Django Crash Course

In this guide, we are going to build a web app for a weed business. This web app will include an ecommerce section (which is what we are going to be focusing on).

GitHub repo: https://github.com/Nguh-Prince/Django-Crash-Course

Here's what we are going to cover:

Creating a Django project

To create a Django project, you will need to install the Django package.
It is recommended to install the package (along with any other packages you will use in the project) in a virtual environment (the commands related to creating/activating the virtual environment are for Windows).

1. Create a new folder on your computer called *django_crash_course*: `mkdir django_crash_course`
2. Create a virtual environment inside the django_crash_course directory:
    - `cd django_crash_course`
    - `python -m virtualenv <env_name>` e.g. `python -m virtualenv my_environment`

    If you don't have the virtualenv package, install it using `python -m pip install virtualenv`
3. Activate the virtual environment: `my_environment\Scripts\activate`
4. Install Django: `pip install Django`
   To check if Django was installed successfully, run: `python -m django --version`
5. Create your Django project called ***iDeal***: `python -m django-admin startproject iDeal`

Ok so now the project is created, but we still have to create a Django app.

Projects vs Apps

- An app is a web application for a particular purpose e.g. we are going to create and ecommerce app. We can create as many apps as we need in our projects but it is important that the apps be independent of each other and serve distinct roles.
- A project is a collection of configurations and apps for a particular website. It can contain multiple apps.

Creating an app

1. We will create the ecommerce app in the *iDeal* directory (the one that has the manage.py file)
    - `cd iDeal`
    - `python manage.py startapp ecommerce`
2. After creating the app, we have to add it to the *INSTALLED_APPS* list in our *iDeal/settings.py* file

```
INSTALLED_APPS = [

 'django.contrib.admin',

 'django.contrib.auth',

 'django.contrib.contenttypes',

 'django.contrib.sessions',

 'django.contrib.messages',

 'django.contrib.staticfiles',

 'ecommerce'  # ⟵
]
```

Models

Creating models

Models are Python classes represent the tables in our database. They allow us to manipulate data from our database without writing SQL queries for the specific DBMS. Django uses an SQLite database by default, we will cover using a PostgreSQL database later.

Open the *`ecommerce/models.py`* file in a text editor and paste the following code into it

```
from django.db import models



class Collection(models.Model):

    name = models.CharField(max_length=20, unique=True)

    time_created = models.DateTimeField(auto_now_add=True)



    class Meta:

        verbose_name = "Collection"

        verbose_name_plural = "Collections"

class Product(models.Model):

    name = models.CharField(max_length=100)

    price = models.FloatField(default=0)

    description = models.TextField(blank=True, null=True)

    cover_image = models.FileField(null=True)

    quantity = models.IntegerField(default=0)
    # validate the price and quantity using the clean method and write a
test



class CollectionProduct(models.Model):

    collection = models.ForeignKey(Collection, on_delete=models.CASCADE)

    product = models.ForeignKey(Product, on_delete=models.CASCADE)



class Variant(models.Model):

    product = models.ForeignKey(Product, on_delete=models.CASCADE)

    name = models.CharField(max_length=30)



    # validate product and variant name are unique together



class Image(models.Model):

    product = models.ForeignKey(Product, on_delete=models.CASCADE)

    file = models.FileField()



class Order(models.Model):

    time_made = models.DateTimeField(auto_now_add=True)

    discount = models.FloatField(default=0) # given in fractions, from 0 - 1
    # create a method for getting the total order price

    # validate the discount > 0 and < 1



class OrderProduct(models.Model):

    order = models.ForeignKey(Order, on_delete=models.CASCADE)

    product = models.ForeignKey(Product, on_delete=models.CASCADE)

    variant = models.ForeignKey(Variant, on_delete=models.SET_NULL,
null=True)

    quantity = models.IntegerField()



    # validate quantity > 0
```

The comments indicate ways in which we can improve our models

After creating our models, to add these tables to our database we have to:

- Create a database migration: `python manage.py makemigrations <app_name>`, for our case; `python manage.py makemigrations ecommerce`
  Migrations contain the code that applies the changes you make in the models of an app to the database. The migration files are stored in the `<app_name>/migrations/` directory (DON'T MESS AROUND WITH THESE FILES)
- Apply the migrations: `python manage.py migrate`

Interacting with the models in the Django shell

The Django shell provides a quick and interactive way to test components related to your project. In this section, we will be testing the models we just created.

1. Open the Django shell by running `python manage.py shell`
2. Import our models from the ecommerce app
   `from ecommerce.models import *`
3. Get the list of collections and products, they should both return an empty queryset

```
Collection.objects.all()
Product.objects.all()
```

4. Create a new collection: `c = Collection.objects.create(name='Collection 1')`. Create a new product: `p = Product.objects.create(name='Product 1', price=-900, quantity=-10)`
5. The product gets created successfully whereas it doesn't make sense for it to have negative values for price and quantity. In the next section we are going to look at how to test the models automatically to ensure that they follow some rules.
6. We will look into more sophisticated model actions in the views.

Writing automated tests for the models

Django heavily encourages the philosophy of TDD (Test Driven Development).
This is a coding practice in which we

- Write tests for a particular behavior, these tests fail the first time they are run
- We then go and code out the required behavior that is supposed to make the tests pass
- We run the tests again, this time they should pass. If the tests still fail then we should go back to the previous step.

