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Install and **Setup Django Environment** with Base Template

📁 Create project environment

```
mkdir project_folder && cd project_folder
```

🖥️ Virtual Environment (venv) to issolate pip packages 📁 .venv

```
python -m venv .venv        # Create .venv folder

.venv/Scripts/activate      # Windows              to exit,  type: deactivate
source .venv/bin/activate   # Linux                OR use buttons: ctrl + c
```

📝 Environment Variables 📁 .env

```
echo 'DEBUG=True'    > .env   # create .env file  (with variable DEBUG=True)
echo 'SECRET_KEY=…' >> .env   # add $SECRET_KEY   (make it a strong password)
source .env                   # Linux             (imports $VARIABLES)
```

I will use the **load_dotenv** function from the **python-dotenv** library in django_project/**settings.py** to automatically load environment variables from the .env file.

> In production, it is generally recommended to avoid using python-dotenv. Instead, rely on the hosting platform's (Heroku / Railway) built-in mechanisms for managing environment variables to avoid conflicts.

📝 .gitignore

```
ignores specified directories when pushing the
project to platforms such as: GitHub and GitLab
```

```
echo '
# Environments
.env
.venv
env/
venv/
ENV/
env.bak/
venv.bak/

# Node.js
node_modules/
' > .gitignore
```

```
echo '\n
# Ignore SQLite database files
*.sqlite
*.sqlite3
*.db
*.db3' >> .gitignore

# Append more paths to .gitignore
# In this instance, ignore SQLite DB
```

```
# creates/writes .gitignore file (This is basic .gitignore, learn more here)
```

📝 requirements.txt

```
register, downloaded via: pip (package manager), 📚libraries in this text file
```

```
echo > requirements.txt   # create empty file

# write/create file with installed pip packages (Use only while in 🖥️ (venv) )
pip freeze > requirements.txt
```

🖥️ (venv) @ project_folder 🧰 **Django Framework**

```
pip install django
django-admin startproject my_website .      # use snake_case naming convention
```

🖥️ (venv) @ project_folder 🐍 manage.py

```
python manage.py startapp app_name          # create app
python manage.py migrate                    # update database
python manage.py createsuperuser            # create admin user
python manage.py runserver localhost:8000   # run/start project

# in the terminal, press ctrl and c buttons simultaneously, to stop the server
```

Don’t use these commands because we haven’t initialized app with static folder

```
# in production, collect all /static files TO /staticfiles (STATIC_ROOT)

python manage.py collectstatic

# use the below commands in terminal after modifing apps’ models.py

python manage.py makemigrations # prepare any modifications for the database
python manage.py migrate        # update databse with these new modifications
```

🖥️ (venv) @ project_folder 📚 pip library

```
pip install
    python-dotenv
```

```
django-bootstrap5 django-crispy-forms crispy-bootstrap5
```

```
django-sass libsass
```

```
python manage.py sass                    ← Don’t use this code yet!
app_name/static/app_name/scss/           app’s .scss files will be automatically
app_name/static/app_name/css/ --watch    converted to .css & saved at static/css
```

```
pip freeze > requirements.txt  # update requirements.txt
```

🖥️ (venv) @ project_folder 🗂️ media & staticfiles

```
mkdir media staticfiles

# media       - for serving user’s data: images, recordings, videos etc…
# staticfiles - for serving website’s assets: css, js etc... in compressed form
```

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
import os

from dotenv import load_dotenv # Remove this code in production
load_dotenv()                  # Remove this code in production
```

```
BASE_DIR = os.path.dirname(os.path.dirname(os.path.abspath(__file__)))

SECRET_KEY = os.getenv('SECRET_KEY')

DEBUG = os.getenv('DEBUG', 'False').lower() in ['true', '1']
```

```
INSTALLED_APPS = [
    'django.contrib.admin',
    ...

    # Add libraries above apps
    'crispy_forms',
    'crispy_bootstrap5',
    'django_bootstrap5',
    'django_sass',

    # Add apps below
    'app_name.apps.AppNameConfig',
]
```

app_name > apps.py

```
1  from django.apps import AppConfig
2
3
   Codeium: Refactor | Explain
4  class AppNameConfig(AppConfig):
5      default_auto_field = 'django.db.models.BigAutoField'
6      name = 'app_name'
```

```
TEMPLATES = [{
    ...

    'DIRS': [os.path.join(BASE_DIR, 'templates')],
    ...
}]

DATABASES = {
    'default': {
    'ENGINE': 'django.db.backends.sqlite3',
    'NAME': os.path.join(BASE_DIR, 'db.sqlite3'),
    }
}
```

```
STATIC_ROOT = os.path.join(BASE_DIR, 'staticfiles')
STATIC_URL = '/static/'

MEDIA_ROOT = os.path.join(BASE_DIR, 'media')
MEDIA_URL = '/media/'

CRISPY_ALLOWED_TEMPLATE_PACKS = "bootstrap5" # Includes styled forms in B5
CRISPY_TEMPLATE_PACK = "bootstrap5"          # Includes styled forms in B5
```

💻 (venv) @ project_folder/app_name 🗂️ app_name

```bash
# Update tree structure of app_name (Linux)

app_name=$(basename "$PWD")

touch forms.py urls.py

static="static/$app_name"
mkdir -p "$static/"{scss,css,ts,js,img}
touch "$static/scss/index.scss"
touch "$static/ts/main.ts"

temps="templates/$app_name"
mkdir -p $temps
touch "$temps/base.html"
touch "$temps/form.html"
touch "$temps/index.html"

tree .
```

```
app_name
├── admin.py
├── apps.py
├── forms.py
├── __init__.py
├── migrations
│   └── __init__.py
├── models.py
├── static
│   └── app_name
│       ├── css
│       ├── img
│       ├── js
│       ├── scss
│       │   └── index.css
│       └── ts
│           └── main.ts
├── templates
│   └── app_name
│       ├── base.html
│       ├── form.html
│       └── index.html
├── tests.py
├── urls.py
└── views.py
```

📝 project_folder/my_website/**urls.py** 🐍 urls.py

```
Function views
    1. Add an import:  from my_app import views
    2. Add a URL to urlpatterns:  path('', views.home, name='home')

Class-based views
    1. Add an import:  from other_app.views import Home
    2. Add a URL to urlpatterns:  path('', Home.as_view(), name='home')

Including another URLconf
    1. Import the include() function: from django.urls import include, path
    2. Add a URL to urlpatterns:  path('blog/', include('blog.urls'))
```

```python
from django.urls import path, include
from django.conf import settings
from django.conf.urls.static import static
```

```python
urlpatterns = [
   … # imports URLs from my_website/app_name/urls.py
   path('', include('app_name.urls')),
]

if settings.DEBUG:
    # Serve static files during development
    urlpatterns += static(settings.STATIC_URL, document_root=settings.STATIC_ROOT)
    # Serve media files during development
    urlpatterns += static(settings.MEDIA_URL, document_root=settings.MEDIA_ROOT)
```

📝 project_folder/app_name/**urls.py** 🐍 urls.py

```python
from django.urls import path
from . import views

urlpatterns = [
    path('', views.indexView, name='index'),
]
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```python
from django.shortcuts import render

def indexView(request):
    return render(request, 'app_name/index.html')
```

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
{% extends 'app_name/base.html' %}
{% load static %}

{% block title %}Index Page{% endblock %}

{% block head %}
    <link rel="stylesheet" href="{% static 'app_name/css/index.css' %}">
{% endblock %}

{% block content %}
    <h2>Welcome to the Index Page!</h2>
{% endblock %}
```

```
{# this is inline comment #}


{% comment "comment name" %}
This is multi-line comment
{% endcomment %}
```

📝 project_folder/app_name/templates/app_name/**base.html** </> base.html

```
{% load django_bootstrap5 %}
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>{% block title %}{% endblock %}</title>
    {% bootstrap_css %}
    {% block head %}{% endblock %}
</head>
<body>
    <main class="container p-5">{% block content %}{% endblock %}</main>
    {% bootstrap_javascript %}
    {% block base %}{% endblock %}
</body>
</html>
```

Create **Model** with

Form Post Request from **Template**

TO update our ☭ Model 卍

📝 project_folder/app_name/**models.py** 🐍 models.py

```python
from django.db import models
from django.utils.translation import
gettext_lazy as _

class ModelName(models.Model):

  id = models.AutoField(primary_key=True)

  title = models.CharField(
      max_length=100,
      blank=False,
      verbose_name=_('My Title')
  )

  COUNTRIES = [
      ('GB', 'Great Britain'),
      ('PL', 'Polska'),
      ('DE', 'Deutschland'),
  ]

  country = models.CharField(
      max_length=100,
      blank=False,
      default=COUNTRIES[1][1], # → Polska
      choices=COUNTRIES,
      verbose_name=_('Select a country')
  )
```

```python
# IGNORE BELOW CODE! It's just an example

class Model(models.Model):
  name = models.CharField()
  context = models.TextField()

  def __str__(self):
    return f"Model(name={self.name},context={self.context})"
```

In settings.py the **DEFAULT_AUTO_FIELD** allows you to specify the default type of auto-incrementing primary key field that will be used for models that do not explicitly define a primary key.
DEFAULT_AUTO_FIELD @ djangoproject.com

```
DEFAULT_AUTO_FIELD =
'django.db.models.BigAutoField'
```

🖥️ (venv) @ project_folder 🐍 manage.py

! IMPORTANT NOTE !

