# Exercises: Django Models Relations

This document defines the **exercise assignments** for the [Python ORM course @ Software University](https://softuni.bg/trainings/4253/python-orm-october-2023).

Submit your solutions in the SoftUni [Judge system](https://judge.softuni.org/Contests/4328/Django-Models-Relations-Exercise).

## Library

Write a Django model called **"Author"** with the provided information:

* **"name"** - character field, **consisting of a maximum of 40 characters.**

Write a **second** Django model called **"Book"** with the provided information:

* **"title"** - character field, **consisting of a maximum of 40 characters.**
* **"price"** - decimal field, with a **maximum** of **5 digits** and **2 decimal places**.
* **"author"** - many-to-one relation to the **"Author"** class. If an author is **deleted**, you should **automatically** **delete** all the **related** books.

Apply all the migrations to the database.

### Functions inside the caller.py file

Function**:** **"show\_all\_authors\_with\_their\_books()"** **returns** a string with **authors** and their **books**, **separated** by **comma and space -** "**,** ", **ordered** **by** the **id** of the **author** (**ascending**) as follows:

* **"{author\_name\_1} has written - {book\_1, book\_2, book\_N}!**

**…**

**{author\_name\_N} has written - {book\_1, book\_2, book\_N}!"**

* **Note:** If an **author** does not have any **books**, **continue** to the next one.

Function**:** **"delete\_all\_authors\_without\_books()"** **deletes** all **authors** that do not have any **book** related to them.

### Examples

**When submitting your solution to the Judge system, please, refactor the caller.py file as you comment or delete the creation of the objects, otherwise, it will have an impact on the database and the results of the Judge tests.**

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| **Test code - caller.py** |
| # Create authors author1 = Author.objects.create(name="J.K. Rowling") author2 = Author.objects.create(name="George Orwell") author3 = Author.objects.create(name="Harper Lee") author4 = Author.objects.create(name="Mark Twain")  # Create books associated with the authors book1 = Book.objects.create(  title="Harry Potter and the Philosopher's Stone",  price=19.99,  author=author1 ) book2 = Book.objects.create(  title="1984",  price=14.99,  author=author2 )  book3 = Book.objects.create(  title="To Kill a Mockingbird",  price=12.99,  author=author3 )  # Display authors and their books authors\_with\_books = show\_all\_authors\_with\_their\_books() print(authors\_with\_books)  # Delete authors without books delete\_all\_authors\_without\_books() print(Author.objects.count()) |
| **Output** |
| J.K. Rowling has written - Harry Potter and the Philosopher's Stone!  George Orwell has written - 1984!  Harper Lee has written - To Kill a Mockingbird!  3 |

## Music App

Write a Django model called **"Song"** with the provided information:

* **"title"** - character field, **consisting of a maximum of 100 characters, unique.**

Write a **second** Django model called **"Artist"** with the provided information:

* **"name"** - character field, **consisting of a maximum of 100 characters, unique.**
* **"songs"** - many-to-many relation to the **"Song"** class. The field has a **related name** set to "**artists**".

Apply all the migrations to the database.

### Functions inside the caller.py file

Function**: "add\_song\_to\_artist(artist\_name: str, song\_title: str)"** gets the **artist** object by the **artist's name** and the **song** object by the **song's title**, and **adds** the **song** object to the **artist's** **songs** collection.

Function**: "get\_songs\_by\_artist(artist\_name: str)"** **returns all** the **song** objects from the **songs** collection, **ordered by song id (descending)** for the given **artist**.

Function**: "remove\_song\_from\_artist(artist\_name: str, song\_title: str)"** gets the **artist** object by the **artist's name** and the **song** object by the **song's title**, and **removes** the **song** object from the **artist's** **songs** collection.

### Examples

**When submitting your solution to the Judge system, please, refactor the caller.py file as you comment or delete the creation of the objects, otherwise, it will have an impact on the database and the results of the Judge tests.**

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| **Test code - caller.py** |
| # Create artists artist1 = Artist.objects.create(name="Daniel Di Angelo") artist2 = Artist.objects.create(name="Indila")  # Create songs song1 = Song.objects.create(title="Lose Face") song2 = Song.objects.create(title="Tourner Dans Le Vide") song3 = Song.objects.create(title="Loyalty")  # Add a song to an artist add\_song\_to\_artist("Daniel Di Angelo", "Lose Face") add\_song\_to\_artist("Daniel Di Angelo", "Loyalty") add\_song\_to\_artist("Indila", "Tourner Dans Le Vide")  # Get all songs by a specific artist songs = get\_songs\_by\_artist("Daniel Di Angelo") for song in songs:  print(f"Daniel Di Angelo: {song.title}")  # Get all songs by a specific artist songs = get\_songs\_by\_artist("Indila") for song in songs:  print(f"Indila: {song.title}")  # Remove a song from an artist remove\_song\_from\_artist("Daniel Di Angelo", "Lose Face")  # Check if the song is removed songs = get\_songs\_by\_artist("Daniel Di Angelo")  for song in songs:  print(f"Songs by Daniel Di Angelo after removal: {song.title}") |
| **Output** |
| Daniel Di Angelo: Loyalty  Daniel Di Angelo: Lose Face  Indila: Tourner Dans Le Vide  Songs by Daniel Di Angelo after removal: Loyalty |