We observed in the previous section that we could create a product with negative prices and quantities which doesn't make sense.
We want the models to raise a **ValidationError** if the price or quantity is less than 0.
Let's go and write out the tests to check the price and quantity

Open the `ecommerce/tests.py` file and paste the following code into it

```
from django.test import TestCase

from django.core.exceptions import ValidationError



from .models import *



class ProductModelTests(TestCase):

    def test_price_less_than_0_raises_error(self):

        """
        checks whether the save method raises a ValidationError when the
price < 0

        """

        product = Product(name='Test product', quantity=3, price=-950)



        self.assertRaises( ValidationError, product.save )



    def test_quantity_less_than_0_raises_error(self):

        """

        checks whether the save method raises a ValidationError when the
quantity < 0

        """

        product = Product(name='Test product', quantity=-3, price=950)



        self.assertRaises( ValidationError, product.save )

    def test_quantity_and_price_less_than_0_raises_error(self):

        """

        checks whether the save method raises a ValidationError when the
quantity < 0 and price < 0

        """

        product = Product(name='Test product', quantity=-3, price=-950)



        self.assertRaises( ValidationError, product.save )
```

After writing the tests, we run them using `python manage.py test`. The output should tell us that 3 tests failed.

We now have to rewrite our Product model in such a way that it passes these tests i.e. raises a ValidationError if the quantity < 0 or the product < 0.

We will do this by overriding the clean and save methods of our model. Copy the code below and paste it into the Product class under the comment

```
    # validate the price and quantity using the clean method and write a test

    def clean(self) -> None:

        if self.quantity < 0:

            raise ValidationError("The quantity of the product cannot be less than 0")

        if self.price < 0:

            raise ValidationError("The price of the product cannot be less than 0")

        return super().clean()



    def save(self, *args, **kwargs) -> None:

        self.clean()

        return super().save(*args, **kwargs)
```

Now running the tests again show us an OK message

To write tests for another model, simply create a new class that inherits from TestCase and define your test methods inside that class.

Let's create one more TestCase for the variant model.

In the *ecommerce/tests.py* file, add this line to the top where the imports are: `from django.db.utils import IntegrityError`
Paste the following code into the `ecommerce/tests.py` file under the ProductModelTests class.

```
class VariantModelTests(TestCase):

    def test_product_and_variant_name_unique_together(self):

        """

        Create and save a variant with a product and a name

        Create another variant with the same product and name as the first

        The save method of the second variant should raise an IntegrityError

        """

        product = Product.objects.create(name='Test product', quantity=3,
price=1000)

        v1 = Variant.objects.create(name='Testv', product=product)



        v2 = Variant(name='Testv', product=product)



        self.assertRaises( IntegrityError, v2.save )
```

Running `python manage.py test` again should show 1 failure.
To make this test pass, we will use a Meta class in our variant model. Paste the following code into the Variant class, under the comment.

```
        # validate product and variant name are unique together
    class Meta:

        unique_together = [

            ["product", "name"]

        ]
```

Make migrations, apply the migrations and run the tests again. This time, they should all pass.

Here are some more tests that you can write:

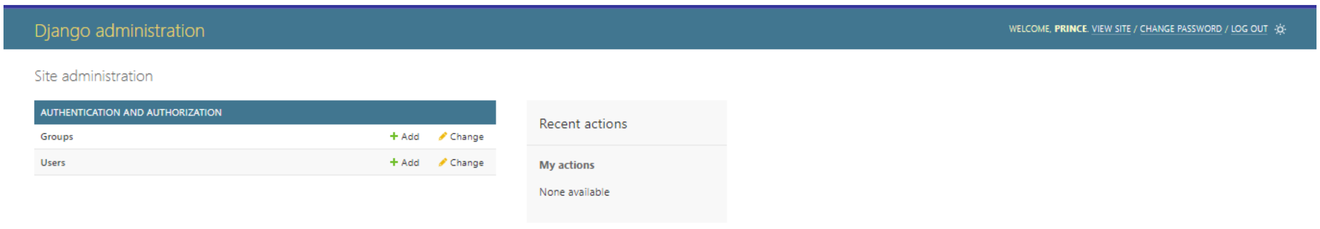
- In the CollectionProduct model, test whether the collection and product attributes are unique together
- In the Order model, check that the discount cannot be < 0 and > 1
- In the OrderProduct model, check
  - that the quantity > 0
  - that the quantity is less than or equal to the quantity of the Product
  - that the Product's quantity is reduced after the OrderProduct is saved

The Django admin site

Django provides a pretty neat admin interface that allows you to interact with your models without having to write any extra code.
The admin's recommended use is limited to an organization's internal management tool. It's not intended for building your entire frontend around.

To access the admin site we need a superuser account. We can create one using the `python manage.py createsuperuser` command.
Just run the command, fill in your username and password (you can leave the Email address empty).

Once you've created the user, run the server and navigate to `<SERVER_IP>:<PORT>/admin/` e.g. (localhost:5000/admin)[localhost:5000/admin].
The interface should look like this when you've logged in:



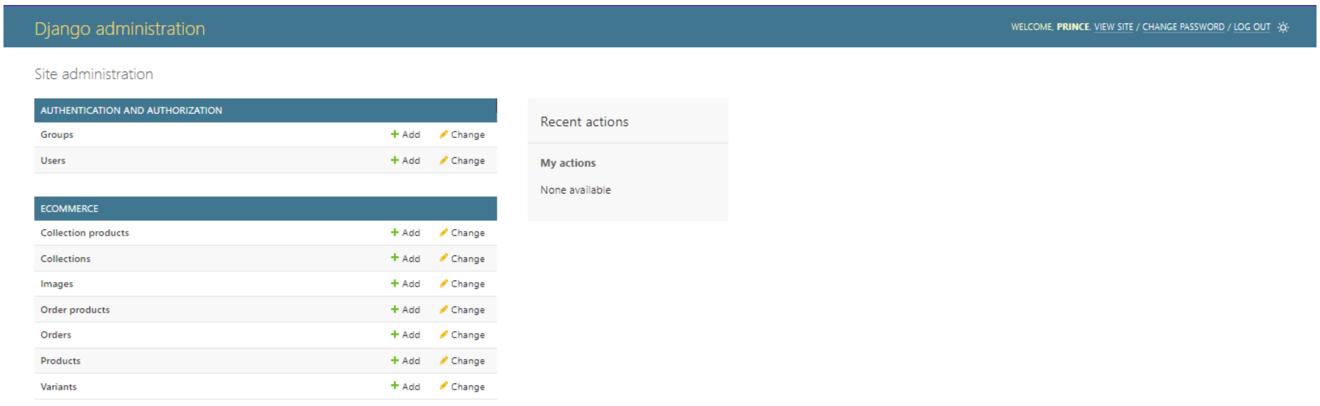
Registering models

Django doesn't know which models you want to access from the admin interface. To make a model accessible from the admin interface, we have to register it.
We register the models for the different apps we have, in our project we have just 1 app and we want to access all of its models from the admin site.

