

Django 1: Route, Model & Admin Site

IN608: Intermediate Application Development Concepts

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Last Session's Content

- Concurrency
- Parallelism

Today's Content

- Django
 - Overview
 - Pipenv
 - Installation
 - Creating a project
 - Development server
 - Creating an app
- MVC vs. MVT
- Route
- Model
- Admin Site

Django

Overview

- High-level Python web framework
- Encourages rapid development
- Takes care of much of the hassle of web development
- Resource: <https://www.djangoproject.com>
- Alternative - Flask (micro-framework)
 - Resource: <https://flask.palletsprojects.com/en/1.1.x>

The Django logo, featuring the word "django" in a white, lowercase, sans-serif font, set against a dark green rectangular background.

Pipenv

- Automatically creates & manages a virtual environment for your projects
- Adds & removes packages from your `Pipfile` as you install & uninstall packages
- Generates a `Pipfile.lock` which is used to produce deterministic builds
- It should look very similar to the `package.json` & `package-lock.json` you saw in the Fundamentals of Web Development course
- Resource: <https://pipenv.pypa.io/en/latest>

Pipenv

- From the command line, cd into a directory where you would like to create your Pipfile, then run the following command:

```
# Windows
...\> pipenv shell

# Linux or macOS
$ pipenv shell
```

Django Installation

- Requires Python
- Python includes a lightweight database
 - For development, we will use SQLite
 - For production, we will use MariaDB or PostgreSQL
- Resource: <https://docs.djangoproject.com/en/3.0/topics/install/#install-the-django-code>

```
# Windows  
...\> pipenv install Django
```

```
# Linux or macOS  
$ pipenv install Django
```


Installation

- View Pipfile & Pipfile.lock

```
[[source]]
name = "pypi"
url = "https://pypi.org/simple"
verify_ssl = true
```

```
[dev-packages]
```

```
[packages]
django = "*"
```

```
[requires]
python_version = "3.7"
```

Creating a Project

- Auto-generate code that creates a Django project
- Each project contains settings for an instance of Django including:
 - Database configurations
 - Django-specific options
 - App-specific options
- Avoid naming projects after in-built Python or Django components
- Resources:
 - <https://docs.djangoproject.com/en/3.0/intro/tutorial01/#creating-a-project>
 - <https://docs.djangoproject.com/en/3.0/faq/troubleshooting/#troubleshooting-django-admin>

Creating a Project

- In the same directory as your `Pipfile` & `Pipfile.lock`, run the following command:

```
# Windows  
...\> django-admin startproject mvt
```

```
# Linux or macOS  
$ django-admin startproject mvt
```

Creating a Project

- Project structure:
 - `mvt/` - Container for the Django project (outer directory)
 - `manage.py` - Command-line utility for interacting with the project
 - `mvt/` - Python package for the project (inner directory)
 - `mvt/__init__.py` - Empty file which tells Python that this directory should be considered a package*
 - `mvt/asgi.py` - Entry-point for ASGI-compatible web servers to serve the project
 - `mvt/settings.py` - Settings/configurations for the project
 - `mvt/urls.py` - URL declarations for the project
 - `mvt/wsgi.py` - Entry-point for WSGI-compatible web servers to serve the project
- Resources:
 - <https://docs.djangoproject.com/en/3.0/ref/django-admin>
 - <https://docs.python.org/3/tutorial/modules.html#tut-packages>
 - <https://docs.djangoproject.com/en/3.0/topics/settings>
 - <https://docs.djangoproject.com/en/3.0/topics/http/urls>

