this under my belt!

I got stuck with board__pk not noticing the dunder i.e. I spelled it as board_pk, which gave me errors. I then inserted board_id which seemed to work and the changed it back to the correct board__pk.

Question though where is this board__pk defined?

Reply • Share ›

Roberto D'Ambrosio ➚ Bruno Vermeulen • 10 months ago

I'm new to Django so I can't help you with a complete answer but I think that you will find useful this explanation:
https://docs.djangoproject....

Reply • Share ›

Bruno Vermeulen ➚ Roberto D'Ambrosio • 9 months ago

thanks for this link, i think I am getting a little further in understanding these concepts

Reply • Share ›

Shekhar Nunia • a year ago

Thanks brother for these tutorial, from first tutorial to this I learn many things from you... I'm a beginner in python field and start Django few days back cause of college training and I kindly like it, iml working for a project for my college submission I'm hopping that I can get any idea from you guys about it that will be great

Reply • Share ›

jason thomas • a year ago • edited

in boardshome ...rendering fails if no posts in topic_posts so ...

{% if board.get_posts_count == 0 %}
<small>Currently no posts</small>
{% else %}
{% with post=board.get_last_post %}
<small>
a href="{% url 'boards:topic_posts' board.pk post.topic.pk %}">By {{
post.created_by.username }} at {{ post.created_at }}
</small>
{% endwith %}
{% endif %}

otherwise ou are hrefing .....topic_posts, with board.pk haveing a value ...but post.topic.pk having no value " ...so rendering will fail.

if you followed tutorial ...your boardshome will be just 'home' and your boards:topic_posts will be just 'topic_posts'

Reply • Share ›

jason thomas • a year ago

to be honest.. this is surely advanced stuff.

Reply • Share ›

jason thomas • a year ago

am I just lucky, or have lots of django enthusiasts either not come across these tutorials, or thought there was something better out there..?
the series is amazing...and covers so much important stuff.

i think this guy should be awarded the nobel prize or an oscar....something major.

Reply • Share ›

ThiaguinhoLS • a year ago

Thank you !

Reply • Share ›

Azamat Musabekov • a year ago

help me

Reply • Share ›

Martin Vazquez • a year ago

Excelent work!

Reply • Share ›

Vazhipokkan • 2 years ago

Thank you Vitor Freitas, very useful series, keep going !!

Reply • Share ›

Chirag Dabgar • 2 years ago

Hello Vitor,

FIrst of all thanks for the blogs, they are very helpful.
I have a doubt though.
I have just started with the Query set topic now and after making the changes in my models.py and home.html file. I can no longer see my home page, that is, where all the boards are being displayed.

It shows the following error : "Cannot query "Django": Must be "Topic" instance."

Please help me out here. As i wanna learn more no this. Thanks in advance
:)

Reply • Share ›

z ➚ Chirag Dabgar • a year ago

return Post.ojects.filter(topic__boars=self).count()

you should look into your call stack.

Reply • Share ›

Jaydaar Syberius • 2 years ago

This is the best django tutorial i ever came across i can actually feel like I can do something substantial after this. You explained everything i had questions about. I look forward to any future series you may have.

Reply • Share ›

Uwe Aime Van • 2 years ago • edited

```
class AddProducts(models.Model):
title = models.CharField(max_length=150)
description = models.CharField(max_length=500)
city = models.CharField(max_length=150)
price = models.CharField(max_length=150,default='')
subcategory = models.ForeignKey(SubCategory, related_name='sub_sub_category')
mobile = models.CharField(max_length=200,default=None)
email = models.CharField(max_length=200,default=None)
sold = models.BooleanField(default=False)
user = models.ForeignKey('auth.User', default=None)

def __str__(self):
return self.title
```

Above is my model

)That how my stuff are related and implemented,

see more

• Reply • Share ›

ChernoborodovIvan • 2 years ago

Hello, after improving home template I got

NoReverseMatch at /home/

Reverse for 'topic_posts' with arguments '(1, '')' not found. 1 pattern(s) tried: ['home/(?P<pk>\\d+)/topics/(?P<topic_pk>\\d+)/$']

• Reply • Share ›

RJ Studio ➚ ChernoborodovIvan • 2 years ago

I also. Could you solve this problem?

• Reply • Share ›

cjkkkk ➚ RJ Studio • 2 years ago

you can write {% with post=board.get_last_post %}
<small>
{% if post %}

By {{ post.created_by.username }} at {{ post.created_at }}

{% endif %}
</small>
{% endwith %}
because if post = None,you can not get post.topic.pk

• Reply • Share ›

Show more replies

Uche Oscar • 2 years ago

This is the models for Topic (MessageRequest) and Post (MessagePost)

```
class MessageRequest(models.Model):
requestmsg = models.CharField(max_length=255)
requestNum = models.CharField(max_length=150)
last_updated = models.DateTimeField(auto_now_add=True)
requestchannel = models.ForeignKey(RequestChannel, related_name='messageRequests')
requeststarter = models.ForeignKey(User, related_name='messageRequests')

def __str__(self):
return self.requestmsg

##Posts
class MessagePost(models.Model):
message = models.TextField(max_length=4000)
```

```
messagePost_from = models.TextField(max_length=10,default='VISITOR')
messagerequest = models.ForeignKey(MessageRequest,related_name='messageposts')
created_at = models.DateTimeField(auto_now_add=True)
updated_at = models.DateTimeField(null=True)
```

see more

Reply • Share ›

Uche Oscar • 2 years ago

Vic I thank you a lot for this wonderful Tutorial. It is the best I have seen so far. Keep it up. Please I got stock in part 5. I changed the Topic Model to MessageRequest. Everything has been working fine until I wanted to save a REPLY Posting. It gave me a error that the MessagePost.messagerequest = messagerequest (like say Post.topic = topic) needs an Instance of the MessageRequest to save. I got stock here. Please I need help. Everything has been working fine to this point. I just changed the names of the models.