Paste the following code into `ecommerce/admin.py`

```
from django.contrib import admin



from .models import *



admin.site.register(Collection)

admin.site.register(Product)

admin.site.register(CollectionProduct)

admin.site.register(Variant)

admin.site.register(Image)

admin.site.register(Order)

admin.site.register(OrderProduct)
```

Saving the file and refreshing (or rerunning if you stopped the server) the admin page should show this output.



Django administration

WELCOME, PRINCE. VIEW SITE / CHANGE PASSWORD / LOG OUT

Site administration

AUTHENTICATION AND AUTHORIZATION		
Groups	+ Add	Change
Users	+ Add	Change

ECOMMERCE		
Collection products	+ Add	Change
Collections	+ Add	Change
Images	+ Add	Change
Order products	+ Add	Change
Orders	+ Add	Change
Products	+ Add	Change
Variants	+ Add	Change

Recent actions

My actions

None available

Before going to the next step, try adding a Product, an Image, a Collection Product and an Order (with corresponding Order products).
If you're up for it, try modifying any of the records you created above using the admin interface.

Customizing the admin site

The admin site works alright but it's not very user-friendly. Here are some issues that one notices when interacting with it:

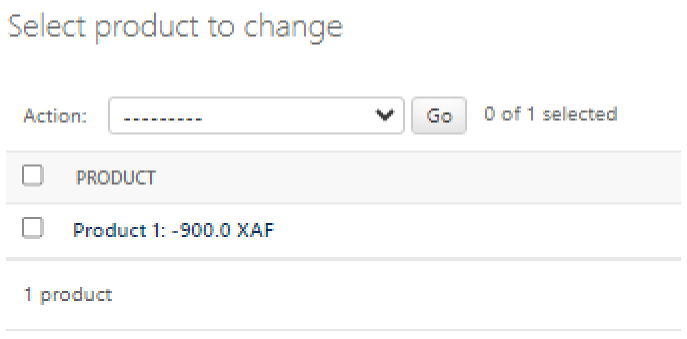
- Our records don't have explicit names e.g. the Products are called `Product object (x)` where x is a number. This doesn't make much sense so we have to modify it.
- To add an Image to a Product, we need to first add the Product before adding the image. Ideally we would like to be able to add images while creating the product
- To add a Variant, we need to create a product first and then add the variant to the Product. To add multiple variants, we need to do so one by one which can be time-consuming.
- To add a Collection product, we need to create a collection, a product and then the collection product. Bear in mind that a product can belong to more than one collection. So with the current user interface, we need to add each of these Collection Products one by one which is not a very good user experience.
- To add an Order Product, we would have to first add the order and then manually add the Order products to the order. Ideally we want to be able to add Order products while creating the order.

1. Giving explicit names to records

The first issue is the easiest and doesn't concern the admin site directly but is a useful tip to know. To modify the names displayed for our records, we simply need to override the _str_ method of the model. The code below shows an example using the Product model, paste it in the Product class in the ecommerce/models.py file.

```
    def __str__(self) -> str:

        return f"{self.name}: {self.price} XAF"
```

Save the file and look at the list of products in the admin page, the string displayed should be updated too.


Select product to change

Action: --------- Go 0 of 1 selected

	PRODUCT
☐	Product 1: -900.0 XAF

1 product

2. Adding images when adding a Product

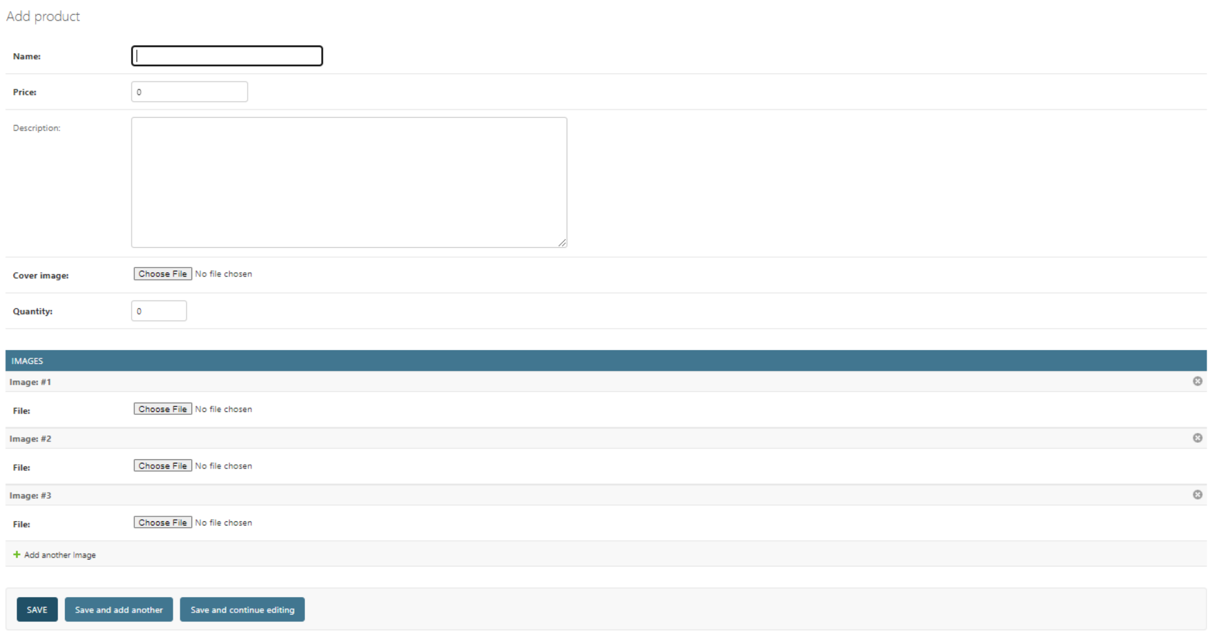
To do this, we need to create 2 new classes