You should **ALWAYS** execute:

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

when you **create** & **update** models.py
to initialize the model table in database

String/Text	`char_field = models.CharField(max_length=100)`
	`text_field = models.TextField()`
	`url_field = models.URLField()`

Numbers	`integer_field = models.IntegerField()`
	`positive_integer_field = models.PositiveIntegerField()`
	`decimal_field = models.DecimalField(max_digits=5, decimal_places=2)`

Time	`date_field = models.DateField()`
	`time_field = models.TimeField()`
	`date_time_field = models.DateTimeField(auto_now_add=True)`

Other	`email_field = models.EmailField()` ← max 254 chars by default
	`boolean_field = models.BooleanField(default=False)`
	`file_field = models.FileField(upload_to='uploads/')`
	`image_field = models.ImageField(upload_to='images/')`

📝 project_folder/my_website/**admin.py** 🐍 admin.py

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

# Register your models here TO display and manage them at the .../admin/ page
admin.site.register(ModelName)
```

📝 project_folder/app_name/**forms.py** 🐍 forms.py

```python
from django import forms
from .models import ModelName

class ModelForm(froms.ModelForm):
    class Meta:
        model = ModelName                # Select fields from ModelName
        fields = ['title', 'country']    # for your <form> rendered @ form.html
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```python
from django.shortcuts import render, redirect
from .forms import ModelForm

def formView(request):
    if request.method == 'POST':         # <form method='POST'> onSubmit
        form = ModelForm(request.POST)
        if form.is_valid():              # Verifies posted by client data
            form.save()                  # Creates new model - ModelName
            return redirect('index')     # Sends user to URL path name='index'
    else:
        form = ModelForm()

    return render(request, 'app_name/form.html', {'form': form})
```

📝 project_folder/app_name/**urls.py** 🐍 urls.py

```python
urlpatterns = [
    path('', views.indexView, name='index'),
    path('form/', views.formView, name='form'), # ← Add this path
]
```

📝 project_folder/app_name/templates/app_name/**form.html** </> form.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}

{% block title %}Form Page{% endblock %}


{% block content %}
  <form action="{% url 'form' %}" enctype="multipart/form-data" method="POST">
    {% csrf_token %}  # Secures our data when sending it to the backend server
    {{ form|crispy }} # Formats form in bootstrap5 & supports error events
    <button type="submit">Create Model</button>
  </form>
{% endblock %}
```

```
{{ form }} → inputs
{{ form.as_p }} → labeled inputs
{{ form|crispy }} → bootstrap inputs
{{ form.field_name }} → this input
{{ form.field_name.value }}
{{ form.field_name.label }}
{{ form.field_name.label_tag }}
{{ form.field_name.help_text }}
{{ form.field_name.errors }}
```

NOTE: My first **view** is called: **formView** (for simplicity)
However, you should rename it to **createModelView** (for semanticity)

Client lacks indication of **Model's** creation!

Let's add **MESSAGES** & display **Models**
from **Database** with **Pagination**

(Output **Models** at 🏠 Index Page)

📚 **messages** - are pre-initialized by default in Django >=5 🐍 settings.py

```
INSTALLED_APPS = [
    ...
    'django.contrib.messages',

    # Add libraries above apps
    'crispy_forms',
    ...
]
```

```
MIDDLEWARE = [
    ...
    'django.contrib.sessions.middleware.SessionMiddleware',
    'django.contrib.messages.middleware.MessageMiddleware',
    ...
]
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```
messages.success()
messages.error()
messages.warnig()
messages.info()
messages.debug()
```

```python
from django.shortcuts import render, redirect
from django.contrib import messages
from .forms import ModelForm

def formView(request):
    if request.method == 'POST':
        form = ModelForm(request.POST)
        if form.is_valid():
            form.save()
            messages.success(request, 'Model created successfully!')
            return redirect('index')
        else:
            messages.error(request, 'Something went wrong!')
    else:
        form = ModelForm()

    return render(request, 'app_name/form.html', {'form': form})
```

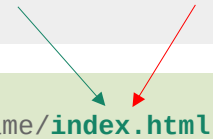
📝 project_folder/app_name/templates/app_name/**base.html** </> base.html

```
{{ messages }}
{{ message }}      → 'My Message'
{{ message.tags }} → success, error, info…
```

```
{% load django_bootstrap5 %}
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>{% block title %}{% endblock %}</title>
    {% bootstrap_css %}
    {% block head %}{% endblock %}
</head>
<body>
    {% if messages %}{% bootstrap_messages %}{% endif %}
    <main name="container p-5">{% block content %}{% endblock %}</main>
    {% bootstrap_javascript %}
    {% block base %}{% endblock %}
</body>
</html>
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```python
from django.core.paginator import Paginator, EmptyPage, PageNotAnInteger
from django.shortcuts import render, redirect
from django.contrib import messages
from .forms import ModelForm
from .models import ModelName

---

def indexView(request):

    # ASCENDING:(a-z) - order_by('field')
    # DESCENDING:(z-a) - order_by('-field')
    model_list = ModelName.objects.all().order_by('title')

    # Paginate the queryset
    paginator = Paginator(model_list, 5)      # Show 5 models per page
    page_number = request.GET.get('page', 1) # Get 'page' from request's query:
                                              # localhost:port/?page=0-9 (number)

---

    try:
        models = paginator.page(page_number)
    except PageNotAnInteger:
        # If page is not an integer, deliver the first page
        models = paginator.page(1)
    except EmptyPage:
        # If page is out of range (e.g., 9999), deliver the last page
        models = paginator.page(paginator.num_pages)

---

    return render(request, 'app_name/index.html', {'models': models})
```



📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
{% extends 'app_name/base.html' %}
{% load static %}
B {% load django_bootstrap5 %}

{% block title %}Index Page{% endblock %}

{% block head %}
    <link rel="stylesheet" href="{% static 'app_name/css/index.css' %}">
{% endblock %}
```

...(more on next page)

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
{% block content %}

<h2>Welcome to the Index Page!</h2>

{% if models %}
    <ul class="list-group pb-3">
    {% for model in models %}
        <li class="list-group-item">
            <h2>{{ model.title }}</h2>
            <p>{{ model.country }}</p>
            <small class="text-muted">{{ model.created_at }}</small>
        </li>
    {% endfor %}
    </ul>
    <-- PAGINATION -->
{% endif %}

{% endblock %}
```

Pagination Example_1 ➖🅱 django-bootstrap5 📚library

```
<div class="pagination">
    <span class="links">

    {% if models.has_previous %}
        <a href="?page=1">&laquo; First</a>
        <a href="?page={{ models.previous_page_number }}">Previous</a>
    {% endif %}

    <span class="current">
        Page {{ models.number }} of {{ models.paginator.num_pages }}
    </span>

    {% if models.has_next %}
        <a href="?page={{ models.next_page_number }}">Next</a>
        <a href="?page={{ models.paginator.num_pages }}">Last &raquo;</a>
    {% endif %}

    </span>
</div>
```

Pagination Example_2 ➕🅱 django-bootstrap5 📚library

```
🅱 {% bootstrap_pagination models %}
```

📝 **Edit** & **Delete** Models

📝 project_folder/app_name/**urls.py** 🐍 urls.py **(BOTH)**

```
# Add below paths   integer (ℤ),  argument: model_id  (it's a custome name)

path('edit-model/<int:model_id>', views.editModelView, name='edit_model'),
path('delete-model/<int:model_id>', views.deleteModelView, name='delete_model'),

# URL example - localhost:8080/delete-model/2
```

📝 project_folder/app_name/**views.py** 🐍 views.py **(DELETE)**

```
from django.core.paginator import Paginator, EmptyPage, PageNotAnInteger
from django.shortcuts import render, redirect, get_object_or_404
from django.contrib import messages
from .forms import ModelForm
from .models import ModelName

---

def deleteModelView(request, model_id):
    model_instance = get_object_or_404(ModelName, pk=model_id)
    model_instance.delete() # ← Removes Model

    messages.warning(request, f'Deleted model: {model_instance.title}')

    return redirect('index')   # CALLS  path(... name='index')  at  urls.py
```

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html **(BOTH)**

```
{% block content %}
...
{% for model in models %}
    <li class="list-group-item">
        <h2>{{ model.title }}</h2>
        <p>{{ model.country }}</p>
        <small class="text-muted">{{ model.created_at }}</small>
        <section class="d-flex justify-content-between">
            <a href="{% url 'edit_model' model.id %}">
                <button class="btn btn-secondary">Edit</button>
            </a>
            <a href="{% url 'delete_model' model.id %}">
                <button class="btn btn-danger">Delete</button>
            </a>
        </section>
    </li>
{% endfor %}
...
{% endblock %}
```

📝 project_folder/app_name/**views.py** 🐍 views.py **(EDIT)**

```
from django.core.paginator import Paginator, EmptyPage, PageNotAnInteger
from django.shortcuts import render, redirect, get_object_or_404
from django.contrib import messages
from .forms import ModelForm
from .models import ModelName

---


def editModelView(request, model_id):
    model_instance = get_object_or_404(ModelName, pk=model_id)

    if request.method == 'POST':
       form = ModelForm(request.POST, instance=model_instance)

       if form.is_valid():
           form.save() # ← Updates Model
           messages.success(request, f'Saved model as: {model_instance.title}')

           return redirect('index')
       else:
           messages.error(request, f'Model not saved: {model_instance.title}')
    else:
        form = ModelForm(instance=model_instance)

    return render(request, 'app_name/form.html', {'form': form})
```

📝 project_folder/app_name/templates/app_name/**form.html** </> form.html **(EDIT)**

```
...
{% block content %}
<form action="{% url 'form' %}" enctype="multipart/form-data" method="POST">
    {% csrf_token %}  # Secures our data when sending it to the backend server
    {{ form|crispy }} # Formats form in bootstrap5 & supports error events
    <button type="submit">Create Model</button>
</form>
<form action="{% if form.instance.id %}{% url 'edit_model' form.instance.id %}
{% else %}{% url 'form' %}{% endif %}" enctype="multipart/form-data"
method="POST">
    {% csrf_token %}
    {{ form|crispy }}
    <button class="btn btn-success" type="submit">
        {% if form.instance.id %}
        <span>Update Model</span>
        {% else %}
        <span>Create Model</span>
        {% endif %}
    </button>
</form>
{% endblock %}
```

Register and **Login** new **Users**

Create **Users** App 👤

🖥️ (venv) @ project_folder — 🐍 manage.py

```
python manage.py startapp users
```

