Full Stack Development using Python

Module 5: Django Web Framework – Part1, 2 & 3
(Model ,Views,Templates,Static CSS)

Django Web Application Fundamentals Exercise

This exercise will guide you through setting up a basic Django project, creating an app, defining a simple model, and displaying data using views and templates.

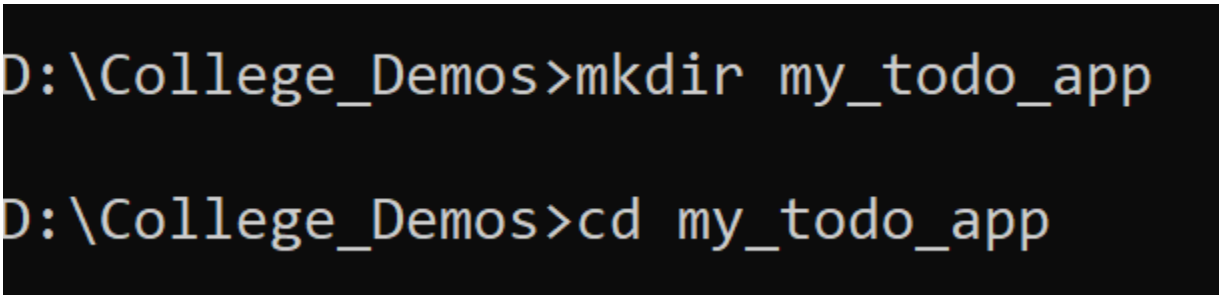
Objective: Create a Django application that displays a list of "Tasks" on a web page.

Part 1: Project and App Setup

1. **Create a Project Folder and Virtual Environment**:
    - Open your terminal or command prompt.
        - Create a new directory for your project (e.g., my_todo_app) and navigate into it.

            ✓mkdir my_todo_app

            ✓cd my_todo_app



- Create and activate a virtual environment named venv within this folder.

✓ ***python -m venv venv***

```
D:\College_Demos\my_todo_app>python -m venv venv
```

On Windows

✓***venv\Scripts\activate***

```
D:\College_Demos\my_todo_app>venv\Scripts\activate
```

- Install Django in your active virtual environment.

✓ ***pip install Django***

```
(venv) D:\College_Demos\my_todo_app>pip install Django
```

2. **Create a Django Project**:
   - Inside my_todo_app, create a new Django project named todo_project. Ensure the project is created in the current directory (use a dot . at the end of the command).

✓ ***django-admin startproject todo_project .***

```
(venv) D:\College_Demos\my_todo_app>django-admin startproject todo_project .
```

Create a Django App:

Create a new Django app within your todo_project named tasks.

✓ ***python manage.py startapp tasks***

```
(venv) D:\College_Demos\my_todo_app>python manage.py startapp tasks
```

3. **Register the App**:
    - Open todo_project/settings.py and add 'tasks' to your INSTALLED_APPS list.

      'DIRS': [os.path.join(BASE_DIR, 'templates')], # Modify this line

- **Open todo_project/settings.py** in your text editor.
- **Find the TEMPLATES setting**. It will look something like this:

```
TEMPLATES = [
    {
        'BACKEND': 'django.template.backends.django.DjangoTemplates',
        'DIRS': [], # This is the line you need to modify
        'APP_DIRS': True,
        'OPTIONS': {
            # ...
        },
    },
]
```

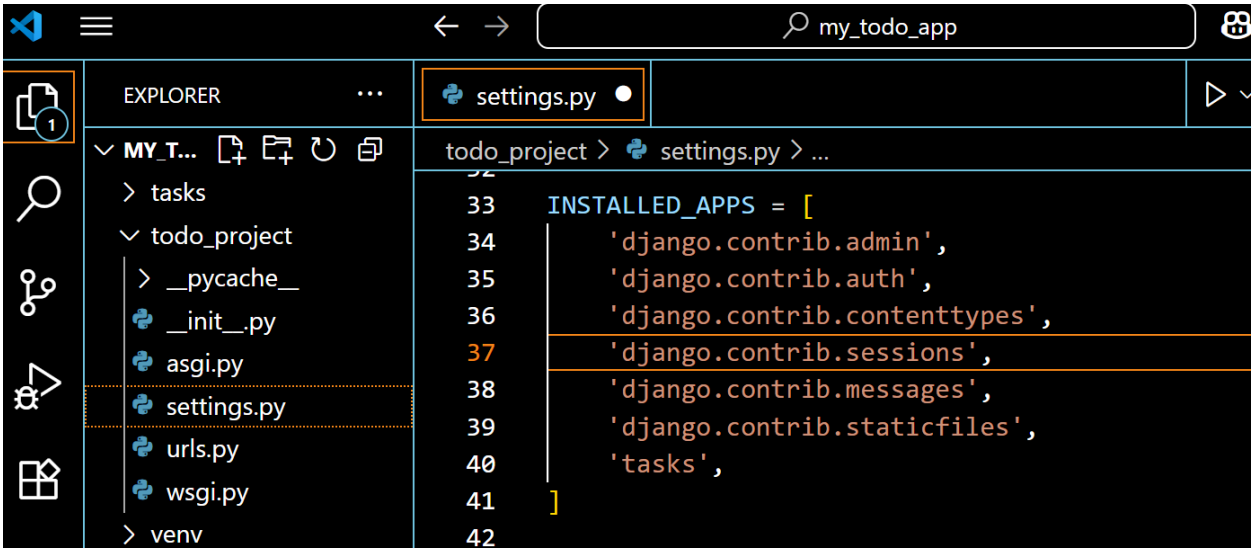
Modify the DIRS list to include the path to your templates directory.
You should use os.path.join and BASE_DIR to make the path platform-independent and robust.
First, ensure you have import os at the top of your settings.py if it's not already there.
Then, change the DIRS line to:

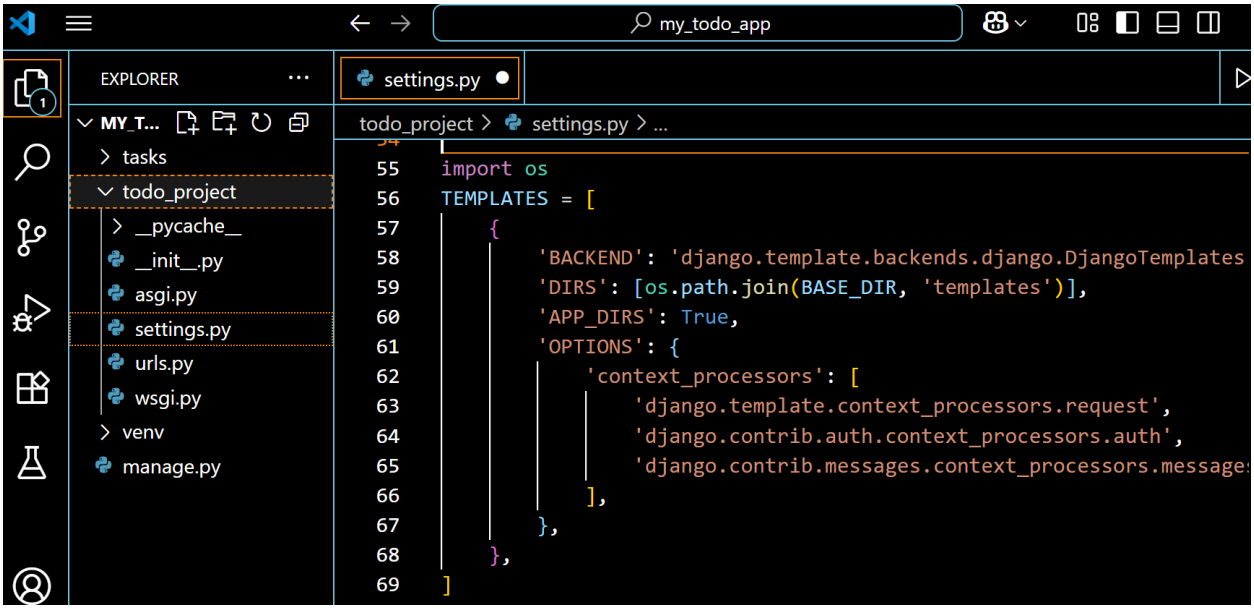
```
import os # Make sure this line is at the top of settings.py

# ... other settings ...
TEMPLATES = [
    {
        'BACKEND': 'django.template.backends.django.DjangoTemplates',
        'DIRS': [os.path.join(BASE_DIR, 'templates')], # Modify this line
        'APP_DIRS': True,
        'OPTIONS': {
            # ...
        },
    },
]
```

... rest of your settings ...

Open the VSCode Editor:

```
(venv) D:\College_Demos\my_todo_app>code .
```



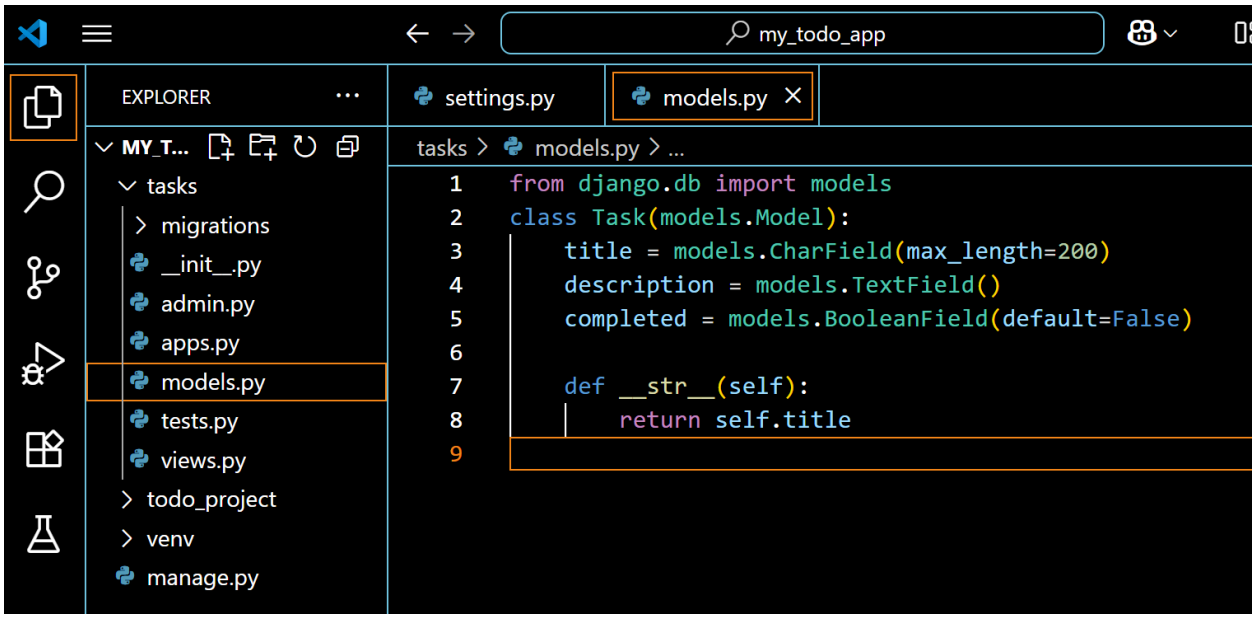


Part 2: Define a Model

1. **Define the Task Model**:
    - Open tasks/models.py.
    - Create a simple Django model named Task with the following fields:
        - title (CharField, max_length=200)
        - description (TextField)
        - completed (BooleanField, default=False)
    - Add a __str__ method to return the task's title.