- `ImageInline` that subclasses the `admin.StackedInline` class. This class will enable us to add images inline with a product.
- `ProductAdmin` that subclasses the `admin.ModelAdmin` class. This class will define how our Product model will be displayed and manipulated on the admin site.
  Paste the code below into the `ecommerce/admin.py` (Replace the old code with this one)

```
from django.contrib import admin



from .models import *



class ImageInline(admin.StackedInline):

    model = Image

    extra = 3



class ProductAdmin(admin.ModelAdmin):

    inlines = [ImageInline]
    list_display = ("name", "price", "quantity")



admin.site.register(Collection)

admin.site.register(Product, ProductAdmin)

admin.site.register(CollectionProduct)

admin.site.register(Variant)

admin.site.register(Order)

admin.site.register(OrderProduct)
```

Ok, so what have we done?

- We removed the line that registers the Image model
- This tells Django that 'Image' objects are edited on the Product admin page. By default, provide enough fields for 3 choices (`extra = 3` in the ImageInline class)
- The list_display tells Django to display the name, price and quantity on the Products list page
  Save the file and try adding a Product from the admin site.



  This is what the Add product page now looks like, we can specify 0 or more images to add alongside the Product.

Apply the same technique to solve the issue of the variants, collectionproducts and orders:

- Create a VariantInline class with extra = 3 like the ImageInline class
- Create a CollectionProductInline class with extra = 3 like the ImageInline class
- Create an OrderProductInline class with extra = 3, create an OrderAdmin class and add the OrderProductInline class to its list of inlines.

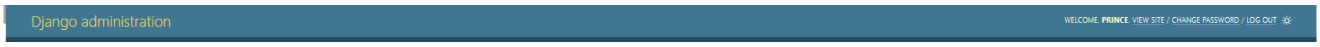
In the end, the `ecommerce/admin.py` file should look like this

```
from django.contrib import admin



from .models import *



class ImageInline(admin.StackedInline):
    model = Image

    extra = 3



class VariantInline(admin.StackedInline):

    model = Variant

    extra = 3



class CollectionProductInline(admin.StackedInline):

    model = CollectionProduct

    extra = 3



class OrderProductInline(admin.StackedInline):

    model = OrderProduct

    extra = 3



class ProductAdmin(admin.ModelAdmin):

    inlines = [ImageInline, VariantInline, CollectionProductInline]

    list_display = ("name", "price", "quantity")



class OrderAdmin(admin.ModelAdmin):

    inlines = [OrderProductInline]
```

```
admin.site.register(Collection)

admin.site.register(Product, ProductAdmin)

admin.site.register(Order, OrderAdmin)
```

3. Customizing the admin look and feel

Right now our admin site looks really generic. We would like for starters to show the name of our organization on the title instead of 'Django administration'



We can do this by modifying the Django admin template.

Create a `templates` directory in the same location where your `manage.py` file is found. Open your `iDeal/settings.py` file and add a `DIRS` option to the `TEMPLATES` setting. Replace the `TEMPLATES` setting with this code:

```
TEMPLATES = [
    {
        "BACKEND": "django.template.backends.django.DjangoTemplates",
        "DIRS": [BASE_DIR / "templates"], # ⟵
        "APP_DIRS": True,
        "OPTIONS": {
            "context_processors": [
                "django.template.context_processors.debug",
                "django.template.context_processors.request",
                "django.contrib.auth.context_processors.auth",
                "django.contrib.messages.context_processors.messages",
            ],
        },
    },
]
```

DIRS is a list of filesystem directories to check when loading Django templates.

Now create an `admin` directory in the `templates` directory you created earlier (this is where we are going to store our custom admin templates).
Copy the template `admin/base_site.html` from within the default Django admin template directory in the source code of Django itself (django/contrib/admin/templates) into that directory.

If you have difficulty locating the Django source files, run the following command `python -c "import django; print(django.__path__)"`. Running it on my machine gave me this output (I'm using a virtual environment for this)
`['D:\\IAI Teaching Documents\\Level 3\\Django Crash Course HTML, CSS & JS\\crash_course\\environment\\lib\\site-packages\\django']`

Replace the code in the `admin/base_site.html` file that you copied to your directory with the one below

```
{% extends "admin/base.html" %}



{% block title %}{% if subtitle %}{{ subtitle }} | {% endif %}{{ title }} | {{ _('iDeal admin') }}{% endblock %}



{% block branding %}

<div id="site-name"><a href="{% url 'admin:index' %}">{{ _('iDeal administration') }}</a></div>

{% if user.is_anonymous %}

  {% include "admin/color_theme_toggle.html" %}

{% endif %}

{% endblock %}



{% block nav-global %}{% endblock %}
```

Users

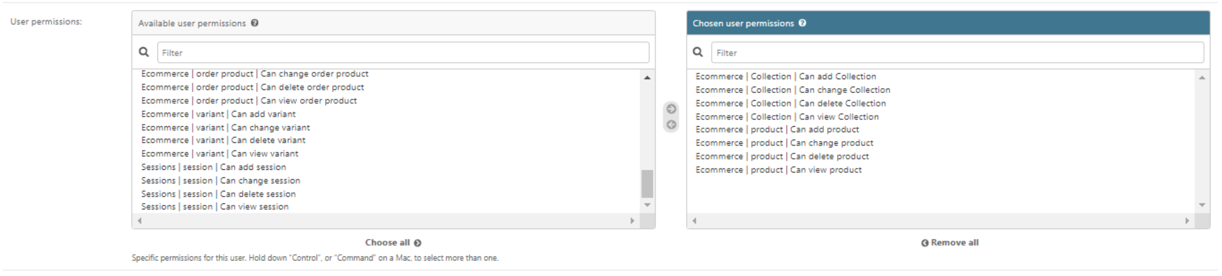
We already created one superuser before and we can create more users with less permissions.
On the admin site, there's a section for 'Authentication and Authorization' that contains Groups and Users.