Register Users **App** and it's **Urls** to Django Website

📝 project_folder/my_website/**settings.py** — 🐍 settings.py

```
INSTALLED_APPS = [
    'django.contrib.admin',
    ...

    # Add libraries above apps
    'crispy_forms',
    'crispy_bootstrap5',
    ...

    # Add apps below
    'app_name.apps.AppNameConfig',
    'users.apps.UsersConfig',
]

...

LOGIN_REDIRECT_URL = 'index'  # Redirects to path(… name='index') on
                              # successful form POST from auth_views.LoginView

LOGOUT_REDIRECT_URL = 'login' # Redirects to path(… name='login') on
                              # successful form POST from auth_views.LogoutView
```

app_name > apps.py

```
from django.apps import AppConfig


Codeium: Refactor | Explain
class AppNameConfig(AppConfig):
    default_auto_field = 'django.db.models.BigAutoField'
    name = 'app_name'
```

📝 project_folder/my_website/**urls.py** — 🐍 urls.py

```
...

urlpatterns = [
    ...
    path('', include('app_name.urls')),

    # imports URLs from my_website/users/urls.py
    path('users/', include('users.urls')),
]
```

Django has build-in **generic Models, Forms & Views** for **Users** App

User (Build-in **Model**)

username, first_name, last_name, email, password (password: encrypted / hashed)

groups, user_permissions,

is_staff, is_active, **is_superuser** ← Boolean (True | False)

last_login, date_joined ← Date & Time fields

UserCreationForm (Build-in **Form**)

password1, password2 ← temporary fields used to create password

auth_views (Build-in **Class View**)

📝 project_folder/users/**forms.py** (**register** users) 🐍 forms.py

```
from django import forms
from django.contrib.auth.models import User
from django.contrib.auth.forms import UserCreationForm
```

```
class UserRegisterForm(UserCreationForm):
    email = forms.EmailField(max_length=255)
    first_name = forms.CharField(max_length=35, label='Forename')
    last_name = forms.CharField(max_length=35, label='Surname')

    class Meta:
        model = User
        fields = [
            'username',
            'first_name',
            'last_name',
            'email',
            'password1',
            'password2'
        ]
```

User model's build-in fields:
email, first_name & **last_name**, are overwritten in this **form**

📝 project_folder/users/**urls.py** (users) 🐍 urls.py

```python
from django.urls import path
from django.contrib.auth import views as auth_views  #  ← (Build-in Class-View)
from . import views

---

urlpatterns = [
   path('login', auth_views.LoginView.as_view(template_name='users/form.html'), name='login'),
   path('logout', auth_views.LogoutView.as_view(), name='logout'),
   path('register', views.registerUserView, name='register'),
]
```

📝 project_folder/users/**views.py** (users) 🐍 views.py

```python
from django.shortcuts import render, redirect
from django.contrib.auth import authenticate, login
from django.contrib import messages
from .forms import UserRegisterForm

---

def registerUserView(request):
    if request.method == 'POST':
        form = UserRegisterForm(request.POST)
        if form.is_valid():
---
            # Register the user, (and returns user instance)
            user = form.save()
            messages.success(request, f'Created account: {user.username}')
---
            # Authenticate the user
            raw_password = form.cleaned_data.get('password1')
            user = authenticate(username=user.username, password=raw_password)
---
            # Sign-in new user
            if user is not None:
                login(request, user)
                messages.success(request, f'Logged-in: {user.username}')
                return redirect('index')
            else:
                messages.error(request, 'Failed to login user')
                return redirect('login')
---
        else:
            messages.error(request, 'Invalid credentials!')
    else:
        form = UserRegisterForm()

    return render(request, 'users/form.html', {'form': form, 'registry': True})
```

📝 project_folder/**users**/templates/users/**form.html** </> form.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}

{% block title %}
    {% if registry %}Register{% else %}Login{% endif %} Page
{% endblock %}
```

```
{% block content %}

    {% if user.is_authenticated and not registry %}
        <div class="p-3 mb-5 bg-light rounded">
            <p>You are already logged-in as: <strong>{{ user }}</strong>
            <br>would you like to sign-in to another account?</p>
        </div>
    {% endif %}
```

```
    <form method="POST" enctype="multipart/form-data">
        {% csrf_token %}
        {{ form|crispy }}
        <button type="submit" class="btn btn-success">
            <span>{% if registry %}Register{% else %}Login{% endif %}</span>
        </button>
    </form>
```

```
    <section class="float-end">
        {% if not registry %}
        <p>Don't have an account?  <a href="{% url 'register' %}">register now</a></p>
        {% else %}
        <p>Already have an account?  <a href="{% url 'login' %}">login now</a></p>
        {% endif %}
    </section>

{% endblock %}
```

📝 project_folder/**app_name**/templates/app_name/**index.html** </> index.html

```
{% block content %}
...
<a href="{% url 'form' %}">add model</a>

<form action="{% url 'logout' %}" method="POST">
    {% csrf_token %}
    <button type="submit" class="btn btn-warning">logout</button>
</form>

{% endblock %}
```

NOTES

authenticate() from django.contrib.auth
adds property: **is_authenticated** to **user**

Hence: {% *if* user.**is_authenticated** %}

---

auth_view.LogoutView requires POST method, due to security reasons

Hence: <form action="{% url 'logout' %}" method="POST"> ✓

instead of: <a href="{% url 'logout' %}"> X

Secure Views 🔐

Anyone can access **views** to create, edit & delete **models**. Let's secure them!

📝 project_folder/app_name/**views.py** 🐍 views.py

```
def formView(request):

    if not request.user.is_superuser:
        messages.error(request, 'you must be logged-in as a super user')
        return redirect('index') # redirect client to URL path(... name='index') at 🐍 urls.py

    if request.method == 'POST':
        form = ModelForm(request.POST)
        if form.is_valid():
            form.save()
            return redirect('index')
    else:
        form = ModelForm()

    return render(request, 'app_name/form.html', {'form': form})
```

In above example, only users with special privilege may access a **formView**()
This approach is ideal for a website with **single-user** in mind

🔓 Let's secure the **view** for **multi-user-based** platform

📝 project_folder/app_name/**views.py** 🐍 views.py

```
from django.contrib.auth.decorators import login_required

@login_required(login_url='login')
def formView(request):

    if request.method == 'POST':
        form = ModelForm(request.POST)
        if form.is_valid():
            form.save()
            return redirect('index')
    else:
        form = ModelForm()

    return render(request, 'app_name/form.html', {'form': form})
```

decorator: **@login_required(**login_url='login'**)** redirects client to URL path(… name='login') at 🐍 urls.py

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
LOGIN_URL = 'login'
```

NOT logged-in users trying to access to restricted **view:** @login_required are redirected to → URL path(… name='login') by default.

```
@login_required(login_url='login')
@login_required
def formView(request):
    ...
```

Profile Model

🖼️ 👧👦 📞

🖥️ (venv) @ project_folder 📚 pip library

```
pip install pillow django-resized
pip freeze > requirements.txt  # update requirements.txt
```

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
INSTALLED_APPS = [
    'django.contrib.admin',
    ...

    # Add libraries above apps
    'django_resized',
    'crispy_forms',
    ...
]
```

📝 project_folder/users/**models.py** (**profile** users) 🐍 models.py

```
from django.db import models
from django.contrib.auth.models import User
from django_resized import ResizedImageField

---

class Profile(models.Model):

    user = models.OneToOneField(User, on_delete=models.CASCADE)
    phone_number = models.CharField(max_length=15)

    image = ResizedImageField(
        size=[300, 300],
        crop=['middle', 'center'],
        quality=75,
        force_format='JPEG',

        # 📁 /profile_pics
        upload_to='profile_pics',
        default='default_profile.jpg'
    )
```

models.CASCADE → Delete this model IF its referenced model is deleted

📁 **/profile_pics** is created at 🗂️ **/media** → 📁 **/media/profile_pics**

1. Register model: **Profile** in → 🐍 users/admin.py &
2. Using 🖥️ terminal: **makemigrations** + **migrate** them to the database →
3. Place: 🖼️ **default_profile.jpg** inside 🗂️ **/media** directory

📝 project_folder/users/**forms.py** (**profile** users) 🐍 forms.py

```
from django import forms
from django.contrib.auth.models import User
from django.contrib.auth.forms import UserCreationForm
from .models import Profile

class ProfileForm(forms.ModelForm):
    class Meta:
        model = Profile
        fields = ['phone_number']
...
```

📝 project_folder/users/**views.py** (**profile** users) 🐍 views.py

```
...

from .forms import UserRegisterForm, ProfileForm


def registerUserView(request):
    if request.method == 'POST':
        form_user = UserRegisterForm(request.POST)
        form_profile = ProfileForm(request.POST)

        if form.is_valid() and form_profile.is_valid():

---

            # Register the user, (and returns user instance)
            user = form_user.save()

            # Create Profile model for new user
            profile = form_profile.save(commit=False)
            profile.user = user
            profile.save()

            messages.success(request, f'Created account: {user.username}')

            # Authenticate the user
            raw_password = form_user.cleaned_data.get('password1')
            ...
---

...
    else:
        form_user = UserRegisterForm()
        form_profile = ProfileForm()

    context = {
        'registry': True,
        'register_view_forms': {
            'user': form_user,
            'profile': form_profile
        }
    }

    return render(request, 'users/form.html', context)
```

📝 project_folder/**users**/templates/users/**form.html** </> form.html

```
...
{% block content %}
    ...
    <form method="POST" enctype="multipart/form-data">
        {% csrf_token %}
    B {{ register_view_forms.profile|crispy }}
    B {{ register_view_forms.user|crispy }}
    B {{ form|crispy }} # ← auth_views.LoginView ← URL path(… name='login')
    ...
{% endblock %}
```

Update Profile Details Page

📝 project_folder/users/**forms.py** (**profile** users) 🐍 forms.py

```
class UserUpdateForm(forms.ModelForm):

    email = forms.EmailField(max_length=255)
    first_name = forms.CharField(min_length=4, max_length=35, label='Forename')
    last_name = forms.CharField(min_length=4, max_length=35, label='Surname')

    confirm_password = forms.CharField(
        widget=forms.PasswordInput,
        help_text='Surname'
    )
```

```
    class Meta:
        model = User
        fields = [
            'username',
            'email',
            'first_name',
            'last_name',
            'confirm_password'
        ]
```

📝 project_folder/users/**urls.py** (**profile** users) 🐍 urls.py

