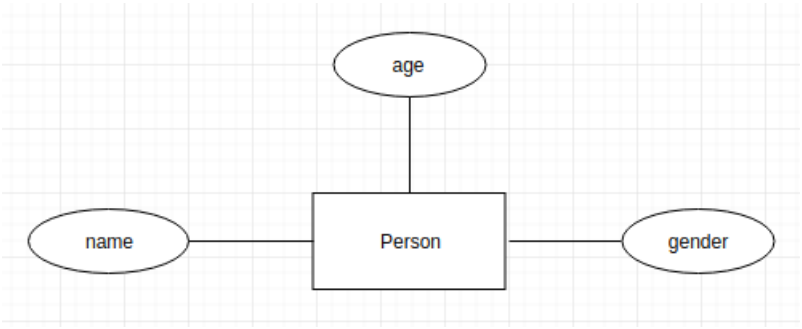
Django ORM if you already know SQL

If you are migrating to Django from another MVC framework, chances are you already know SQL.

In this post, I will be illustrating how to use Django ORM by drawing analogies to equivalent SQL statements. Connecting a new topic to your existing knowledge will help you learn to use the ORM faster.

Let us consider a simple base model for a person with attributes name, age, and gender.



To implement the above entity, we would model it as a table in SQL.

```
CREATE TABLE Person (
    id int,
    name varchar(50),
    age int NOT NULL,
    gender varchar(10),
);
```

The same table is modeled in Django as a class which inherits from the base Model class. The ORM creates the equivalent table under the hood.

```
class Person(models.Model):
    name = models.CharField(max_length=50, blank=True)
    age = models.IntegerField()
    gender = models.CharField(max_length=10, blank=True)
```

The most used data types are:

SQL	Django
`INT`	`IntegerField()`
`VARCHAR(n)`	`CharField(max_length=n)`
`TEXT`	`TextField()`
`FLOAT(n)`	`FloatField()`
`DATE`	`DateField()`
`TIME`	`TimeField()`
`DATETIME`	`DateTimeField()`

The various queries we can use are:

SELECT Statement

Fetch all rows
SQL:

```
SELECT *
FROM Person;
```

Django:

```
persons = Person.objects.all()
for person in persons:
    print(person.name)
    print(person.gender)
    print(person.age)
```

Fetch specific columns
SQL:

```
SELECT name, age
FROM Person;
```

Django:

```
Person.objects.only('name', 'age')
```

Fetch distinct rows
SQL:

```
SELECT DISTINCT name, age
FROM Person;
```

Django:

```
Person.objects.values('name', 'age').distinct()
```

Fetch specific number of rows
SQL:

```
SELECT *
FROM Person
LIMIT 10;
```

Django:

```
Person.objects.all()[:10]
```

LIMIT AND OFFSET keywords
SQL:

```
SELECT *
FROM Person
OFFSET 5
LIMIT 5;
```

Django:

```
Person.objects.all()[5:10]
```

WHERE Clause

Filter by single column
SQL:

```
SELECT *
FROM Person
WHERE id = 1;
```

Django:

```
Person.objects.filter(id=1)
```

Filter by comparison operators
SQL:

```
WHERE age > 18;
WHERE age >= 18;
WHERE age < 18;
WHERE age <= 18;
WHERE age != 18;
```

Django:

```
Person.objects.filter(age__gt=18)
Person.objects.filter(age__gte=18)
Person.objects.filter(age__lt=18)
Person.objects.filter(age__lte=18)
Person.objects.exclude(age=18)
```

BETWEEN Clause
SQL:

```
SELECT *
FROM Person
WHERE age BETWEEN 10 AND 20;
```

Django:

```
Person.objects.filter(age__range=(10, 20))
```

LIKE operator
SQL:

```
WHERE name like '%A%';
WHERE name like binary '%A%';
WHERE name like 'A%';
WHERE name like binary 'A%';
WHERE name like '%A';
WHERE name like binary '%A';
```

Django:

```
Person.objects.filter(name__icontains='A')
Person.objects.filter(name__contains='A')
Person.objects.filter(name__istartswith='A')
Person.objects.filter(name__startswith='A')
Person.objects.filter(name__iendswith='A')
Person.objects.filter(name__endswith='A')
```