Go to the Users page to see the list of users and click the 'Add User' button. This will take you to a page where you have to fill the username and password. Put whatever you want

here.
You can also edit the user after creating to put in more details such as the first and last name as well as the permissions.

When taken to this page:

- Fill in the user's first and last name
- Check the 'Staff status' checkbox (only staff users can access the admin)
- Go down to the User permissions section and select any permissions you want the user to have.
- Permissions are written in the following manner `App_name|model_name|permission_name` e.g. `Ecommerce | Product | Can add product` means the user can add a product.
- Let's give our user the following permissions
    - CRUD on product (add, view, change, delete)
    - CRUD on Collections
- Once you've selected your desired permissions, Click on the arrow pointing to the right between the 2 sections to move the permissions over to the Chosen user permissions. After doing so, you should have something similar to this:


User permissions:

Available user permissions

Filter

Ecommerce | order product | Can change order product
Ecommerce | order product | Can delete order product
Ecommerce | order product | Can view order product
Ecommerce | variant | Can add variant
Ecommerce | variant | Can change variant
Ecommerce | variant | Can delete variant
Ecommerce | variant | Can view variant
Sessions | session | Can add session
Sessions | session | Can change session
Sessions | session | Can delete session
Sessions | session | Can view session

Choose all

Specific permissions for this user. Hold down "Control", or "Command" on a Mac, to select more than one.

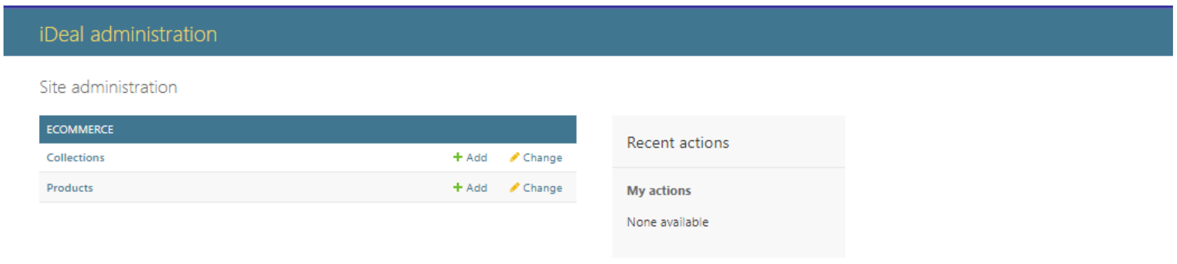
Chosen user permissions

Filter

Ecommerce | Collection | Can add Collection
Ecommerce | Collection | Can change Collection
Ecommerce | Collection | Can delete Collection
Ecommerce | Collection | Can view Collection
Ecommerce | product | Can add product
Ecommerce | product | Can change product
Ecommerce | product | Can delete product
Ecommerce | product | Can view product

Remove all

    - Save the user.
    - Log out and log back in with the new user, your interface should look like this:


iDeal administration

Site administration

ECOMMERCE		
Collections	+ Add	Change
Products	+ Add	Change

Recent actions

My actions

None available

- Notice how this user can only view the models that he has permissions on.

Groups

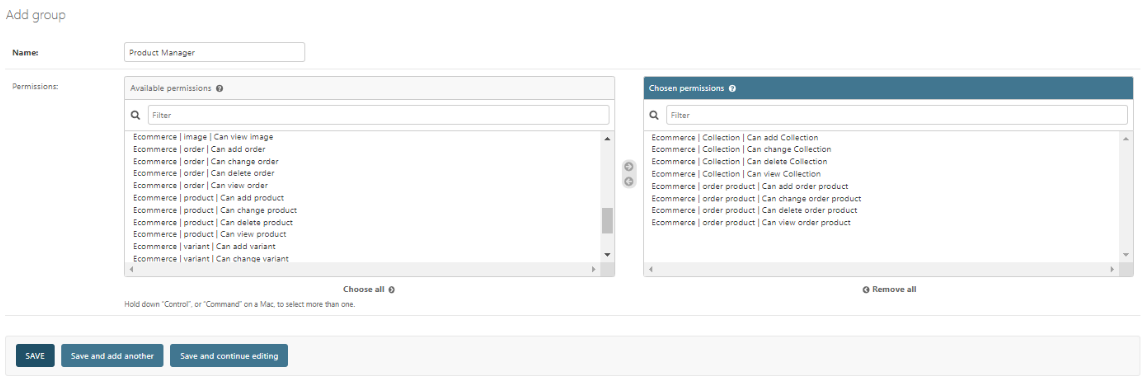
So we created a user and assigned permissions above, but if we had to create many users and assign them the same permissions, it gets pretty tiresome.

So instead, we would create a Group with permissions and then assign users to that group. Each user in a group has all the permissions that the group has. A user can belong to more than one group.

To create a group, we go to the Add Group page and define the group name, as well as the group's permissions (similar to how we defined them in the Users) and save.