```
from django.urls import path
from django.contrib.auth import views as auth_views
from . import views
```

```
urlpatterns = [
  path('login', auth_views.LoginView.as_view(template_name='users/form.html'),…
name='login'),
  path('logout', auth_views.LogoutView.as_view(), name='logout'),
  path('register', views.registerUserView, name='register'),
  path('profile/<int:user_id>', views.profileView, name='profile'),
]
```

📝 project_folder/users/**views.py** (**profile** users) 🐍 views.py

```python
from django.contrib.auth.decorators import login_required
from django.shortcuts import render, redirect, get_object_or_404
from django.contrib.auth import authenticate, login
from django.contrib.auth.hashers import check_password
from django.contrib.auth.models import User
from django.contrib import messages
from .forms import UserRegisterForm, UserUpdateForm, ProfileForm
from .models import Profile
```

user_instance : **User** Model with ID → **user_id**

```python
@login_required
def profileView(request, user_id):
    user_instance = get_object_or_404(User, pk=user_id)

    if request.method == 'POST' and request.user.id == user_instance.id:
```

request.user.id : logged-in user's ID

```python
        form_user = UserUpdateForm(
            request.POST,
            instance=user_instance
        )
        form_profile = ProfileForm(
            request.POST,
            request.FILES,
            instance=user_instance.profile
        )
```

confirm_password : value of <input name="confirm_password">

```python
        if form_user.is_valid() and form_profile.is_valid():
            confirm_password = form_user.cleaned_data.get('confirm_password')

            if check_password(confirm_password, user_instance.password):
                form_user.save()
                form_profile.save()
                messages.success(request, 'Successfully updated profile')
            else:
                messages.error(request, 'Invalid password!')
                form_user.add_error('confirm_password', 'Invalid password!')
        else:
            messages.error(request, 'Invalid credentials!')
```

.add_error() → form|crispy → RED <input name="confirm_password"> + Error

```python
    else:
        form_user = UserUpdateForm(instance=user_instance)
        form_profile = ProfileForm(instance=user_instance.profile)

    context = {
        'profile_user': user_instance,
        'forms': {
            'user': form_user,
            'profile': form_profile
        }
    }

    return render(request, 'users/profile.html', context)
```

📝 project_folder/**users**/templates/users/**profile.html** </> profile.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}
{% block title %}Profile Page{% endblock %}
{% block content %}
<div class="container">
  <div class="row">
    <aside class="col-md-4">
      <div class="p-3 bg-secondary text-white">
        <img width="100%" src="{{ profile_user.profile.image.url }}">
      </div>
    </aside>
    <main class="col-md-8">
      <div class="p-3 bg-light">
        {% if user.id == profile_user.id %}
          <form action="{% url 'profile' profile_user.id %}"
                enctype="multipart/form-data"
                method="POST"
          >
            {% csrf_token %}
            {{ forms.profile|crispy }}
            {{ forms.user|crispy }}
            <button class="btn btn-warning" type="submit">Update Profile</button>
          </form>
        {% else %}
          {% for field in forms.user %}
            {% if field.label|lower != "confirm password" %} <!-- Disclude: confirm_password -->
              <div class="mb-3">
                <label for="{{ field.id_for_label }}" class="form-label">{{ field.label }}</label>
                <p class="bg-white p-3" id="{{ field.id_for_label }}">{{ field.value }}</p>
              </div>
            {% endif %}
          {% endfor %}
          {% for field in forms.profile %}
            {% if field.label|lower != "image" %} <!-- Disclude: image -->
              <div class="mb-3">
                <label for="{{ field.id_for_label }}" class="form-label">{{ field.label }}</label>
                <p class="bg-white p-3" id="{{ field.id_for_label }}">{{ field.value }}</p>
              </div>
            {% endif %}
          {% endfor %}
        {% endif %}
      </div>
    </main>
  </div>
</div>
{% endblock %}
```

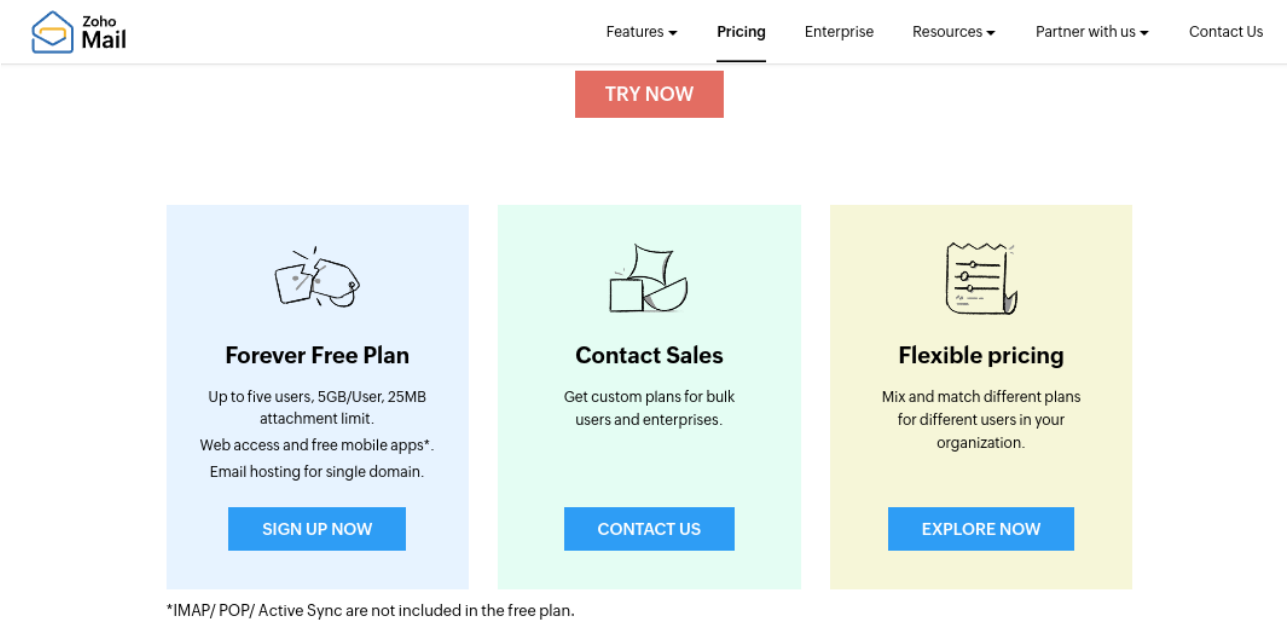
📝 project_folder/**app_name**/templates/app_name/**index.html** </> index.html

```
...
<a href="{% url 'form' %}" class="float-start">add model</a>

<a href="{% if request.user.is_authenticated %}{% url 'profile' request.user.id
%}{% else %}{% url 'login' %}{% endif %}" class="float-end">
    <button type="submit" class="btn btn-primary ms-3">profile</button>
</a>

<form action="{% url 'logout' %}" method="POST" class="float-end">
    {% csrf_token %}
    <button type="submit" class="btn btn-warning">logout</button>
</form>

...
```

Update User's **password** using custom **Email**

🎨 🧒👧 ☎️

Zoho Mail



Email is required for this stage
Hence, I will be using Zoho mail's

Forever Free Plan

(you can also create and manage additional emails via admin user)