 # tasks/models.py

```
from django.db import models
class Task(models.Model):
    title = models.CharField(max_length=200)
    description = models.TextField()
    completed = models.BooleanField(default=False)

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



2. **Create and Apply Migrations**:
    - In your terminal (from the todo_project directory), run the following commands to create and apply migrations for your new Task model.

✓ ***python manage.py makemigrations tasks***
✓ ***python manage.py migrate***

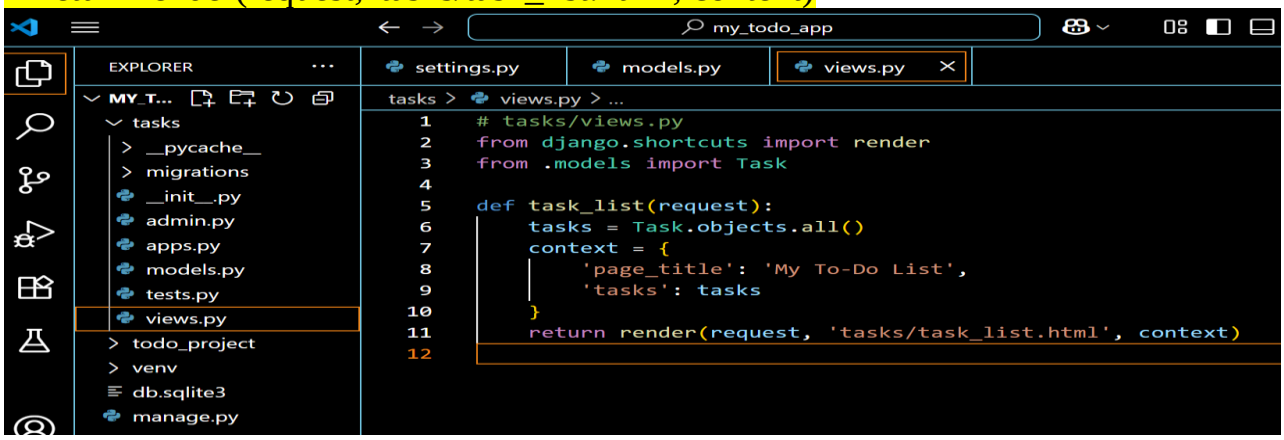
```
(venv) D:\College_Demos\my_todo_app>python manage.py makemigrations tasks
```

```
(venv) D:\College_Demos\my_todo_app>python manage.py migrate
```

Part 3: Create a View and URLs

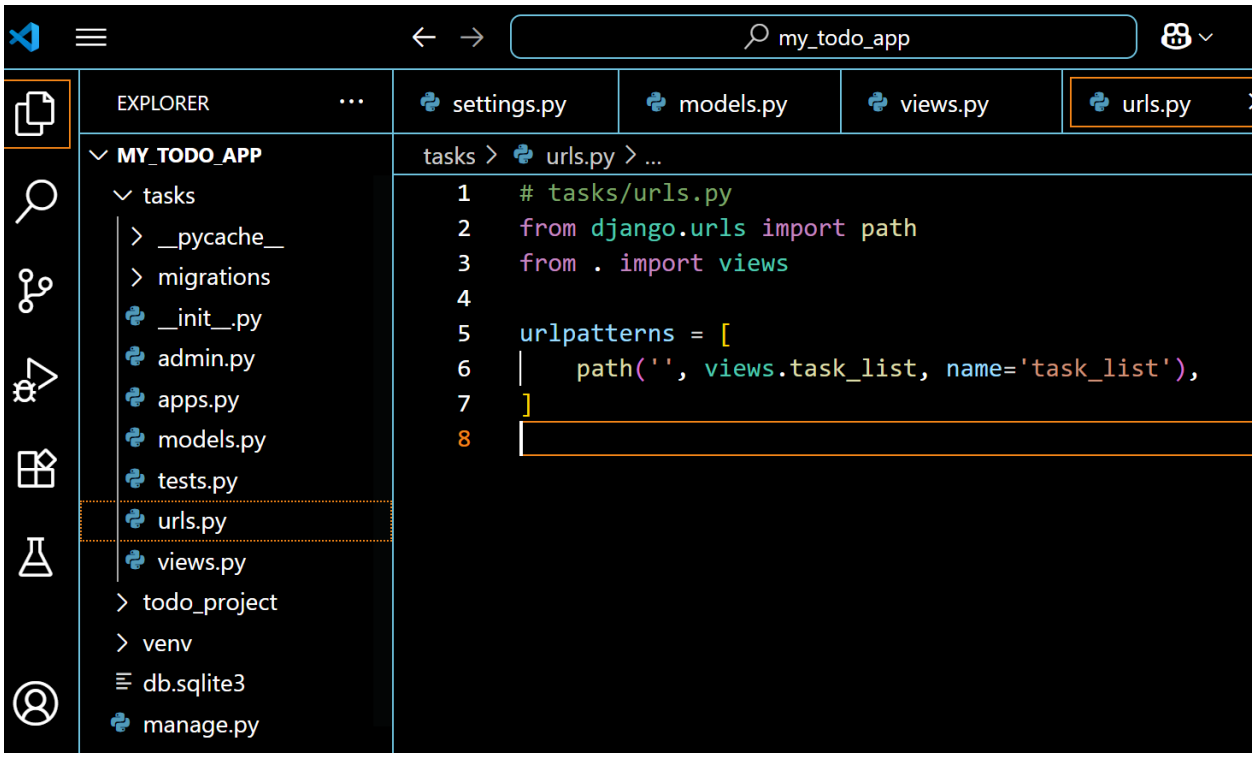
1. **Create a Task List View**:
    - Open tasks/views.py.
    - Create a function-based view task_list that fetches all Task objects from the database and passes them to a template.

```
# tasks/views.py
from django.shortcuts import render
from .models import Task