Log back in as the superuser and do the following:

- Add a group called Product Manager
- Give it the following permissions
    - CRUD on Products
    - CRUD on Collections



Add group

Name: Product Manager

Permissions:

Available permissions

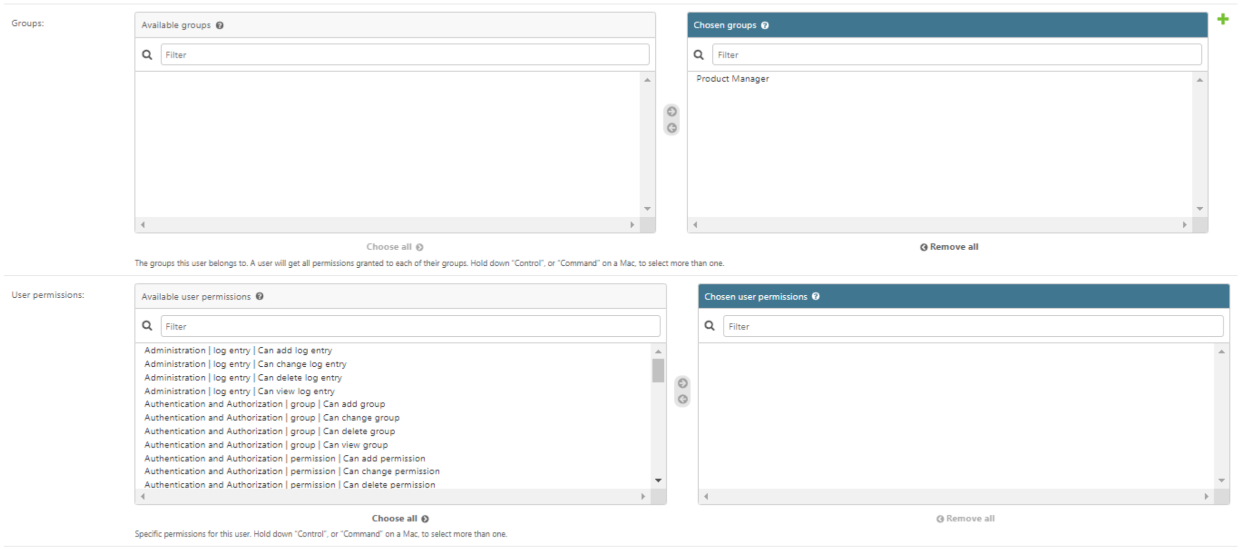
Ecommerce | image | Can view image
Ecommerce | order | Can add order
Ecommerce | order | Can change order
Ecommerce | order | Can delete order
Ecommerce | order | Can view order
Ecommerce | product | Can add product
Ecommerce | product | Can change product
Ecommerce | product | Can delete product
Ecommerce | product | Can view product
Ecommerce | variant | Can add variant
Ecommerce | variant | Can change variant

Chosen permissions

Ecommerce | Collection | Can add Collection
Ecommerce | Collection | Can change Collection
Ecommerce | Collection | Can delete Collection
Ecommerce | Collection | Can view Collection
Ecommerce | order product | Can add order product
Ecommerce | order product | Can change order product
Ecommerce | order product | Can delete order product
Ecommerce | order product | Can view order product

Hold down "Control", or "Command" on a Mac, to select more than one.

- Modify the user you created in the previous section by
  - Adding the Product Manager group to their list of groups
  - Removing all of the permissions that it has, so that the only permissions it will have are those assigned to the group(s) he belongs to.



Groups:

Available groups

Chosen groups

Product Manager

The groups this user belongs to. A user will get all permissions granted to each of their groups. Hold down "Control", or "Command" on a Mac, to select more than one.

User permissions:

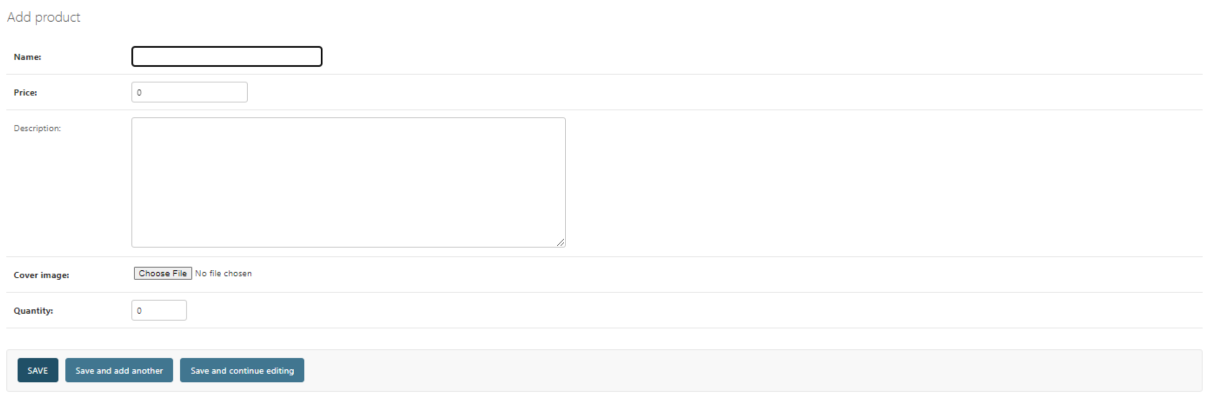
Available user permissions

Administration | log entry | Can add log entry
Administration | log entry | Can change log entry
Administration | log entry | Can delete log entry
Administration | log entry | Can view log entry
Authentication and Authorization | group | Can add group
Authentication and Authorization | group | Can change group
Authentication and Authorization | group | Can delete group
Authentication and Authorization | group | Can view group
Authentication and Authorization | permission | Can add permission
Authentication and Authorization | permission | Can change permission
Authentication and Authorization | permission | Can delete permission

Chosen user permissions

Specific permissions for this user. Hold down "Control", or "Command" on a Mac, to select more than one.

- Add another user to this same Group
- Log back in as one of the users that you created and try adding a Product.
- Notice that all of our inline models are gone (Image, CollectionProduct, Variant). This is because this user doesn't have the permission to add them.


Add product

Name:	
Price:	0
Description:	
Cover image:	Choose File No file chosen
Quantity:	0

- So log back in as the superadmin and modify the group such that it has permissions to manipulate the above models.