IN operator
SQL:

```
WHERE id in (1, 2);
```

Django:

```
Person.objects.filter(id__in=[1, 2])
```

AND, OR and NOT Operators

SQL:

```
WHERE gender='male' AND age > 25;
```

Django:

```
Person.objects.filter(gender='male', age__gt=25)
```

SQL:

```
WHERE gender='male' OR age > 25;
```

Django:

```
from django.db.models import Q
Person.objects.filter(Q(gender='male') | Q(age__gt=25))
```

SQL:

```
WHERE NOT gender='male';
```

Django:

```
Person.objects.exclude(gender='male')
```

NULL Values

SQL:

```
WHERE age is NULL;
WHERE age is NOT NULL;
```

Django:

```
Person.objects.filter(age__isnull=True)
Person.objects.filter(age__isnull=False)

# Alternate approach
Person.objects.filter(age=None)
Person.objects.exclude(age=None)
```

ORDER BY Keyword

Ascending Order
SQL:

```
SELECT *
FROM Person
order by age;
```

Django:

```
Person.objects.order_by('age')
```

Descending Order
SQL:

```
SELECT *
FROM Person
ORDER BY age DESC;
```

Django:

```
Person.objects.order_by('-age')
```

INSERT INTO Statement

SQL:

```
INSERT INTO Person
VALUES ('Jack', '23', 'male');
```

Django:

```
Person.objects.create(name='jack', age=23, gender='male')
```

UPDATE Statement

Update single row
SQL:

```
UPDATE Person
SET age = 20
WHERE id = 1;
```

Django:

```
person = Person.objects.get(id=1)
person.age = 20
person.save()
```

Update multiple rows
SQL:

```
UPDATE Person
SET age = age * 1.5;
```

Django:

```
from django.db.models import F

Person.objects.update(age=F('age')*1.5)
```

DELETE Statement

Delete all rows
SQL:

```
DELETE FROM Person;
```

Django:

```
Person.objects.all().delete()
```

Delete specific rows
SQL:

```
DELETE FROM Person
WHERE age < 10;
```

Django:

```
Person.objects.filter(age__lt=10).delete()
```

Aggregation

MIN Function
SQL:

```
SELECT MIN(age)
FROM Person;
```

Django:

```
>>> from django.db.models import Min
>>> Person.objects.all().aggregate(Min('age'))
{'age__min': 0}
```

MAX Function
SQL:

```
SELECT MAX(age)
FROM Person;
```

Django:

```
>>> from django.db.models import Max
>>> Person.objects.all().aggregate(Max('age'))
{'age__max': 100}
```

AVG Function
SQL:

```
SELECT AVG(age)
FROM Person;
```

Django:

```
>>> from django.db.models import Avg
>>> Person.objects.all().aggregate(Avg('age'))
{'age__avg': 50}
```

SUM Function
SQL:

```
SELECT SUM(age)
FROM Person;
```

Django:

```
>>> from django.db.models import Sum
>>> Person.objects.all().aggregate(Sum('age'))
{'age__sum': 5050}
```

COUNT Function
SQL:

```
SELECT COUNT(*)
FROM Person;
```

Django:

```
Person.objects.count()
```

GROUP BY Statement

Count of Person by gender
SQL:

```
SELECT gender, COUNT(*) as count
FROM Person
GROUP BY gender;
```

Django:

```
Person.objects.values('gender').annotate(count=Count('gender'))
```

HAVING Clause

Count of Person by gender if number of person is greater than 1
SQL:

```
SELECT gender, COUNT('gender') as count
FROM Person
GROUP BY gender
HAVING count > 1;
```

Django:

```
Person.objects.annotate(count=Count('gender'))
.values('gender', 'count')
.filter(count__gt=1)
```

JOINS

Consider a foreign key relationship between books and publisher.

```
class Publisher(models.Model):
    name = models.CharField(max_length=100)

class Book(models.Model):
    publisher = models.ForeignKey(Publisher, on_delete=models.CASCADE)
```

Fetch publisher name for a book
SQL:

```
SELECT name
FROM Book
LEFT JOIN Publisher
ON Book.publisher_id = Publisher.id
WHERE Book.id=1;
```

Django:

```
book = Book.objects.select_related('publisher').get(id=1)
book.publisher.name
```

Fetch books which have specific publisher
SQL:

```
SELECT *
FROM Book
WHERE Book.publisher_id = 1;
```

Django:

```
publisher = Publisher.objects.prefetch_related('book_set').get(id=1)
books = publisher.book_set.all()
```