def task_list(request):
    tasks = Task.objects.all()
    context = {
        'page_title': 'My To-Do List',
        'tasks': tasks
    }
    return render(request, 'tasks/task_list.html', context)
```



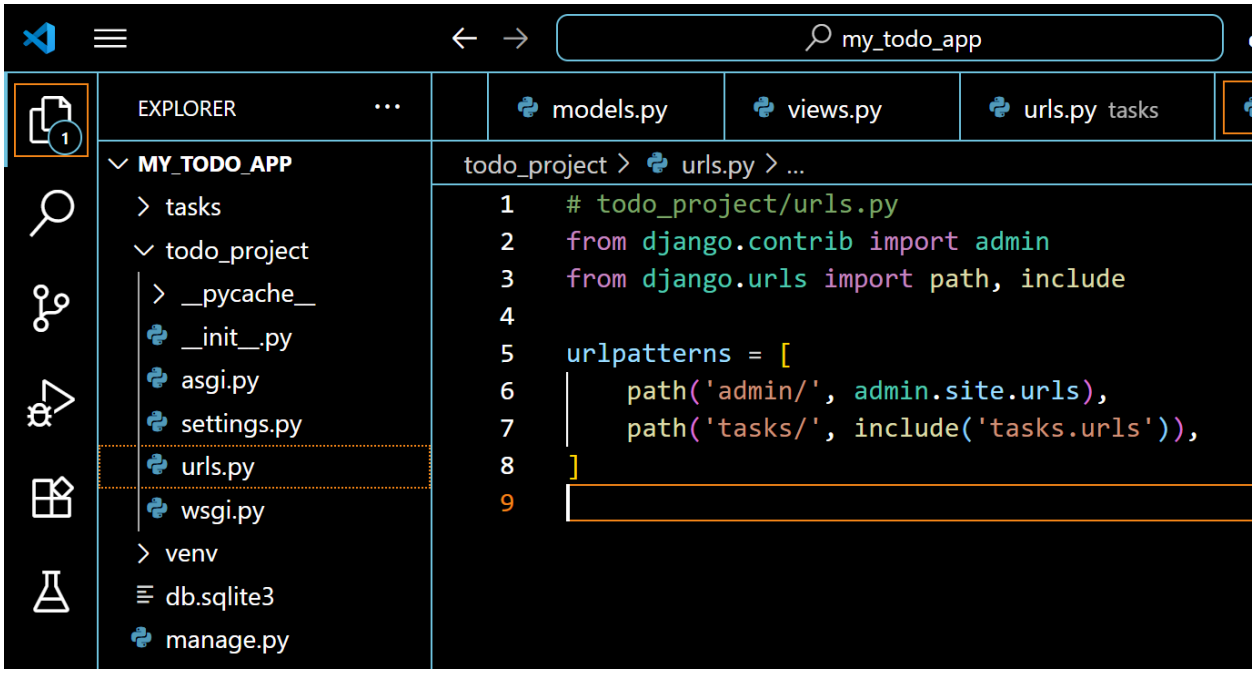
2. **Define App URLs**:
    - Inside the tasks directory, **create a new file named urls.py.**
    - Define a URL pattern that maps the root path (') to your task_list view.

```
# tasks/urls.py
from django.urls import path
from . import views

urlpatterns = [
    path('', views.task_list, name='task_list'),
]
```



3. **Include App URLs in Project URLs**:
    - Open todo_project/urls.py (the project-level urls.py).
    - Import include and add a path that delegates to your tasks.urls. For example, all URLs under /tasks/ will be handled by your tasks app.

```
# todo_project/urls.py
from django.contrib import admin
from django.urls import path, include

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



Part 4: Create a Template

1. **Create Templates Directory**:
    - In your project root (todo_project), create a new folder named templates.
    - Inside templates, create another folder named tasks.

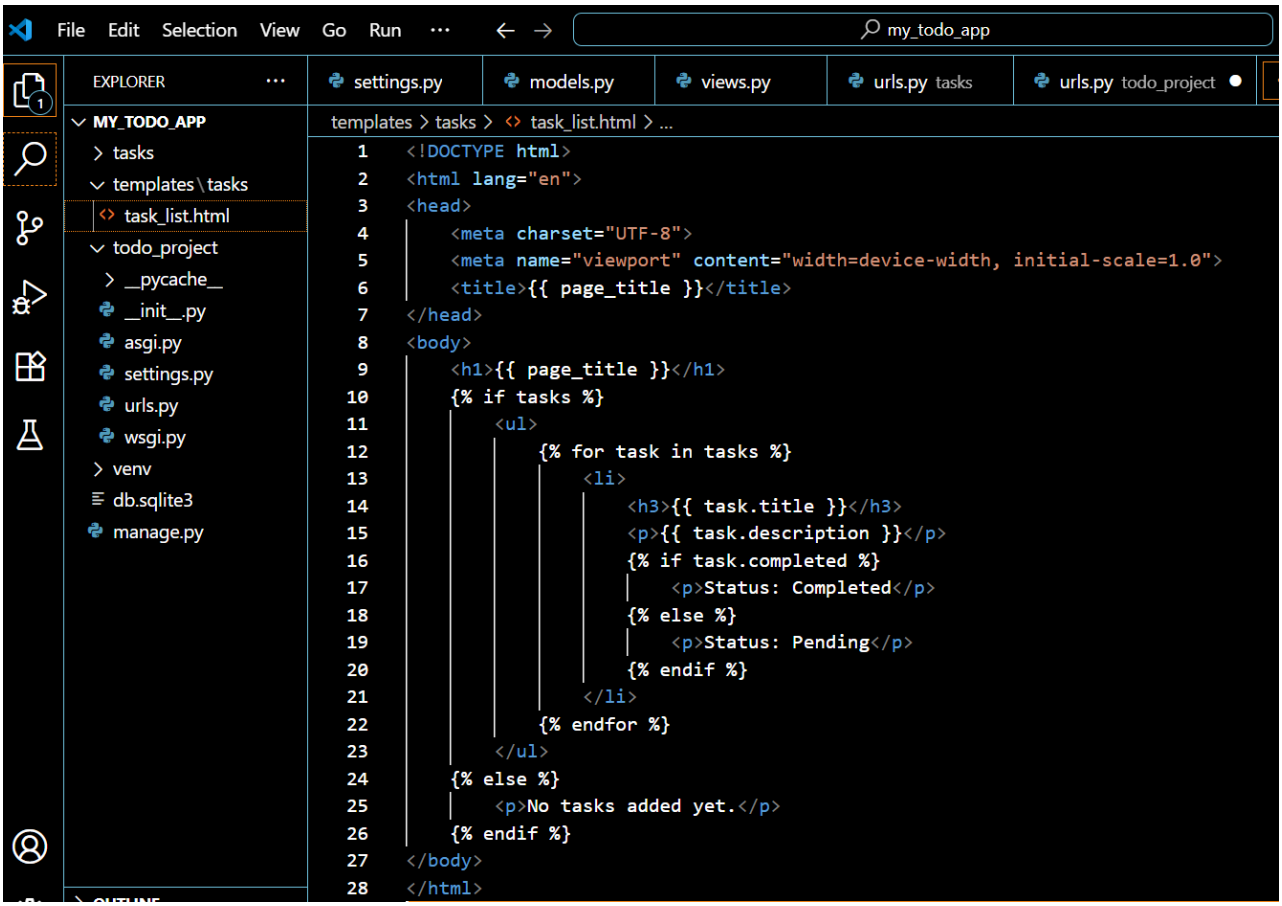
```
(venv) D:\College_Demos\my_todo_app>mkdir templates

(venv) D:\College_Demos\my_todo_app>mkdir templates\tasks
```