admin@… , noreply@… , support@…

However, you may need to
buy a **domain** for custom emails

GoDaddy

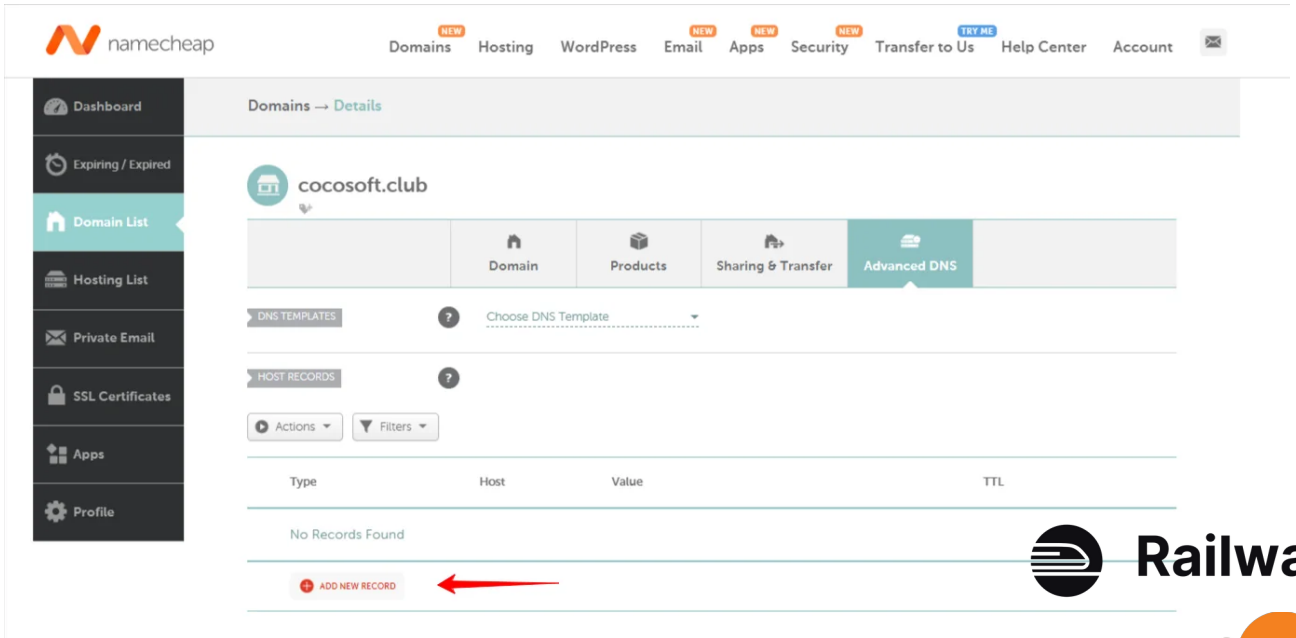
OR

namecheap

HOSTINGER

Hostinger provides domains and can host websites

I personally recommend **NameCheap**
service as it’s easy to manage



Railway

CLOUDFLARE

ZOHO

Domain can be linked to
Email & Web-Hosting, Services

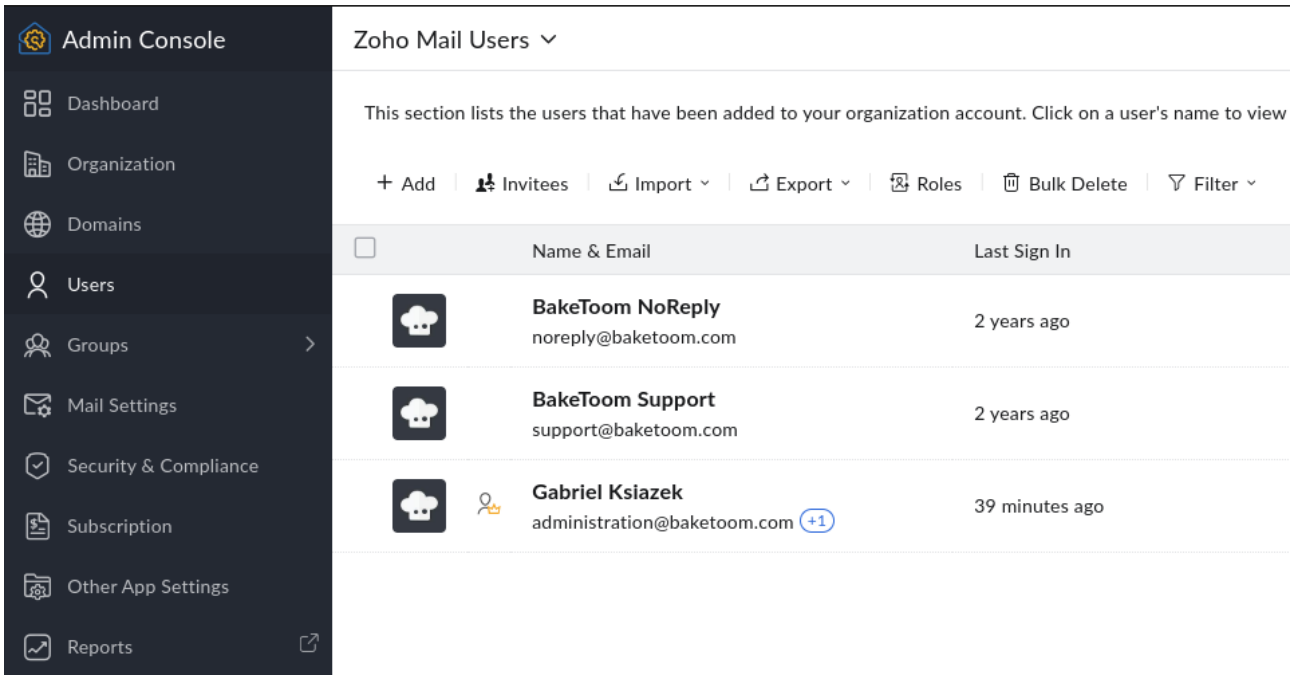
heroku

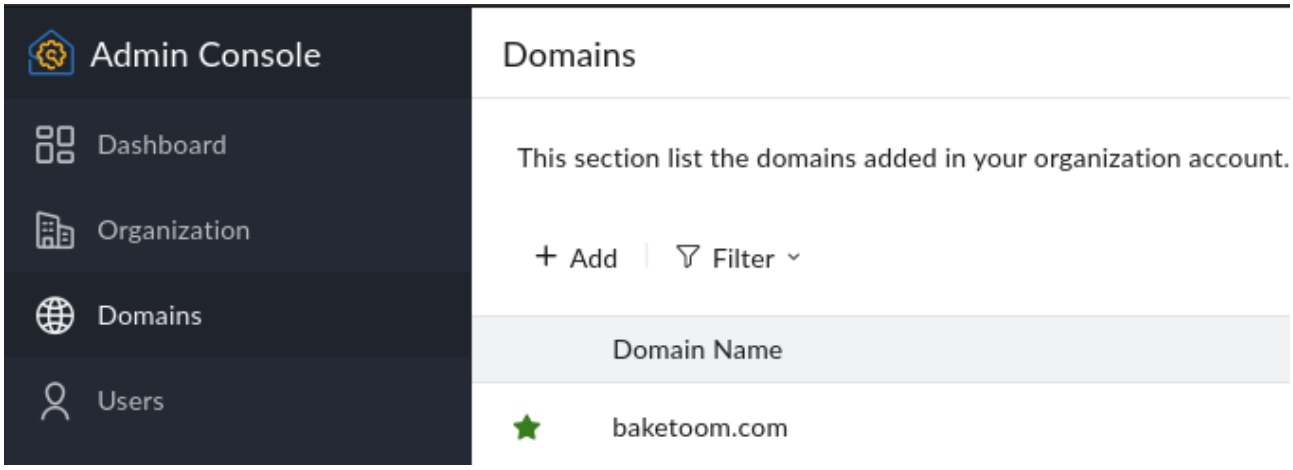
Zoho Admin Console

mailadmin.zoho.com | mailadmin.zoho.eu

Email Hosting Guide (link at dashboard)

https://www.zoho.com/mail/help/adminconsole/email-hosting-setup.html





📝 project_folder/**.env** .env

```
...

# Zoho Mail : Account

EMAIL_HOST_USER='noreply@domain.com'
EMAIL_HOST_PASSWORD='email's password here'
```

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
...

EMAIL_BACKEND = 'django.core.mail.backends.smtp.EmailBackend'
EMAIL_HOST = 'smtp.zoho.eu'
EMAIL_PORT = 587
EMAIL_USE_TLS = True
EMAIL_USE_SSL = False # Avoid SSL because it's less secure

EMAIL_HOST_USER = os.getenv('EMAIL_HOST_USER')
EMAIL_HOST_PASSWORD = os.getenv('EMAIL_HOST_PASSWORD')
DEFAULT_FROM_EMAIL = f'(Domain) <{EMAIL_HOST_USER}>'

# DEFAULT_FROM_EMAIL : (Domain) <noreply@domain.com>
```

📝 project_folder/users/**urls.py** (**profile** users) 🐍 urls.py

```
from django.urls import path
from django.contrib.auth import views as auth_views
from . import views

---

urlpatterns = [
  path('login', auth_views.LoginView.as_view(template_name='users/form.html'), name='login'),
  path('logout', auth_views.LogoutView.as_view(), name='logout'),
  path('register', views.registerUserView, name='register'),

  path('password-reset/',
    auth_views.PasswordResetView.as_view(
      template_name='users/password_reset.html'),
    name='password_reset'),

  path('password-reset/done/',
    auth_views.PasswordResetDoneView.as_view(
      template_name='users/password_reset_done.html'),
    name='password_reset_done'),

  path('password-reset-confirm/<uidb64>/<token>/',
    auth_views.PasswordResetConfirmView.as_view(
      template_name='users/password_reset_confirm.html'),
    name='password_reset_confirm'),

  path('password-reset-complete/',
    auth_views.PasswordResetCompleteView.as_view(
      template_name='users/password_reset_complete.html'),
    name='password_reset_complete'),

]
```

📝 project_folder/**users**/templates/users/**profile.html** </> profile.html

```
...
<form action="{% url 'profile' profile_user.id %}"
      enctype="multipart/form-data"
      method="POST"
>
    {% csrf_token %}
    {{ forms.profile|crispy }}
    {{ forms.user|crispy }}
    <button class="btn btn-warning" type="submit">Update Profile</button>
    <div class="row justify-content-between">
        <div class="col-auto">
            <button class="btn btn-warning" type="submit">Update Profile</button>
        </div>
        <div class="col-auto">
            <a href="{% url 'password_reset' %}" class="btn btn-link">change password</a>
        </div>
    </div>
</form>
...
```

📝 project_folder/**users**/templates/users/**password_reset.html** </>

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}
{% block title %}Reset Password{% endblock %}

{% block content %}

<form action="{% url 'password_reset' %}"
     enctype="multipart/form-data"
      method="POST"
>
    {% csrf_token %}
    {{ form|crispy }}
    <button type="submit" class="btn btn-warning">
        <span>Request Password Change</span>
    </button>
    <a href="javascript:history.back()" class="float-end">
        <span>Return to previous page</span>
    </a>
</form>

{% endblock %}
```

📝 project_folder/**users**/templates/users/**password_reset_done.html** </>

```
{% extends 'app_name/base.html' %}
{% load static %}
{% block title %}Reset Password{% endblock %}

{% block content %}

<div class="mx-auto" style="max-width: 750px">
    <section class="bg-light p-3 mb-3">
        <h1 class="fs-3">Request sent</h1>
        <p>An email with instructions to reset your password has been sent to
the email address you entered.</p>
    </section>
    <section class="d-flex justify-content-between">
        <a href="{% url 'password_reset' %}">
            <button type="submit" class="btn btn-warning">
                <span>Resend request</span>
            </button>
        </a>
        <a href="{% url 'index' %}">
            <button type="submit" class="btn btn-primary">
                <span>Continue</span>
            </button>
        </a>
    </section>
</div>

{% endblock %}
```

📝 project_folder/**users**/templates/users/**password_reset_confirm.html** </>

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}
{% block title %}Reset Password{% endblock %}
{% block content %}

{% if form %}
<form method="POST" enctype="multipart/form-data">
    {% csrf_token %}
    {{ form|crispy }}
    <button type="submit" class="btn btn-warning">
        <span>Change Password</span>
    </button>
</form>
{% else %}
<div class="mx-auto" style="max-width: 750px">
    <section class="bg-light p-3 mb-3">
        <h1 class="fs-3">Request sent</h1>
            <p>ERROR 404 - Something went lost in the dust of the universe.</p>
    </section>
</div>
{% endif %}

{% endblock %}
```

📝 project_folder/**users**/templates/users/**password_reset_complete.html** </>

```
{% extends 'app_name/base.html' %}
{% load static %}
{% block title %}Reset Password{% endblock %}
{% block content %}