Views and URLs

Ok, so we've customized the admin part of our application which is intended to be used by the administrators/employees of the organization but what about the end users?
The end users cannot be allowed to use the admin site, so we have to create a separate frontend for them. We will create the different pages of this frontend by writing views in our `ecommerce` app.

A view function, or simply a view, is a Python function or method that receives a web request and returns a web response. These views are responsible for processing user input, interacting with the model, and returning the appropriate response, often rendered using a template (HTML file).

Views are connected to specific URLS via the URLconf (URL configuration). This is typically defined in the urls.py file.

Let's create a simple index view. To do so:

- Go to the `iDeal/urls.py` file and paste the code below:

```
from django.contrib import admin

from django.urls import include, path



urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include('ecommerce.urls'))
]
```

This tells Django to check in the `ecommerce/urls.py` file for any URL that does not start with admin.

- Create a function, `index` in the `ecommerce/views` file that simply returns a Hello message. Replace the code in the `ecommerce/views.py` file with the one below:

```
from django.shortcuts import render

from django.http import HttpResponse



def index(request):

    return HttpResponse("Hello, World!")
```

- For this view to be accessible to a user, we need to connect it to a URL. We had already told Django to search for URLS (except for the admin) in the ecommerce.urls file, now we have to create that file and its content. Create a urls.py file and paste the following code in it:

```
from django.urls import path



from . import views



urlpatterns = [

    path('', views.index, name='index')

]
```

- Now going to `localhost:8000` should display the "Hello, World!" message.

Setting up file uploads

We wrote our models earlier and some of them included fields for uploading files. When we upload files using these models, the files are stored in the project directory which is not

ideal.
Also we currently cannot access these files in our views.
In this step we are going to configure our Django project so that it uploads the files to a particular directory and can serve static files.

- Add a new folder to your project directory called `uploads`. You might want to add this folder to the .gitignore as it can get pretty large.
- Go to the `iDeal/settings.py` and add these 2 lines at the end:

```
MEDIA_ROOT = BASE_DIR / "uploads/"

MEDIA_URL = '/media/'
```

- Go to the `iDeal/urls.py` file and replace the urlpatterns list with this one

```
urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include('ecommerce.urls'))

] + static(settings.MEDIA_URL, document_root=settings.MEDIA_ROOT)
```

- Ok, almost done. Now we need to specify in the models where the uploaded files should be saved. Go to your `ecommerce/models.py` file and in each `FileField` pass another parameter called `upload_to` e.g. in the Product class, `cover_image = models.FileField(null=True, upload_to='uploads')`. Do the same for the Image model
- Now if you try to upload from the admin, it gets saved to the uploads folder.

Adding products and collections

Use the admin site to add the following:

- Collections (High THC, Personal Care, Hybrid Strain, Indica Strain, Sativa Strain, and Sale)
- Products (create the products in the product-images folder with the names and images there) below are the prices for the different products, create them with quantity 10
  - Afghan Kush: 230
  - Cbd God Bud Dried Cannabis Flower: 230
  - Cherry Punch Dried Flower: 110
  - Chocolate Caramel Half Spheres

- Chowie Wowie Balance Solid Milk
- Dark Chocolate Square
- Glueberry
- Lemon Sapp

Product	Collections	Variants	Price	Quantity
Afghan Kush	High thc, Hybrid strain, Indica strain, Personal care, Sativa strain	Chocolate, Vanilla, Fruit Punch	230	10
Cherry Punch Dried Flower				
Chocolate Caramel Half Spheres				
Chowie Wowie				
Dark Chocolate				
Cbd God Bud Dried Cannabis				
Glueberry				
Mazar haze				
Namaster				
Pink kush				
Pure Sun				
Purple Punch				
Sativa				
Sensi Star				
Tangerine Dream				
Tweed Bakerstreet				
Ultra Sour				
Unite Organic				

Modify the Product model by adding a time_created attribute like so: `time_created = models.DateTimeField(auto_now_add=True)`

Create the migrations for this change (when prompted either to set a one-off value or write one in the code, pick the 1st option and set the default value to timezone.now)

Modify the `ProductAdmin` in the `ecommerce/admin.py` by adding the time_created attribute to the list_display i.e. `list_display = ("name", "price", "quantity", "time_created")`

Templates and static files

Django uses the Model View Template (MVT) logical architecture. We've already seen the models, and some views. The templates are simply the HTML files that get returned from the views.

Templates are usually stored in a `templates/<app_name>` folder **within each application in your Django app**.

Static files represent files like CSS, JS and images that remain the same for the entire website. These are usually stored in a `static/<app_name>` folder **within each application in your Django app**.

Copy the templates and static folder from the ecommerce app in the reference project and paste it into your own ecommerce folder.
In the `templates/ecommerce` folder you just copied there are some HTML files, one of which is `base.html`.
In the `static/ecommerce` folder, there are a couple of subfolders such as cdn, shop, etc.

Let's inspect the base.html file in the ecommerce app. The first line has `{% load static %}`, static is a template filter (think of it as a function) that loads static files in our templates. Look, for example, at the file included on line 10:

```
<link

  rel="shortcut icon"

  href="{% static 'ecommerce/cdn/shop/files/fav_32x323b1f.png' %}"

  type="image/png"

/>
```

The href attribute there shows how we load static files in templates. We give the relative path from the `static` folder to the file. The file we just loaded above is found in the `ecommerce/static/ecommerce/cdn/shop/files/fav_32x323b1f.png` but the path we included is just the `ecommerce/cdn/shop/files/fav_32x323b1f.png` (the relative path from the static directory)

You can look at the different CSS and JS files in the base.html file for more examples of including static files.

Returning templates from views

- Let's modify the index view in our `ecommerce` app to return the `index.html` template. Replace the index function with this one:

```
def index(request):
    return render(request, template_name="ecommerce/index.html")
```

Let's also modify the `ecommerce/urls.py` file by adding `app_name = 'ecommerce'` just before the `urlpatterns` list.

Now going to `localhost:8000` should display an HTML page instead of Hello, World!