2. **Create Task List Template**:
    - Inside todo_project/templates/tasks/, create a new file named task_list.html.
    - Add basic HTML structure and use Django Template Language (DTL) to display the page_title and iterate over the tasks list. For each task, display its title, description, and completed status.

#task_list.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>{{ page_title }}</title>
</head>
<body>
    <h1>{{ page_title }}</h1>
    {% if tasks %}
        <ul>
            {% for task in tasks %}
                <li>
                    <h3>{{ task.title }}</h3>
                    <p>{{ task.description }}</p>
                    {% if task.completed %}
                        <p>Status: Completed</p>
                    {% else %}
```

```
                    <p>Status: Pending</p>
                {% endif %}
            </li>
        {% endfor %}
    </ul>
{% else %}
    <p>No tasks added yet.</p>
{% endif %}
</body>
</html>
```



Part 5: Run the Development Server

1. **Run the Server**:
    - In your terminal (from the todo_project directory), run the Django development server.

✓ ***python manage.py runserver***

```
(venv) D:\College_Demos\my_todo_app>python manage.py runserver
```

2. **View Your Application**:
    - Open your web browser and go to http://127.0.0.1:8000/tasks/.
    - You should see your "My To-Do List" page.

Bonus (Optional): Add Data via Admin Panel

1. **Create a Superuser**:
    - Create an administrative user for your Django project.

✓ python manage.py createsuperuser

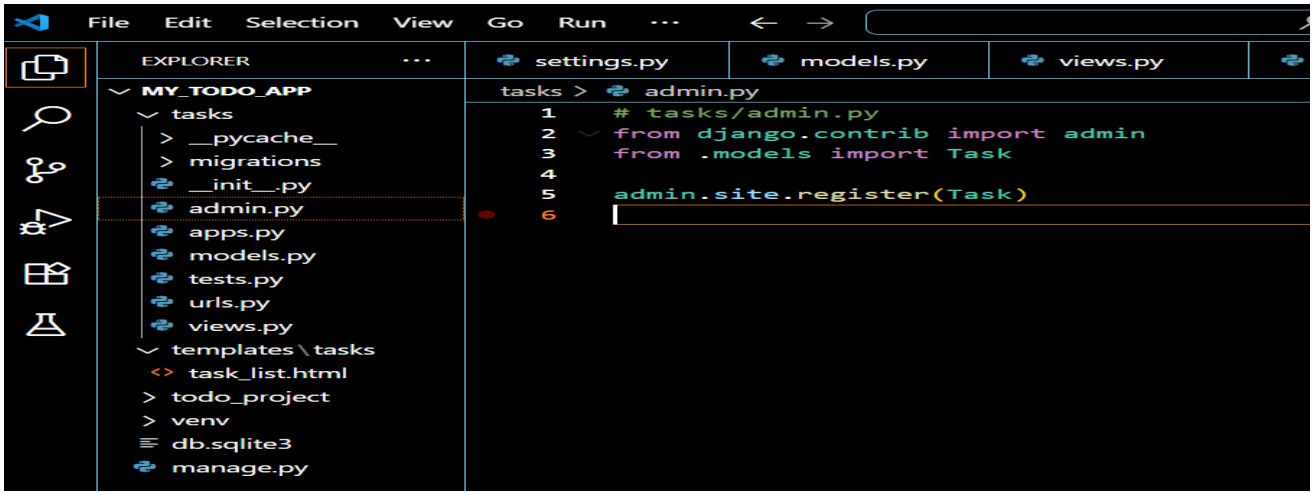
```
(venv) D:\College_Demos\my_todo_app>python manage.py createsuperuser
Username (leave blank to use 'dell'): shubhali
Email address: shubhali11@gmail.com
Password:
Password (again):
Superuser created successfully.
```

    - Follow the prompts to set up a username, email (optional), and password.

2. **Register Model in Admin**:
    - Open tasks/admin.py and register your Task model so you can manage tasks through the Django admin interface.

 # tasks/admin.py