Reply • Share ›

Paul Childs • 2 years ago • edited

Hi Vitor,

I haven't worked with Django since 1.6. This is a really good way of catching up.
I did have one problem with the login_required decorator. It is redirecting to http://localhost:8000/accounts/login instead of http://localhost:8000/login. I checked through the code and can't explain it. Any ideas why this might be happening?

Thanks
Paul

NOTE: Fix for anyone having the same problem...

Changed: @login_required to @login_required(login_url='/login/')

Reply • Share ›

Kelechi Egbosi ➚ Paul Childs • 2 years ago

This solution is not DRY..Thus you will have to repeat this same step anywhere you use the @login_required decorator.
The best fix is to go to your settings.py file and add the line
LOGIN_URL='login'

Reply • Share ›

Devy Freshia • 2 years ago

Awesome tutorial as usual! Thanks so much! :)

Reply • Share ›

Andre • 2 years ago

Excelente trabalho Vitor! Estou agora a começar a explorar o Django e o teu blog está a ser uma grande ajuda! Gostava de saber se estás a pensar incluir alguma informação neste tutorial, ou fazer uma nova serie, relativo à Django Rest Framework? Parabéns e continua com o bom trabalho!

Reply • Share ›

Rory Chang • 2 years ago

Hi Vitor, thanks a lot for your tutorial.
After reading some django documents, I found out this guide is really really useful for beginners like me.
Thanks again for this awesome website!

Reply • Share ›

Gurmeet Singh • 2 years ago

I can't believe i was missing out on these tutorials. Awesome

Reply • Share ›

RobertD • 2 years ago

Hi Vitor,
thank you for your tutorials.
I noticed when I replied a topic the value of "views" increased by 2 and not 1.
But when I only viewed then the value correctly increased by 1.
Is it only my problem? Or experienced anybody else?

Reply • Share ›

Vitor Freitas Mod ➚ RobertD • 2 years ago

Hey Robert!
Maybe something related to a redirect to the page
Anyway we still have to improve this view count :-) maybe add a session cookie to avoid counting views from the same user twice (or more) within a short period of time
We will find a solution for that in the next tutorial!

2 Reply • Share ›

ERICK MWAZONGA • 2 years ago

Hi buddy, Thank you for the awesome tuts. With this knowledge, I think you can compose an excellent comprehensive DJANGO BOOK!

Reply • Share ›

Vitor Freitas Mod ➚ ERICK MWAZONGA • 2 years ago

Thanks a lot Erick! After I finalize the series I'm planning to adjust the whole material and make it available as an e-book or something :-)

2 Reply • Share ›

Avatar This comment was deleted.

Vitor Freitas Mod ➚ Guest • 2 years ago

Thanks buddy! :D

Reply • Share ›

Santosh Purbey • 2 years ago

Thank you Vitor for consistency, updating blog on regular basis Hats up man! :)

Reply • Share ›

Vitor Freitas Mod ➚ Santosh Purbey • 2 years ago

Thanks a lot, Santosh :-)

• Reply • Share ›

Azamat Musabekov • a year ago

help me, it dont straight

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Olivier Pons • 2 years ago • edited

Please your tutorial is excellent, but *avoid* using def instead of classes when you make views. Use Django class based views... there are tons of things already done, it's cleaner, easier to read, thus faster to understand and debug: https://docs.djangoproject.... This is the only side where you're not helping but teaching an old-fashionned technique

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Vitor Freitas Mod ➚ Olivier Pons • 2 years ago

Hi Olivier,

Thanks a lot for your feedback! I really appreciate it!

Django's documentation mention that class-based views are not a replacement of function-based views. After all, what a class-based view is doing is generating a view funtion on-the-fly.

I don't think it's a old-fashioned technique, or that it's not meant to be used anymore. Especially for beginners, it's much easier to see the conection between the url routing and the execution of the view function, because theres nothing in between.

I think while learning it's important to feel comfortable with the tools and also feel in control of what's happening. For that matter I think function-based views provide a better learning experience. Of course there are limitations, such as handling HTTP methods using conditional branching, it's hard to reuse and extend the code. But in the other hand, it's simple to implement, I find it easier to read and follow to code flow since it's explict. The abstraction of the request/response cycle is more clear: it's just a function that receives an HttpRequest and return an HttpResponse.

see more

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Olivier Pons ➚ Vitor Freitas • 2 years ago

Hi Vitor,

"With your sample, it's hard to reuse and extend the code"

You've said everything. I never teach something that is hard to reuse and extend. I prefer teaching things that people will be able to re-use all time, even if it's a bit harder to understand... that's my point of view!

"I will give an introduction to class-based views (and also the generic class-based views) in the next tutorial, but first I wanted those that are just getting started with Django, to get a better understanding of how the framework works."

This is exactly the sentence you could just say at the beginning, so there's no confusion, and I wouldn't have made a comment ;)

Anyway very good tutorial, I'll give the link to all my students!

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