Passing data from views to templates

Our index page is currently empty, we would like to see the 5 most recently added products on our page. To do so, we have to get them from our DB and pass them to the template. Replace the index function in the `ecommerce/views.py` with this one:

```
def index(request):

    recent_products = Product.objects.order_by("-time_created")[:5]



    return render(request, template_name="ecommerce/index.html", context={

        "new_arrivals": recent_products,
        "variable": 'This is a test variable (include it, we will use it
later)'

    })
```

This gets the products from the database, orders them by time_created and selects the first 5 elements.
We pass data to templates using the context argument to the render function. This argument is usually a dictionary where the individual keys are the variables we want to pass.

Accessing data passed from views in templates

Ok, so we are passing a list of new_arrivals from our index view to the template, but we need to access this data.
Go to your `index.html` template in the ecommerce app and replace the `<h4>BEST MARIJUANA PRODUCTS</h4>` with `<h4>{{ variable }}</h4>` and refresh the page.
You should see it displaying the value of the `variable` key in our context dictionary from our

index view.
To access variables in a template, we simply use `{{ variable_name }}`

So now we are ready to display the new_arrivals right? Wrong.
The new_arrivals variable is a list (actually a queryset but that doesn't matter) so we want to loop through it and display each of the items in a particular structure.
For this we are going to use a for loop. Django allows us to run for loops and conditional blocks in our templates.
Look at `line 74` to see how it's done, notice that there's an `{% endfor %}` after the div, this is where the loop ends if it's not included Django will raise a TemplateError.

Let's dissect this for loop a bit:

- `{% for arrival in new_arrivals %}` is similar to a normal for loop in Python. It simply loops through the `new_arrivals` iterable storing the item in the arrival variable
- To access the attributes of the arrival variable we simply do `{{ arrival.<attribute> }}` e.g. `{{ arrival.name }}`.
- **NB**: The arrival variable is a Product so it has the same attributes. Also you cannot call methods from templates, a simple workaround this is using the `@property` keyword that allows you to access methods like attributes

Saving the index.html file now and refreshing the web page should display the 5 most recent products in your database.

Template inheritance

Notice how at the top of the `index.html` file there is an `{% extends 'ecommerce/base.html' %}`. This line tells us that this template inherits from base.html. This means that all the content from base.html is also included in this file.

This is a pretty neat trick to keep the sizes of the individual templates small. We can also overwrite specific sections of the base template in the child template using blocks.

Look at the page_content block in the base.html and compare it with the same block in the index.html file.
The page_content block in the index.html file overwrites the one in the base.html file. Try writing some text inside this block in the index.html file. This text will not be displayed in the index.html file.
Now try deleting the entire page_content block from the index.html, now the text should show.
Undo the deletion in index.html file.

More views and templates

We are going to write another view that lists all the products and all the products in a particular collection. Paste the following code under the index function in the `ecommerce/views.py`

```
def collections(request, collection_id=None):

    collections = Collection.objects.all()



    if not collection_id:

        # get all the unique products whose collectionproducts' collections

        # are in the `collections` list

        products = Product.objects.filter(

            collectionproduct__collection__in=collections

        ).distinct()

        print(f'Query is {products.query}')

    else:

        # get all the unique products whose collectionproducts' collections

        # have id `collection_id`

        products = Product.objects.filter(

            collectionproduct__collection__id=collection_id

        ).distinct()

        print(f'Query is {products.query}')



    return render(request, template_name='ecommerce/collections.html', 
context={

        "collections": collections,
        "products": products,

        # "collection_id": collection_id,

        "collection": collections.filter(id=collection_id).first()

    })
```

Also replace the urlpatterns in `ecommerce/urls.py` with the code below:

```
urlpatterns = [

    path('', views.index, name='index'),

    path('collections/', views.collections, name='collections'),

    path('collections/<int:collection_id>', views.collections,
name='collections')

]
```

Ok, so what just happened?

- Firstly we created a collections function that takes an optional parameter collection_id
- The function basically
    - Returns all the products in the database if no collection_id is passed else
    - It returns all the products that belong to the collection passed.
- You can look at the SQL queries generated by each of our filters to get a better sense of what is going on.
- Secondly, we added 2 URLS to our `ecommerce/urls.py`
    - The first, `collections/` runs the collections function in the view (In this case the collection_id passed to the view is None)
    - The second, `collections/<int:collection_id>`, runs the collections function anytime it encounters a URL that matches the pattern (i.e. 'collections/<integer>' e.g. 'collections/2').
    - This then calls the collections function and passes collection_id as the integer from the URL. E.g. collections/2 runs the `collections` function with collection_id=2.
    - Notice how the parameter in the URL is the same as the one in the view function. If they aren't, Django will raise an error.

In the `collections.html` file, we see the use of `if-else` block to display our breadcrumbs. Here's the code:

```
<ul>

      <li><a href="{% url 'ecommerce:index' %}">Home</a></li>



      {% if collection %}

        <li><a href="{% url 'ecommerce:collections' %}">Collections</a></li>

        <li><span>{{ collection.name }}</span></li>

      {% else %}

        <li><span>Collections</span></li>

      {% endif %}

    </ul>
```

- The `{% url %}` template tag in Django is used to generate URLs for view functions and can also handle URLs dynamically based on the parameters provided. This tag is particularly useful for maintaining DRY (Don't Repeat Yourself) principles, as it allows you to refer to views by their name rather than hardcoding URLs throughout your templates.
- The `{% url 'ecommerce:index' %}` basically gives us the url for the index function without us having to hardcode it. Notice how we prepended the app_name to the view name, this becomes more important the more apps we have.
- In the view, we passed a `collection` variable to the template. This collection is None if no collection_id is passed to the view.
- In the template, we check this collection variable using an if statement. If it exists, we display a breadcrumbs to it else we just display the string `'Collections'`
- There are 2 more for loops on this page, one that displays the products and another that displays the collections in a sidebar.