```
from django.contrib import admin
from .models import Task

admin.site.register(Task)
```

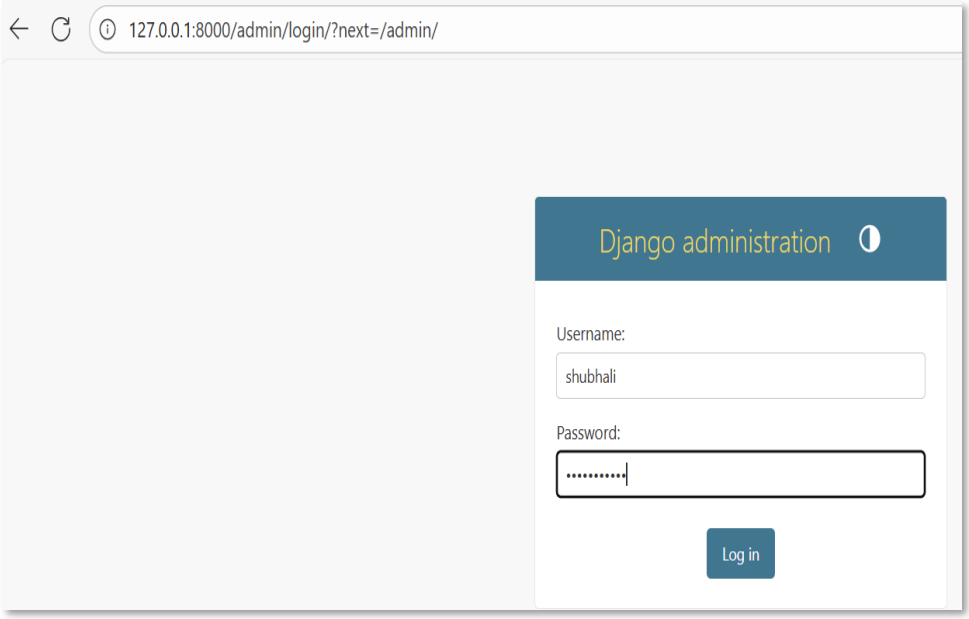


3. **Access Admin Panel**:

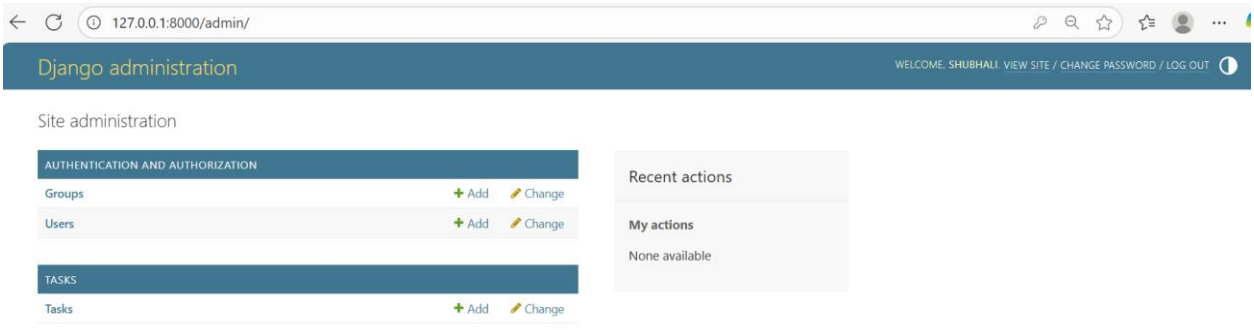
1. Ensure your development server is running (python manage.py runserver).

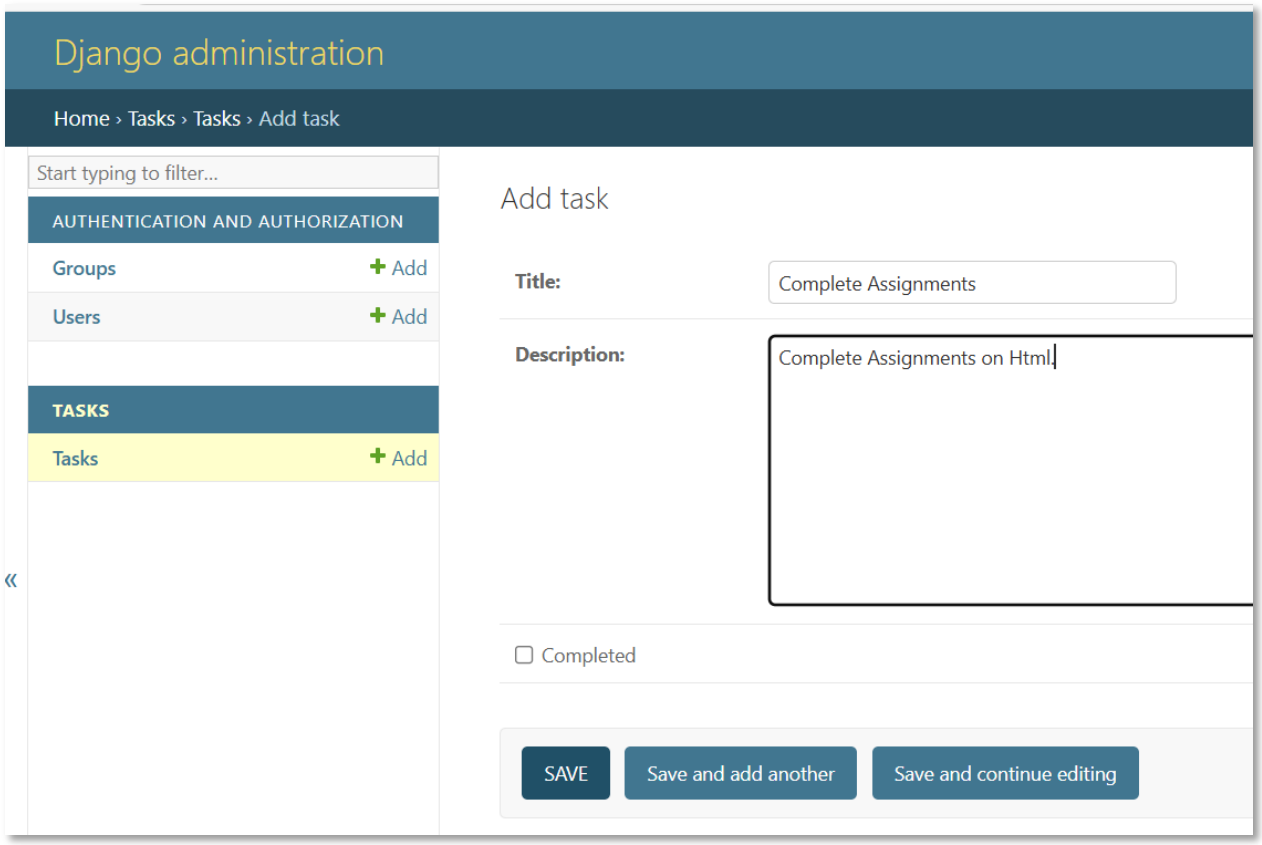
```
(venv) D:\College_Demos\my_todo_app>python manage.py runserver
```

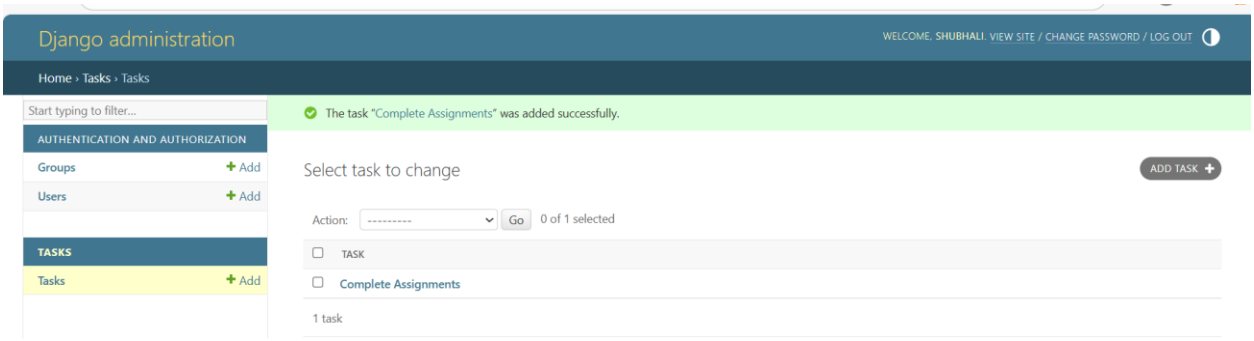
- **Open http://127.0.0.1:8000/admin/ in your browser**. Log in with the superuser credentials you just created.



- You should now see "Tasks" under your "Tasks" app. Click "Add" next to "Tasks" to create new tasks. These tasks will then appear on your http://127.0.0.1:8000/tasks/ page.




Django administration
Home › Tasks › Tasks › Add task
Start typing to filter...
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
TASKS
Tasks + Add
Add task
Title:
Complete Assignments
Description:
Complete Assignments on Html.
