SDEV 2401

Rapid Backend App Development

Databases, Models, Migrations and the Admin - 1

Expectations - What I expect from you

- No Late Assignments

- No Cheating

- Be a good classmate

- Don't waste your time

- Show up to class

Agenda

On the right is what we will cover today.

- Django ORM Fundamentals
- Defining a Model
- Available Core Fields in Django Models
- Making and Applying Migrations
- Registering Models with the Admin
- Creating and Querying Data
- Filtering and Updating Records
- Deleting Records
- Conclusion

Django ORM Fundamentals

- Django's ORM (Object Relational Mapper) lets you interact with your database using Python classes and objects.

- You don't need to write raw SQL for most operations.

- Key concepts: Model, Migration, QuerySet, Admin.

Defining a Model

- A model is a Python class that represents a table in your database.

- Example: Let's track books in a library.

```python
from django.db import models

class Book(models.Model):
    title = models.CharField(max_length=200)
    author = models.CharField(max_length=100)
    published_year = models.IntegerField()

    def __str__(self):
        return f"{self.title} by {self.author}"
```

Available Core Fields in Django Models

Here's a brief overview of some core field types you can use in Django models (look at the docs Django documentation for more details):

- `CharField` : A short text field, used for small strings like names or titles.

- `TextField` : A large text field, used for longer strings like descriptions or comments.

- `IntegerField` : A field for storing integers.

- `FloatField` : A field for storing floating-point numbers.

- `BooleanField` : A field for storing boolean values (True/False).

- `DateField` : A field for storing dates.

- `DateTimeField` : A field for storing date and time values.

- `EmailField` : A field for storing email addresses, which includes validation to ensure the value is a valid email format.

- `URLField` : A field for storing URLs, which includes validation to ensure the value is a valid URL format.

Making and Applying Migrations

- After creating or changing a model, generate a migration:

  ```
  python manage.py makemigrations
  ```

- Apply the migration to update the database:

  ```
  python manage.py migrate
  ```

- This creates the `Book` table in your database.

Registering Models with the Admin

- To manage your data easily, register your model in `admin.py` :

```python
from django.contrib import admin
from .models import Book

admin.site.register(Book)
```

- Now you can add, edit, and delete books via the Django admin interface.

Creating and Querying Data

- Open the Django shell:

```
python manage.py shell
```

- Add a new book:

```python
from library.models import Book
Book.objects.create(title="1984", author="George Orwell", published_year=1949)
```

- Query all books:

```python
books = Book.objects.all()
for book in books:
    print(book)
```

Filtering and Updating Records

- Filter books by author:

```
orwell_books = Book.objects.filter(author="George Orwell")
```

- Update a book's year:

```
book = Book.objects.get(title="1984")
book.published_year = 1950
book.save()
```

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Deleting Records

- Remove a book from the database:

```python
book = Book.objects.get(title="1984")
book.delete()
```

Conclusion

- Django ORM makes it easy to create, read, update, and delete records using Python.

- Use models to define your data structure, migrations to update your database, and the admin for easy management.

- Practice by building a model for another entity, like `Member` or `Loan`, and try CRUD operations in the shell.

Example

Let's go do an example together