Development Server

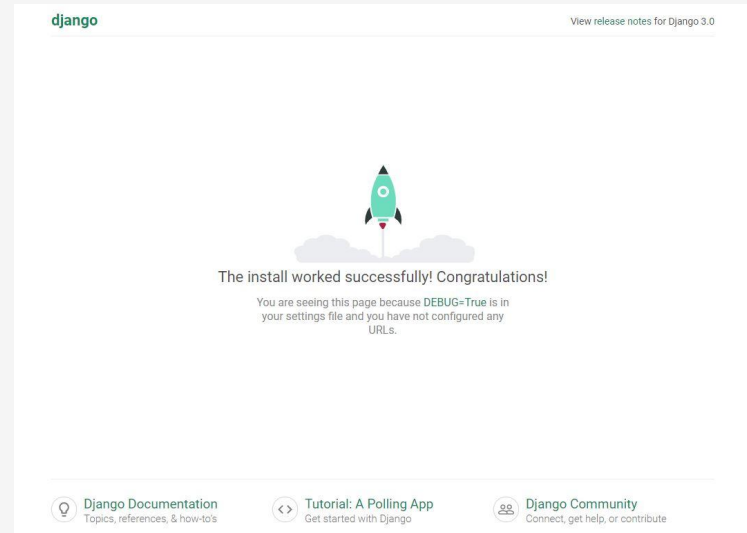
- Lightweight web server written purely in Python
- From the command line, cd into the outer `mv` directory, then run the following command:

```
# Windows
...\> python manage.py runserver

# Linux or macOS
$ python manage.py runserver
```

Development Server

- Navigate to <http://127.0.0.1:8000>



Creating an App

- Command-line utility which automatically generates the basic structure of an app

```
# Windows
...\> python manage.py startapp polls

# Linux or macOS
$ python manage.py startapp polls
```

Creating an App

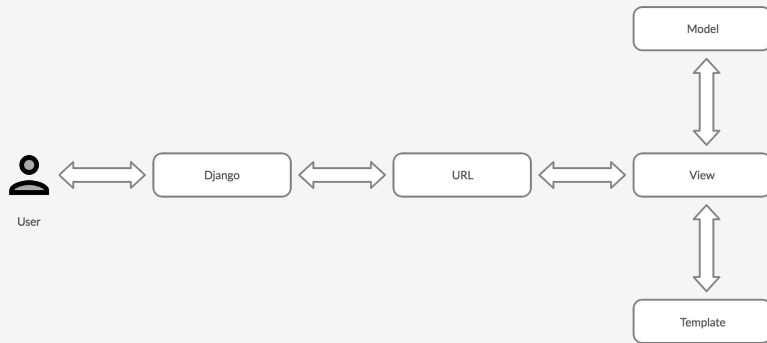
- App structure:

```
mvt/  
polls/  
    __init__.py  
    admin.py  
    apps.py  
    migrations/  
        __init__.py  
    models.py  
    tests.py  
    views.py
```


MVC vs. MVT

MVC vs. MVT

- What is the difference between MVC & MVT?
- Popular web frameworks which use MVC:
 - ASP.NET Core MVC
 - Laravel
 - Ruby on Rails
 - Spring MVC



Route

Route

- To create an URLconf in the `polls/` directory, create a file called `urls.py`
- App structure:

```
polls/  
  __init__.py  
  admin.py  
  apps.py  
  migrations/  
    __init__.py  
  models.py  
  tests.py  
  urls.py  
  views.py
```

Route

- Resources:

- <https://docs.djangoproject.com/en/3.0/ref/urls/#path>
- <https://docs.djangoproject.com/en/3.0/ref/urls/#django.urls.include>

- polls/urls.py

```
from django.urls import path
from . import views

# Placeholder route. We can not proceed with no routes
urlpatterns = [
    path('', views.index, name='index'),
]
```

Route

- mvt/urls.py

```
from django.contrib import admin
from django.urls import include, path

urlpatterns = [
    path('polls/', include('polls.urls')),
    path('admin/', admin.site.urls),
]
```

View

View

- mvt/views.py

```
from django.http import HttpResponse  
  
# Again...another placeholder  
def index(request):  
    return HttpResponse('hello')
```


Model

Model

- Single, definitive source of truth about your data
- Contains the essentials fields & behaviours of your data
- Follows the DRY principle
- Define your data model in one place & automatically derive from it

Model

- Resources:

- <https://docs.djangoproject.com/en/3.0/ref/models/instances/#django.db.models.Model>
- <https://docs.djangoproject.com/en/3.0/ref/models/fields/#module-django.db.models.fields>