Completed
SAVE
Save and add another
Save and continue editing


Django administration
WELCOME, SHUBHALI. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Tasks › Tasks
Start typing to filter...
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
TASKS
Tasks + Add
The task "Complete Assignments" was added successfully.
Select task to change
ADD TASK +
Action: --------- Go 0 of 1 selected
TASK
Complete Assignments
1 task


127.0.0.1:8000/tasks/
My To-Do List
Complete Assignments
Complete Assignments on Html.
Status: Pending

Part 6: Add Static CSS

The goal here is to create a basic CSS file and apply some styles to your task_list.html page.

1. **Create Static Files Directories:**
    - In your project's root directory (my_todo_app, where manage.py is located), create a new folder named static.
    - Inside the static folder, create another folder named css.

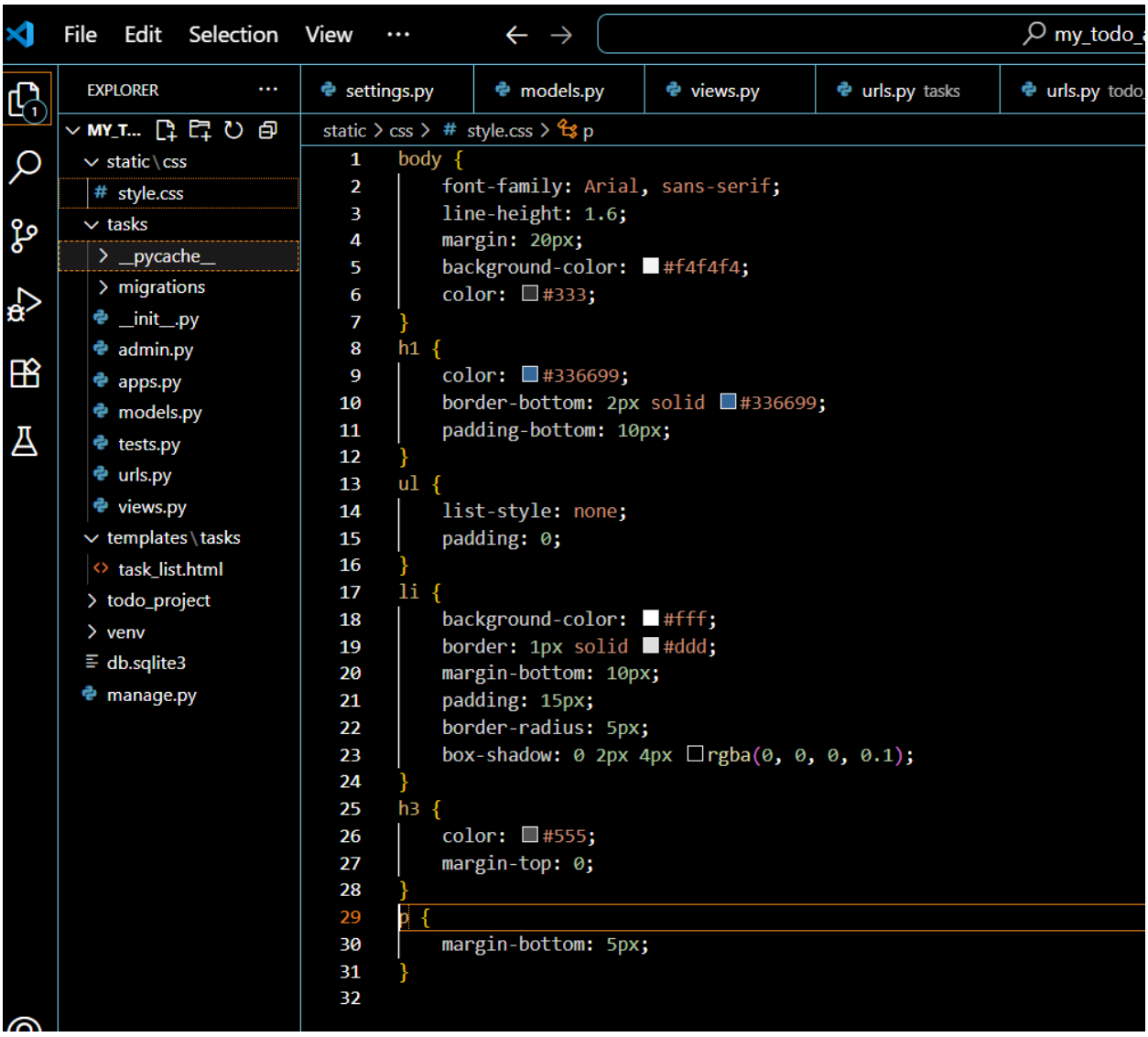
```
(venv) D:\College_Demos\my_todo_app>mkdir static