## Shop

Write a Django model called **"Product"** with the provided information:

* **"name"** - character field, **consisting of a maximum of 100 characters, unique.**

Write a **second** Django model called **"Review"** with the provided information:

* **"description"** - text field, **consisting of a maximum of 200 characters.**
* **"rating"** - positive integer field.
* **"product"** - many-to-one relation to the **"Product"** class. If a product is **deleted**, you should **automatically** **delete** all the **related** reviews. The relation is **optional**.

Apply all the migrations to the database.

### Functions inside the caller.py file

Function**:** **"calculate\_average\_rating\_for\_product\_by\_name(product\_name: str)"** **returns** the calculated **average** **rating** for a given product by its **name**.

Function**:** **"get\_reviews\_with\_high\_ratings(threshold: int)"** **returns** all reviews with **greater than** or **equal** ratings than the **threshold**.

Function**:** **"get\_products\_with\_no\_reviews(product\_name: str)"** **returns** all **products** that do **NOT** **have** any related **reviews, ordered by** product **name** (**descending**).

Function**:** **"delete\_products\_without\_reviews()"** **deletes** all the **products** that do not have any **related** **reviews.**

### Examples

**When submitting your solution to the Judge system, please, refactor the caller.py file as you comment or delete the creation of the objects, otherwise, it will have an impact on the database and the results of the Judge tests.**

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| **Test code - caller.py** |
| *# Create some products* product1 = Product.objects.create(name="Laptop") product2 = Product.objects.create(name="Smartphone") product3 = Product.objects.create(name="Headphones") product4 = Product.objects.create(name="PlayStation 5")  *# Create some reviews for products* review1 = Review.objects.create(description="Great laptop!", rating=5, product=product1) review2 = Review.objects.create(description="The laptop is slow!", rating=2, product=product1) review3 = Review.objects.create(description="Awesome smartphone!", rating=5, product=product2)  *# Run the function to get products without reviews* products\_without\_reviews = get\_products\_with\_no\_reviews() print(f"Products without reviews: {', '.join([p.name *for* p *in* products\_without\_reviews])}")  *# Run the function to delete products without reviews* delete\_products\_without\_reviews() print(f"Products left: {Product.objects.count()}")  *# Calculate and print the average rating* print(calculate\_average\_rating\_for\_product\_by\_name("Laptop")) |
| **Output** |
| Products without reviews: PlayStation 5, Headphones  Products left: 2  3.5 |

## License

Write a Django model called **"Driver"** with the provided information:

* **"first\_name"** - character field, **consisting of a maximum of 50 characters.**
* **"last\_name"** - character field, **consisting of a maximum of 50 characters.**

Write a **second** Django model called **"DrivingLicense"** with the provided information:

* **"license\_number"** - character field, **consisting of a maximum of 10 characters, unique.**
* **"issue\_date"** - date field.
* **"driver"** - one-to-one relation to the **"Driver"** class. If a driver is **deleted**, you should **automatically** **delete** the **related** license.

Apply all the migrations to the database.

### Functions inside the caller.py file

Function**:** **"calculate\_licenses\_expiration\_dates()"** **calculates** the **expiration date** for all **licenses**. **The expiration date** is **365** days after the **issue date**. **Return** the **license** **number** and the **expiration date** as a string, **ordered** **by** **license number** **(descending**) as follows:

* **"License with id: {license\_number\_1} expires on {expiration\_date\_1}!**

**…**

**License with id: {license\_number\_N} expires on {expiration\_date\_N}!"**

Function**:** **"get\_drivers\_with\_expired\_licenses(due\_date)"** **returns** all drivers (**in a list**) that have **expired licenses**. A **license** counts as **expired** when the **expiration date** is one or more days after **the due date.**

### Examples

**When submitting your solution to the Judge system, please, refactor the caller.py file as you comment or delete the creation of the objects, otherwise, it will have an impact on the database and the results of the Judge tests.**