<div class="mx-auto" style="max-width: 750px">
    <section class="bg-light p-3 mb-3">
        <h1 class="fs-3">Success!</h1>
        <p>Your password has been updated successfully.</p>
    </section>
    <a href="{% url 'index' %}">
        <button type="submit" class="btn btn-primary">
            <span>Continue to main page</span>
        </button>
    </a>
</div>

{% endblock %}
```

Models are modifiable by
all logged-in users

Let’s Create, Edit & Delte
User’s Models only!
🗃️ 👧🧒🔬📊

📝 project_folder/app_name/**models.py** 🐍 models.py

```
from django.db import models
from django.contrib.auth.models import User
from django.utils.translation import gettext_lazy as _

class ModelName(models.Model):

  id = models.AutoField(primary_key=True)
  creator = models.ForeignKey(User, on_delete=models.CASCADE)

  title = models.CharField(
      max_length=100,
...
```

🖥️ (venv) @ project_folder 🐍 manage.py # **IGNORE BELOW CODE** (Reminder Example)

! IMPORTANT NOTE !

You should **ALWAYS** execute:

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

when you **create** & **update** models.py
to initialize the model table in database

```
class Model(models.Model):
  name = models.CharField()
  context = models.TextField()

  def __str__(self):
    return f"Model(name={self.name},context={self.context})"
```

In settings.py - The **DEFAULT_AUTO_FIELD** allows you to specify the default type of auto-incrementing primary key field that will be used for models that do not explicitly define a primary key.
DEFAULT_AUTO_FIELD @ djangoproject.com

```
DEFAULT_AUTO_FIELD = 'django.db.models.BigAutoField'
```

🖥️ (venv) @ project_folder 🐍 manage.py

Sometimes, you may have to **remove migrations**: 🐍 NNNN_initial.py from app_name
you can also make migrations with --fake flag to resolve conflicts (← AVOID!)

```
python manage.py migrate --fake          ← Avoid using: --fake OR --fake-initial
python manage.py migrate --fake-initial Used for integrating existing db schema

python manage.py migrate --fake app_name zero  ← Use these commands when you
python manage.py makemigrations app_name         can't fix conflicts and want
python manage.py migrate app_name                to preserve your database data
```

🖥️ (venv) @ project_folder 🐍 manage.py (shell)

We also have old instances of model: ModelName.
Update their **creator field** manually **OR delete** them all:

```
python manage.py shell
(shell) >> from app_name.models import ModelName
(shell) >> ModelName.objects.all().delete()
(shell) >> exit()
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```
...
from django.contrib.auth.decorators import login_required
from django.shortcuts import render, redirect, get_object_or_404
from django.contrib import messages
from .forms import ModelForm
from .models import ModelName
```

```
@login_required
def formView(request):                                  # CreateModelView
    if request.method == 'POST':
        form = ModelForm(request.POST)
        if form.is_valid():
            form.save()
            model_instance = form.save(commit=False)
            model_instance.creator = request.user
            model_instance.save()

            messages.success(request, 'Model created successfully!')
            return redirect('index')
        else:
            messages.error(request, 'Failed to create new model!')
    else:
        form = ModelForm()

    return render(request, 'app_name/form.html', {'form': form})

...
```

```
# (OPTIONAL EXAMPLE) - declare custom functions in  🐍 views.py
#    use:  user_instance == model_instance.creator         # (for simplicity)
# or use:  is_model_creator(model_instance, user_instance) # (for semanticity)


def is_model_creator(model_instance, user_instance):
    return user_instance == model_instance.creator # → True | False
```

```
from django.core.exceptions import ValidationError
from django.db.models import Model

def is_model_creator(model_instance=None, user_instance=None):

    if model_instance is None or user_instance is None:
        raise ValueError("Both 'model_instance' and 'user_instance' must be provided")

    if not isinstance(model_instance, Model):
        raise ValidationError(f"{model_instance} is not a valid Django model instance")

    if not hasattr(model_instance, 'creator'):
        raise ValidationError(f"{model_instance} does not have a 'creator' field")

    return user_instance == model_instance.creator
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```python
...

@login_required
def editModelView(request, model_id):
    model_instance = get_object_or_404(ModelName, pk=model_id)

    if not is_model_creator(model_instance, request.user):
        messages.error(request, 'You are not the owner of this model')
        return redirect('index')

    if request.method == 'POST':
```

```python
@login_required
def deleteModelView(request, model_id):
    model_instance = get_object_or_404(ModelName, pk=model_id)

    if not is_model_creator(model_instance, request.user):
        messages.error(request, 'You are not the owner of this model')
        return redirect('index')

    model_instance.delete()
    messages.warning(request, f'Deleted model: {model_instance.title}')

    return redirect('index')
```

Search for Users' **Models** 🔎

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
<form method="POST" action="{% url 'index' %}{% if request.GET %}?{% for key, value in request.GET.items %}{{ key }}={{ value }}{% if not forloop.last %}&{% endif %}{% endfor %}{% endif %}">

    {% csrf_token %}
    <div class="input-group py-3">

        <input  type="search"
         placeholder="Search"
               class="form-control rounded-start"
                name="search_query">

        <button type="submit" class="btn btn-outline-primary">search</button>

    </div>
</form>
```

Include Search bar 🔎

📝 project_folder/app_name/**views.py** 🐍 views.py

```
...
def indexView(request):

    model_list = ModelName.objects.all()

    if request.method == 'POST':
        search = request.POST.get('search_query')
        if search:
            model_list = model_list.filter(title__icontains=search)

---

    #localhost:8000/?country_code=PL&creator=McRaZick → request.GET.items()

    for key, value in request.GET.items():
        if key == 'country_code':                   # PL
            model_list = model_list.filter(country=value)
        elif key == 'creator_id':                   #
            model_list = model_list.filter(creator=value)
        elif key == 'creator':                                          # McRa…
            model_list = model_list.filter(creator__username__icontains=value)

...
```

title, **country** & **creator** are fields of model: ModelName @ app_name.models.py

Django Lookup for ORM (Object-Relational Mapping): **.filter(field__lookup)**		**Queryset Lookups**
Category	**Regexp Equivalent**	**Lookup**
Exact match	^value$	field__exact="value"
Case-insensitive Exact match	(?i)^value$	field__iexact="value"
Contains	.*value.*	field__contains="value"
Case-insensitive Contains	(?i).*value.*	field__icontains="value"
In		field__in=[**value1**, **value2**, ...]
>		field__gt=**value**
>=		field__gte=**value**
<		field__lt=**value**
<=		field__lte=**value**
Starts with	^value.*	field__startswith="value"
Case-insensitive Starts with	(?i)^value.*	field__istartswith="value"
Ends with	.*value$	field__endswith="value"
Case-insensitive Ends with	(?i).*value$	field__iendswith="value"
Range (From → To)		field__range=(**start_value**, **end_value**)

The **code** we've implemented is decent but it **is also faulty**. For example:

```
When client uses pagination buttons, we will only receive:
localhost:port/?page=N in our URL.

By adding query parameter: &country_code=GB,
and heading to the next page, using template's pagination button,

we expect our URL to become: localhost:port/?page=N&country_code=GB.

However, we are redirected to: localhost/?page=N+1, instead.
```

This is an **issue because** additional **filters** will **not** be **applied**.

Another issue is with the `<form action ...>`. It's cool that we can include any query parameter and also use a `search <button>` to also filter the models' title.

However, this is **impractical**, because **if client decides to make a new search**, then the additional filters will not be removed. It's more practical to include additional filters using radio buttons and checkboxes.

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
<form method="POST" action="{% url 'index' %}{% if request.GET %}?{% for key, value in request.GET.items %}{{ key }}={{ value }}{% if not forloop.last %}&{% endif %}{% endfor %}{% endif %}">
    ...
</form>
```

Remove the above code &
Use django_bootstrap5 librarie's pagination, with **url** argument like so:

```
{% bootstrap_pagination models url=request.build_absolute_uri %}
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```
from django.urls import reverse
from django.http import HttpResponseRedirect
```

```
...
def indexView(request):

    model_list = ModelName.objects.all()

    if request.method == 'POST':
        search = request.POST.get('search_query')
        if search:
            # Note: request.GET is immutable, hence we need to create a mutable copy.
            query_params = request.GET.copy() # query_params is a mutable copy
            query_params['search'] = search    # add search parameter to request copy

            new_url = reverse('index') + "?" + query_params.urlencode()

            # return back to the previous render, with updated url
            return HttpResponseRedirect(new_url)

            model_list = model_list.filter(title__icontains=search)


    for key, value in request.GET.items():
        if key == 'search':
            model_list = model_list.filter(title__icontains=search)
        elif key == 'country_code':
        if key == 'country_code':
            model_list = model_list.filter(country=value)
...
```

.urlencode() method converts special characters to %XX format:

Space	( )	%20 or +
Exclamation Mark	(!)	%21
Double Quote	(")	%22
Hash	(#)	%23
Dollar	($)	%24
Percent	(%)	%25
Ampersand	(&)	%26
Plus	(+)	%2B
Equals	(=)	%3D
Question Mark	(?)	%3F

There is more...

reverse - is used to IMIDIEATELY get the url.
(from my_website/urls.py file) - often used in - function_based views

reverse_lazy - is used to get the url later when needed.
(from my_website/urls.py file) - often used in - class_based views

---

This is a better solution, however, we haven't implemented our filters just yet. We can include the query parameters into the URL with JavaScript. Or do that in the backend.

I will implement a solution in the backend out of preference and to demonstrate view's control flow of request in custom function, and show other cool perks :)

📝 project_folder/app_name/templates/app_name/**index.html** </> index.html

```
...
<form action="{% url 'index' %}" enctype="multipart/form-data" method="POST">
  {% csrf_token %}
  <div class="input-group py-3">
    <input type="search" name="search_query" class="form-control rounded-start"
placeholder="Search">
    <button type="submit" class="btn btn-outline-primary">search</button>
  </div>

  <div id="filters">
    <h3 class="fs-4">Include filters in your search</h3>
    <ul class="list-inline list-unstyled py-2">

      <li class="list-inline-item">
        <label for="creator_empty">no creator:</label>
        <input type="radio" name="creator" id="creator_empty" checked>
      </li>
      <li class="list-inline-item">
        <label for="creator_username">creator username:</label>
        <input type="radio" name="creator" id="creator_username">
      </li>
      <li class="list-inline-item">
        <label for="creator_id">creator id:</label>
        <input type="radio" name="creator" id="creator_id">
      </li>

      <li class="mt-2">
        <input type="text" name="creator_username_value" id="creator_value" class="form-control
mt-2" placeholder="Enter model creator's username" disabled hidden>
        <input type="text" name="creator_id_value" id="creator_value" class="form-control mt-2"
placeholder="Enter model creator's ID" disabled hidden>
      </li>
      <li class="my-2">
        <label for="country_code">country code:</label>
        <input type="checkbox" name="country_code" id="country_code">
        <input type="text" name="country_code_value" id="country_code_value" class="form-control
mt-2" placeholder="Enter model's country code" disabled>
      </li>

    </ul>
  </div>
</form>
...
```

```
. . .