(venv) D:\College_Demos\my_todo_app>mkdir static\css
```

Your directory structure should now look something like this:

```
my_todo_app/
├── todo_project/
│   ├── __init__.py
│   ├── asgi.py
│   ├── settings.py  <-- You will edit this
│   ├── urls.py      <-- You will edit this
│   └── wsgi.py
├── tasks/
│   ├── migrations/
│   ├── __init__.py
│   ├── admin.py     <-- You might have edited this
│   ├── apps.py
│   ├── models.py    <-- You edited this
│   ├── tests.py
│   ├── urls.py      <-- You created this
│   └── views.py     <-- You edited this
├── templates/
│   └── tasks/
│       └── task_list.html <-- You will edit this
├── static/          <-- NEW FOLDER
│   └── css/         <-- NEW FOLDER
│       └── style.css <-- NEW FILE
├── manage.py
└── venv/
```

2. **Create your CSS File:**
    - Inside my_todo_app/static/css/, create a new file named style.css.
    - Add some basic CSS rules to it. For example:

```
/* my_todo_app/static/css/style.css */
body {
    font-family: Arial, sans-serif;
    line-height: 1.6;
    margin: 20px;
    background-color: #f4f4f4;
    color: #333;
}
h1 {
    color: #336699;
    border-bottom: 2px solid #336699;
    padding-bottom: 10px;
}
ul {
    list-style: none;
    padding: 0;
}
li {
    background-color: #fff;
    border: 1px solid #ddd;
    margin-bottom: 10px;
    padding: 15px;
    border-radius: 5px;
    box-shadow: 0 2px 4px rgba(0, 0, 0, 0.1);
}
h3 {
    color: #555;
    margin-top: 0;
}

p {
    margin-bottom: 5px;
}
```



3. **Configure settings.py for Static Files:**
    - Open todo_project/settings.py.
    - You should already have STATIC_URL = 'static/' defined (it's usually there by default).
    - Below STATIC_URL, add STATICFILES_DIRS. This list tells Django where to look for static files outside of individual app static folders.

 # todo_project/settings.py

import os # Make sure this is at the top of your file

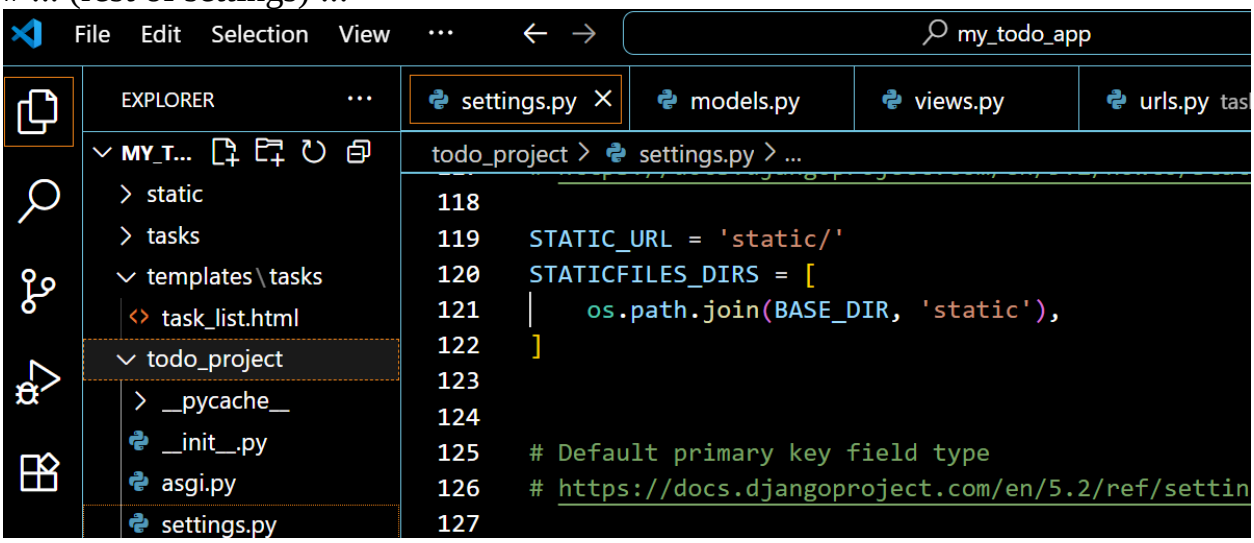
... (other settings) ...

Static files (CSS, JavaScript, Images)
https://docs.djangoproject.com/en/5.0/howto/static-files/

STATIC_URL = 'static/'

# Add this line to tell Django where your project-wide static files are
STATICFILES_DIRS = [
    os.path.join(BASE_DIR, 'static'),
]

... (rest of settings) ...



4. **Link the CSS in your Template:**
    - Open todo_project/templates/tasks/task_list.html.
    - At the very top of the file, add {% load static %}. This tag makes the static template tag available.
    - In the <head> section of your HTML, add a <link> tag to reference your style.css file using the {% static %} template tag.

```
#task_list.html
{% load static %}
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <title>{{ page_title }}</title>
    <link rel="stylesheet" href="{% static 'css/style.css' %}">
</head>
<body>
    <h1>{{ page_title }}</h1>
    {% if tasks %}
        <ul>
            {% for task in tasks %}
                <li>
                    <h3>{{ task.title }}</h3>
                    <p>{{ task.description }}</p>
                    {% if task.completed %}
                        <p>Status: Completed</p>
                    {% else %}
                        <p>Status: Pending</p>
                    {% endif %}
                </li>
            {% endfor %}
        </ul>
    {% else %}
        <p>No tasks added yet.</p>
    {% endif %}
</body>
</html>
```

5. **Run the Development Server and Verify:**
    - Ensure your development server is running:

      python manage.py runserver

```
(venv) D:\College_Demos\my_todo_app>python manage.py runserver
```

    - Open your browser and navigate to http://127.0.0.1:8000/tasks/.