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| **Test code - caller.py** |
| # Create drivers driver1 = Driver.objects.create(first\_name="Tanya", last\_name="Petrova") driver2 = Driver.objects.create(first\_name="Ivan", last\_name="Yordanov")  # Create licenses associated with drivers license1 = DrivingLicense.objects.create(license\_number="123", issue\_date=date(2022, 10, 6), driver=driver1) license2 = DrivingLicense.objects.create(license\_number="456", issue\_date=date(2022, 1, 1), driver=driver2)  # Calculate licenses expiration dates expiration\_dates = calculate\_licenses\_expiration\_dates() print(expiration\_dates)  # Get drivers with expired licenses drivers\_with\_expired\_licenses = get\_drivers\_with\_expired\_licenses(date(2023, 1, 1)) for driver in drivers\_with\_expired\_licenses:  print(f"{driver.first\_name} {driver.last\_name} has to renew their driving license!") |
| **Output** |
| License with id: 456 expires on 2023-01-01!  License with id: 123 expires on 2023-10-06!  Tanya Petrova has to renew their driving license! |

## Car Registration

Write a Django model called **"Owner"** with the provided information:

* **"name"** - character field, **consisting of a maximum of 50 characters.**

Write a **second** Django model called **"Car"** with the provided information:

* **"model"** - character field, **consisting of a maximum of 50 characters.**
* **"year"** - positive integer field.
* **"owner"** - many-to-one relation to the **"Owner"** class. If an owner is **deleted**, you should **automatically** **delete** all the **related** cars. The field is **optional**.

Write a **third** Django model called **"Registration"** with the provided information:

* **"registration\_number"** - character field, **consisting of a maximum of 10 characters, unique.**
* **"registration\_date"** - date field, **optional**.
* **"car"** - one-to-one relation to the **"Car"** class. If a car is **deleted**, you should **automatically** **delete** all the **related** registrations. The field is **optional**.

Apply all the migrations to the database.

### Functions inside the caller.py file

**Create** a new **function** called **"register\_car\_by\_owner(owner: object)"** that **register cars with the given owner object**:

* First, get the first **registration** that is not **related** to any **car**. After that get the **first** car without **registration related to the given owner**, as well.
* Then, you should **set** the new **registration** to the **car object**. The **registration date** should be set to the current **day** of the **registration** (**today**) to the **registration object**. **Do not forget to save all the changes in the database.**
* Lastly, **return** thecar **model,** the **owner's name,** and the **registration number** as a string as follows:

**"Successfully registered {car\_model} to {owner\_name} with registration number {registration\_number}."**

### Examples

**When submitting your solution to the Judge system, please, refactor the caller.py file as you comment or delete the creation of the objects, otherwise, it will have an impact on the database and the results of the Judge tests.**

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| --- |
| **Test code - caller.py** |
| # Create instances of the Owner model owner1 = Owner.objects.create(name='Ivelin Milchev') owner2 = Owner.objects.create(name='Alice Smith')  # Create instances of the Car model and associate them with owners car1 = Car.objects.create(model='Citroen C5', year=2004) car2 = Car.objects.create(model='Honda Civic', year=2021)  # Create instances of the Registration model for the cars registration1 = Registration.objects.create(registration\_number='TX0044XA') registration2 = Registration.objects.create(registration\_number='XYZ789')  print(register\_car\_by\_owner(owner1)) |
| **Output** |
| Successfully registered Citroen C5 to Ivelin Milchev with registration number TX0044XA. |

### Constraints

* The **owner** will always have at least **one** **car**.

## \*Car Admin Setup

You are going to work with the model "**Car**" from **exercise 5**. In the "**admin.py**" file inside the "**main\_app**" create a **super user** and **create** and **register** the "**CarAdmin**" model and use:

* "**list\_display**" - including the **fields**: "**model**", "**year**", "**owner**", and "**car\_details**".

### Methods inside the CarAdmin model

Method: **"car\_details(obj: object)"** is a **static** **method** and **returns** information about the **owner** and the **registration number** of all cars as follows:

* **"Owner: {owner\_name}, Registration: {registration\_number}"**
* If the **car** has no **owner,** the function should **return** "**No owner**".
* If the **car** has no **registration,** the function should **return** "**No registration number**".

Also, **include** a user-friendly **short description** for that method named "**Car Details**".

### Hint

**"car\_details(obj)"**: This is a custom method that takes an instance of the **Car** model (**obj**) and **returns** a string based on whether the **car** has an **owner** and a **registration**. It constructs a string that includes the owner's **name** and **registration number** or "**No owner**" and "**No registration number**" if the respective **fields** are missing.

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Описанието е генерирано автоматично

**"car\_details.short\_description"**: This sets a custom column header for the "**car\_details()"** method in the **admin** list view. Once you're **logged** **in**, navigate to the list view of the "**Car"** model. You should see a custom column labeled "**Car Details**" that displays the information about the **owner** and **registration number** for each **car**, as specified in the "**car\_details()"** method.

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