- polls/models.py

```
from django.db import models
from django.utils import timezone

class Question(models.Model):
    question_text = models.CharField(max_length=200)
    pub_date = models.DateTimeField(default=timezone.now)

    def __str__(self):
        return self.question_text

class Choice(models.Model):
    question = models.ForeignKey(Question, on_delete=models.CASCADE)
    choice_text = models.CharField(max_length=200)
    votes = models.IntegerField(default=0)

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

Model

- Custom method
- Import `timedelta` method from `datetime`

```
from django.db import models
from django.utils import timezone
from datetime import timedelta

class Question(models.Model):
    question_text = models.CharField(max_length=200)
    pub_date = models.DateTimeField(default=timezone.now)

    def was_published_recently(self):
        return self.pub_date >= timezone.now() - timedelta(days=1)

    def __str__(self):
        return self.question_text

class Choice(models.Model):
    question = models.ForeignKey(Question, on_delete=models.CASCADE)
    choice_text = models.CharField(max_length=200)
    votes = models.IntegerField(default=0)

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

Model

- mvt/settings.py

```
INSTALLED_APPS = [  
    'polls.apps.PollsConfig'  
    'django.contrib.admin',  
    'django.contrib.auth',  
    'django.contrib.contenttypes',  
    'django.contrib.sessions',  
    'django.contrib.messages',  
    'django.contrib.staticfiles',  
]
```

Model

- Changes made to `polls/models.py`
- Store changes as a migration
 - How Django stores changes to your model

```
# Windows
...\> python manage.py makemigrations polls
```

```
# Linux or macOS
$ python manage.py makemigrations polls
```

```
Migrations for 'polls':
  polls/migrations/0001_initial.py
    - Create model Question
    - Create model Choice
```

Model

- Run all migrations that have not be applied against your database

```
# Windows  
...\> python manage.py migrate
```

```
# Linux or macOS  
$ python manage.py migrate
```

```
Operations to perform:
```

```
  Apply all migrations: admin, auth, contenttypes, polls, sessions
```

```
Running migrations:
```

```
  Applying contenttypes.0001_initial... OK
```

Admin Site

Admin Site

- Create a user who can login to the Django admin site
- Resource: <https://docs.djangoproject.com/en/3.0/ref/contrib/admin>

```
# Windows  
...\> python manage.py createsuperuser
```

```
# Linux or macOS  
$ python manage.py createsuperuser
```

```
Username: admin  
Email address: admin@example.com  
Password: ***** # P@ssw0rd123  
Password: ***** # P@ssw0rd123  
Superuser created successfully.
```

Admin Site

- polls/admins.py

```
from django.contrib import admin
from .models import Question, Choice

admin.site.register(Question)
admin.site.register(Choice)
```

Admin Site

- Start development web server - `python manage.py createsuperuser`
 - Username
 - Email
 - Password
- Navigate to <http://127.0.0.1:8000/admin>



The image shows a screenshot of the Django administration login interface. At the top, there is a dark blue header bar with the text "Django administration" in white. Below the header, the page has a white background. There are two input fields: the first is labeled "Username:" and the second is labeled "Password:". Both labels are in a small, grey font. Below each label is a white input box with a thin grey border. At the bottom of the form, there is a blue button with the text "Log in" in white.

Admin Site

Django administration

WELCOME, **ADMIN**. [VIEW SITE](#) / [CHANGE PASSWORD](#) / [LOG OUT](#)

Site administration

AUTHENTICATION AND AUTHORIZATION

Groups

+ Add

✎ Change

Users

+ Add

✎ Change

POLLS

Choices

+ Add

✎ Change

Questions

+ Add

✎ Change

Recent actions

My actions

None available

Django administration

WELCOME, **ADMIN**. [VIEW SITE](#) / [CHANGE PASSWORD](#) / [LOG OUT](#)

Home » Polls » Questions » Add question

Add question

Question text:

Pub date:

Date:

2020-07-14

Today

📅

Time:

09:43:17

Now

🕒

Note: You are 12 hours ahead of server time.

Save and add another

Save and continue editing

SAVE