



# SDEV 2401

Rapid Backend App Development

Databases, Models, Migrations and the Admin - 1

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# 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: Relationships with ForeignKey and ManyToMany
- Example: Author and Book Models
- Making and Applying Migrations
- Adding Data in the Admin
- Displaying Related Data in a Template
- Filtering by Related Fields
- ManyToMany Relationships
- Summary

# Django ORM: Relationships with ForeignKey and ManyToMany

Django's ORM lets you define relationships between models, such as one-to-many and many-to-many, using special field types.

- We'll use a `Library` example with `Book` and `Author` models.
- You'll see how to set up `ForeignKey` and `ManyToMany` relationships and display related data in templates.

# Example: Author and Book Models

On the right, we'll define an `Author` model and a `Book` model. Each book is written by one author (`ForeignKey`), and each book can have multiple genres (`ManyToMany`).

```
from django.db import models

class Author(models.Model):
    name = models.CharField(max_length=100)
    bio = models.TextField(blank=True, null=True)

    def __str__(self):
        return self.name

class Genre(models.Model):
    name = models.CharField(max_length=50)

    def __str__(self):
        return self.name

class Book(models.Model):
    title = models.CharField(max_length=200)
    author = models.ForeignKey(Author, on_delete=models.CASCADE)
    genres = models.ManyToManyField(Genre)
    published_year = models.IntegerField()

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

# Making and Applying Migrations

After defining your models, run these commands to create and apply migrations:

```
python manage.py makemigrations  
python manage.py migrate
```

This will create the necessary tables and relationships in your database.

# Adding Data in the Admin

- Register your models in `admin.py` to manage them via the Django admin interface.
- Example:

```
from django.contrib import admin
from .models import Author, Book, Genre

admin.site.register(Author)
admin.site.register(Book)
admin.site.register(Genre)
```

- Add some authors, genres, and books in the admin.

# Displaying Related Data in a Template

You can fetch all books and display their authors and genres in a template.

```
# views.py
from django.shortcuts import render
from .models import Book

def book_list(request):
    books = Book.objects.all()
    return render(request, 'library/book_list.html', {'books': books})
```

# Displaying Related Data in a Template Continued

To display the books in your template, you can loop through the `books` context variable passed from the view. Each book will show its title, author, published year, and associated genres.

In your template:

```
!— library/book_list.html —>
<ul>
  {% for book in books %}
    <li>
      <strong>{{ book.title }}</strong> by {{ book.author.name }} ({{ book.published_year }})
      <ul>
        {% for genre in book.genres.all %}
          <li>{{ genre.name }}</li>
        {% endfor %}
      </ul>
    </li>
  {% endfor %}
</ul>
```

# Filtering by Related Fields

You can filter books by author or genre using related fields.

```
# Get all books by a specific author
books_by_alice = Book.objects.filter(author__name="Alice Smith")

# Get all books in the "Science Fiction" genre
scifi_books = Book.objects.filter(genres__name="Science Fiction")
```

You can use the `__` to look up fields across relationships.

# ManyToMany Relationships

- ManyToMany fields let you associate multiple records from one model with multiple records from another.
- In the example, a book can have many genres, and a genre can belong to many books.
- You can access related objects using `.all()` in templates and views.

# Summary

- Use `ForeignKey` for one-to-many relationships (e.g., each book has one author).
- Use `ManyToManyField` for many-to-many relationships (e.g., books and genres).
- Access related data in templates using dot notation and `.all()`.
- Filter and display related data for more dynamic web pages.



# Example

Let's go do an example together