{% block base %}
   <script name="search.js" src="{% static 'app_name/js/search.js' %}" defer></script>
{% endblock %}
```

📝 `project_folder/app_name/static/app_name/js/search.js` JS search.js

```
// location - localhost:port/?param1=a&param2=b...
// location.search - param1=a&param2=b...

// Get search parameters into Map Object with their values
const search = document.location.search.slice(1).split('&');

// searchMap - Map(param1 -> a, param2 -> b...)
const searchMap = new Map(search.map(s => {
   const [key, value] = s.split('=');
   return [key, decodeURIComponent(value)];
}));


// searchMap - Map(param1 -> a, param2 -> b...)
const filters = document.querySelector('#filters');


---

function showOnlySpecifiedCreatorInput(input_id, value) {
   /* Summary of this function:
   /
   / Hides all creator inputs,
   / Shows creator input specified by input_id, and
   / It optionally updates creator input's value if provided
   */

   let creatorInputs = filters.querySelectorAll('#creator_value');
   [...creatorInputs].map(input => {
      input.disabled = true;
      input.hidden = true;
   });

   if (input_id == undefined) return;

   let input = filters.querySelector(`#creator_value[name=${input_id}]`);
   input.disabled = false;
   input.hidden = false;

   if (value != undefined) input.value = value;
}
```

```
// hides all #creator_value inputs at #filters
showOnlySpecifiedCreatorInput();


// Populate filters if location.search has expected parameters
for (const [key, value] of searchMap) {
    switch (key)
    {
    case 'search':
        document.querySelector('input[name=search_query]').value = searchMap.get('search');
        break;

    case 'creator':
        filters.querySelector('#creator_username').checked = true;
        // shows #creator_value[name=creator_username_value] and update its value
        showOnlySpecifiedCreatorInput('creator_username_value', value);
        break;

    case 'creator_id':
        filters.querySelector('#creator_id').checked = true;
        // shows #creator_value[name=creator_username_value] and update its value
        showOnlySpecifiedCreatorInput('creator_id_value', value);
        break;

    case 'country_code':
        filters.querySelector('#country_code').checked = true;
        filters.querySelector('#country_code_value').disabled = false;
        filters.querySelector('#country_code_value').value = value;
        break;
    }
}
```

```
// Make radio filters for #creator_value inputs work
const radios = filters.querySelectorAll('input[name=creator]');
    [...radios].map(radio => {
        radio.addEventListener('change', () => {
        if (radio.checked && radio.id != 'creator_empty') {
            // shows #creator_value input of filter option: #radio.id
            showOnlySpecifiedCreatorInput(radio.id + '_value');
        } else {
            // hides all filter: #creator_value, inputs
            showOnlySpecifiedCreatorInput();
        }
    });
});
```

```javascript
// Toggle country code input's active state
let checkbox = filters.querySelector('#country_code');
checkbox.addEventListener('change', () => {
    if (checkbox.checked) {
        filters.querySelector('#country_code_value').disabled = false;
    } else {
        filters.querySelector('#country_code_value').disabled = true;
    }
});
```

📝 project_folder/app_name/**views.py** 🐍 views.py

```python
...
def indexView(request):

    model_list = ModelName.objects.all()

    if request.method == 'POST':
        search = request.POST.get('search_query')
        if search:
            # Note: request.GET is immutable, hence we need to create a mutable copy.
            query_params = request.GET.copy()  # query_params is a mutable copy
            query_params['search'] = search    # add search parameter to request copy

            new_url = reverse('index') + "?" + query_params.urlencode()
            new_url = reverse('index') + "?" + request_search_filter_params(request)
            # return back to the previous render, with updated url
            return HttpResponseRedirect(new_url)
```

```python
    for key, value in request.GET.items():
        if key == 'search':
            model_list = model_list.filter(title__icontains=search)
        elif key == 'country_code':
            model_list = model_list.filter(country=value)
...
```

NOTE: request_search_filter_params() is a custom function which is defined at the next page

📝 `project_folder/app_name/views.py` 🐍 views.py

```
...

def is_model_creator(model_instance, user_instance):
    return model_instance.creator == user_instance
```

```
def request_search_filter_params(request):
    """
    Converts posted form arguments, to permitted search url parameters.
    Additional parameters are filtered from the request copy: GET_copy.

    Returns:
        GET_copy (QueryDict) with valid parameters
    """
```

```
    # Note: requests are immutable, hence we need to create a mutable copy
    GET_copy = request.GET.copy()     # GET_copy is a mutable copy
    POST_copy = request.POST.copy() # POST_copy is a mutable copy

    # Remove 'creator_id_value' if 'creator_username_value' exists
    if request.POST.get('creator_id_value') and request.POST.get('creator_username_value'):
        POST_copy.pop('creator_id_value')
```

```
    # Add parameters to copy of request GET
    for key, value in POST_copy.items():

        if key == 'search_query':
            GET_copy['search'] = value

        elif key == 'creator_id_value':
            try: # Remove invalid 'creator_id' parameter
                GET_copy['creator_id'] = int(value)
            except ValueError:
                messages.error(request, 'Creator\'s ID must be an Integer!')

        elif key == 'creator_username_value':
            GET_copy['creator'] = value

        elif key == 'country_code_value':
            GET_copy['country_code'] = value
```

```
    return GET_copy.urlencode()
...
```

Place **request_search_filter_params** function somewhere above **indexView**

Right, although this code might work initially, there are a couple of issues.
I decided to implement faulty code as an example of deseption of a naming convention: **urlencode**()

GET_copy = request.GET.copy() → **QueryDict** (from django.http import QueryDict)

QueryDict('param1=Hello&param2=World') → <param1: [‘Hello’], param2: [‘World’]>

We can’t just pass this data in cases were: **QueryDict**('param=Hello World')
Because it includes unsupported characters upon return, like a space character.

Because unsupported string characters are present in our **GET_copy** QueryDict.
urlencode() is thus required to avoid errors. However, its encoding changes URL:

```
new_url = localhost:port/?param=Hello+World.
```

This is not a recognized URL encoding by JavaScript’s **decodeURIComponent**()
Hence, the + in ?param, will be ignored, introducing this “plus” character in our template form’s <input> data.

It gets worse when clients POSTS back this received param data to the server.

Let’s fix it

📝 project_folder/app_name/**views.py** 🐍 views.py

```
def get_request_with_valid_search_filter_parameters(request):
def request_search_filter_params(request):
    ...
    return GET_copy
```

Update function’s name to make it more semantic
Remove urlencode() **from** retun GET_copy

```
def get_encoded_parameters_from_request(request):
    """
    Returns: parameters (as string), in URI Encoded form of a request (QueryDict).
    E.g. IN: request items, OUT: item1=value1&item2=Hello%20World
    """
    parameters = '&'.join([f"{key}={quote(str(value))}" for key, value in request.items()])
    return parameters

def http_response_redirect_with_parameters(path_name, parameters):
    new_url = reverse(path_name) + '?' + parameters
    return HttpResponseRedirect(new_url)
```

Add both functions below **request_with_valid_search_filter_params**()

```
from urllib.parse import quote
```

Import **quote** (there is also **unquote** in cause you'd need it)

```
...
def indexView(request):

    model_list = ModelName.objects.all()

    # Handle POST request (search form submission)
    if request.method == 'POST':
        R = get_request_with_valid_search_filter_parameters(request)
        params = get_encoded_parameters_from_request(R)
        # Redirect to indexView with search filter parameters in URI
        return http_response_redirect_with_parameters('index', params)
    if request.method == 'POST':
        search = request.POST.get('search_query')
        if search:
            new_url = reverse('index') + "?" + request_search_filter_params(request)
            # return back to the previous render, with updated url
            return HttpResponseRedirect(new_url)
```

Update indexView's - if request.method == 'POST':

WARNING!

Test this search and especially the pagination.

This code might be faulty because I have documented the solution too soon, after couple of improvements.

IF the code is faulty, debug it and improve it. OR,
head to the Section - **Django HTMX - Infinite Scroll**

Contact Us View
(Support)

📝 project_folder/app_name/**forms.py** 🐍 forms.py

```
...
class ContactUsForm(forms.Form):

    TOPIC_CHOICES = [
        ('', ' --- Select a topic --- '),
        ('auth_failure', 'I can\'t access my account'),
        ('auth_failure', 'I can\'t log in with my email address'),
        ('auth_failure', 'I can\'t log in with my username'),
        ('auth_failure', 'I can\'t log in with my TFA code'),
        ('impersonation', 'Someone is impersonating me'),
        ('report_user', 'User violates terms and conditions'),
        ('bug_report', 'A feature on a website is broken'),
        ('other', 'Other')
    ]

    email = forms.EmailField(label='Email', max_length=255)

    subject = forms.ChoiceField(
        label='Subject',
        choices=TOPIC_CHOICES,
        required=True
    )

    message = forms.CharField(
        label='Message',
        widget=forms.Textarea,
        initial=''+
            'Hello, my name is: Forename Surname\n\n'+
            'I would like to report the following issue:',
        max_length=10000,
        min_length=250,
        required=True
    )
```

NOTE the use of: forms.**Form** , instead of , forms.**ModelForm**

ModelForm uses sub-class Meta to link **Model** and it's Fields

There is no need for a model. Hence, the use of a normal **Form**

📝 project_folder/app_name/**views.py** 🐍 views.py

```
...
from django.core.mail import send_mail, EmailMultiAlternatives
from django.conf import settings
from django.utils.html import escape
...
```

```
...


def email_client_and_support_team(email, subject, message):
    # Escape HTML tags to treat them as plain text
    escaped_message = escape(message)

    # Replace newline characters with <br> for the HTML content
    html_message = escaped_message.replace('\n', '<br>')

    recipient_message = (
        '<p style="color: rgb(95,95,95);font-family: &amp;quot;Indeed Sans&amp;quot; , &amp;quot;Noto Sans&amp;quot; , Helvetica , Arial , sans-serif;font-size: 14.0px;font-weight: normal;line-height: 24.0px;margin: 0;padding: 0;direction: ltr;">'
        '<strong>You have sent the following message to our support team:</strong><br><br>'
       f'{html_message}<br><br>'
        '<strong>Our support team will get back to you as soon as possible.</strong><br>'
        '<strong>Feel free to ignore this email if it wasn\'t you.</strong>'
        '</p>'
    )

    # Send HTML email to recipient
    email_to_recipient = EmailMultiAlternatives(
        subject=f"Support Request: {subject}",
        body=recipient_message,
        from_email=settings.EMAIL_HOST_USER,
        to=[email]
    )

    # Send email to recipient
    email_to_recipient.attach_alternative(recipient_message, "text/html")
    email_to_recipient.send()

    # Send email to support team
    send_mail(
        subject=f'Support Request: {subject}',
        message=f'{message}\n\nRequest from (Email): {email}',
        from_email=settings.EMAIL_HOST_USER,
        recipient_list=['support@walentynki.site']
    )
```

Let's **create** **contactFormView** **below** **email_client_and_support_team**

NOTE: **email_client_and_support_team** is our custom function at 🐍 views.py

📝 project_folder/app_name/**views.py** 🐍 views.py

```
...
from .forms import ModelForm, ContactUsForm
...
```

```
...


def contactFormView(request):

    if request.method == 'POST':
        form = ContactUsForm(request.POST)
```

```
        if form.is_valid():
            email = form.cleaned_data['email']
            subject = form.cleaned_data['subject']
            message = form.cleaned_data['message']

            email_client_and_support_team(email, subject, message)

            messages.success(request, 'Message sent successfully!')
            messages.info(request, f'We will contact you shortly at: {email}')

            # Reset some fields to their default values
            initial_data = form.cleaned_data.copy()
            initial_data['subject'] = ContactUsForm.TOPIC_CHOICES[0][0]
            initial_data['message'] = ContactUsForm.base_fields['message'].initial

            form = ContactUsForm(initial=initial_data)
        else:
            messages.error(request, 'Failed to send message!')
```

```
    else:
        form = ContactUsForm()

    return render(request, 'app_name/contact.html', {'form': form})
```

📝 project_folder/app_name/**urls.py** 🐍 urls.py

```
urlpatterns = [
    ...
    path('contact/', views.contactFormView, name='contact'),
]
```

📝 project_folder/**app_name**/templates/app_name/**contact.html** </> contact.html

```
{% extends 'app_name/base.html' %}

{% load static %}
{% load crispy_forms_tags %}
{% block title %}Contact Page{% endblock %}

---

{% block content %}
<form action="{% url 'contact' %}" method="POST">
    {% csrf_token %}
    {{ form|crispy }}
    <button type="submit" class="btn btn-warning">
        <span>Send Message</span>
    </button>
</form>
{% endblock %}
```

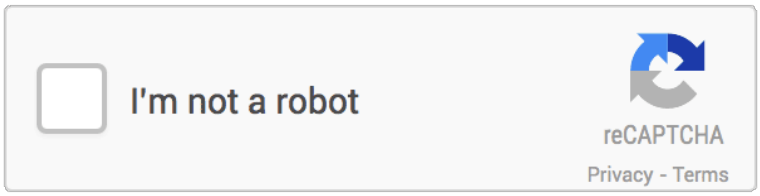
Secure Forms (reCAPTCHA) 🔐

Frequent requests from the server's bot (**noreply**@domain.com) may lead the external host provider, such as **Zoho**, to stop processing these requests.

Consequently, temporarily disable the EMAIL_HOST provider, classify the bot's messages as spam, and ensure that these messages do not land in recipients' inboxes.

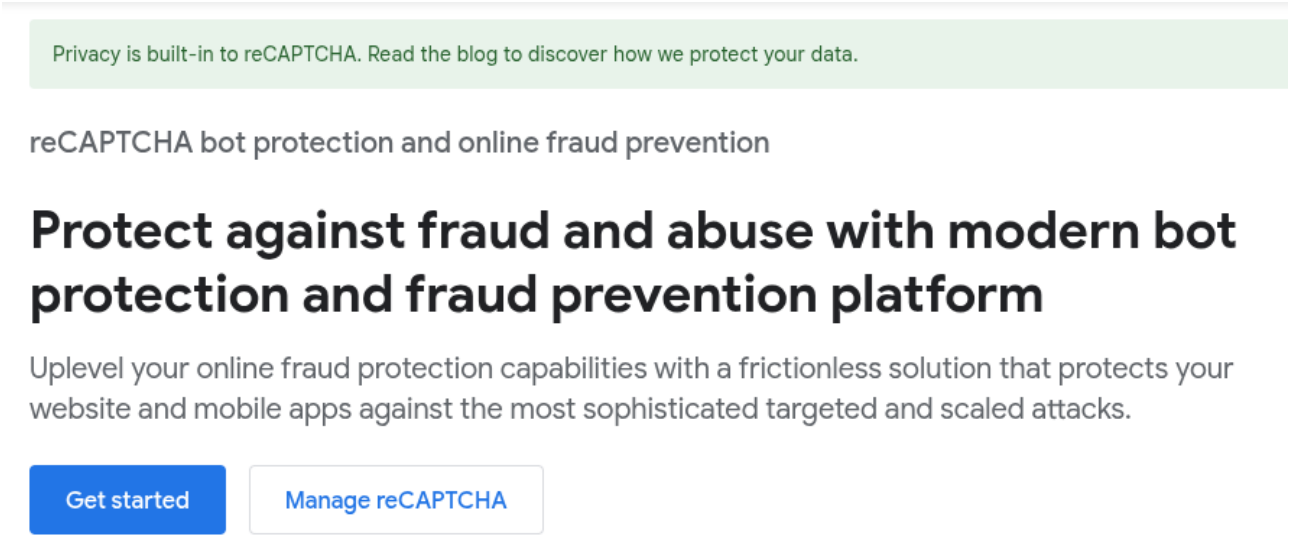
The use of **reCAPTCHA** deters spammers from abusing our **Forms**, significantly minimizing such incidents.

Let's employ it!



Create Google Account, and hit **Get started** at

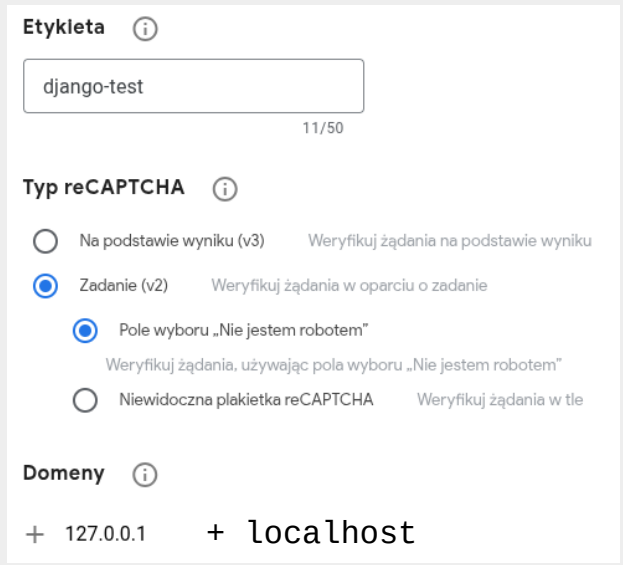
http://google.com/recaptcha/about

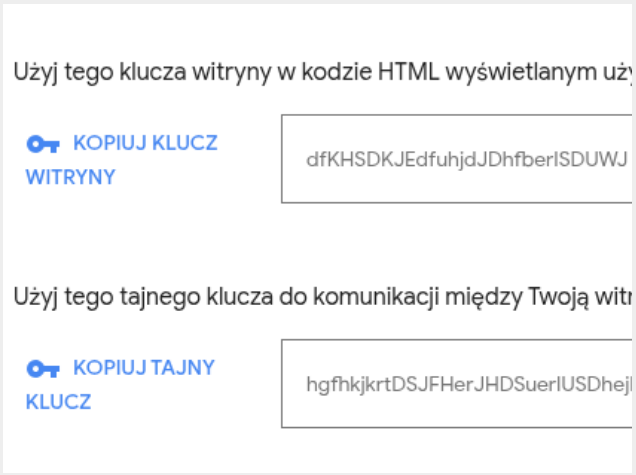


Manage existing reCAPTCHAS at
https://www.google.com/recaptcha/admin

I'm going to use reCAPTCHA v2 checkBox

Copy Public & Private keys





ADD: 127.0.0.1 AND localhost TO Domains

🖥️ (venv) @ project_folder — 📚 pip library

```
pip install django-recaptcha
pip freeze > requirements.txt  # update requirements.txt
```

📝 project_folder/**.env** — .env

```
# Google reCAPTCHA

RECAPTCHA_PUBLIC_KEY='public key here'
RECAPTCHA_PRIVATE_KEY='private key here'
```

📝 project_folder/my_website/**settings.py** — 🐍 settings.py

```
INSTALLED_APPS = [
    ...
    # Add libraries above apps
    'django_recaptcha',
]

...

RECAPTCHA_PUBLIC_KEY = os.getenv('RECAPTCHA_PUBLIC_KEY')
RECAPTCHA_PRIVATE_KEY = os.getenv('RECAPTCHA_PRIVATE_KEY')
```

📝 project_folder/app_name/**forms.py** (EXAMPLE) 🐍 forms.py

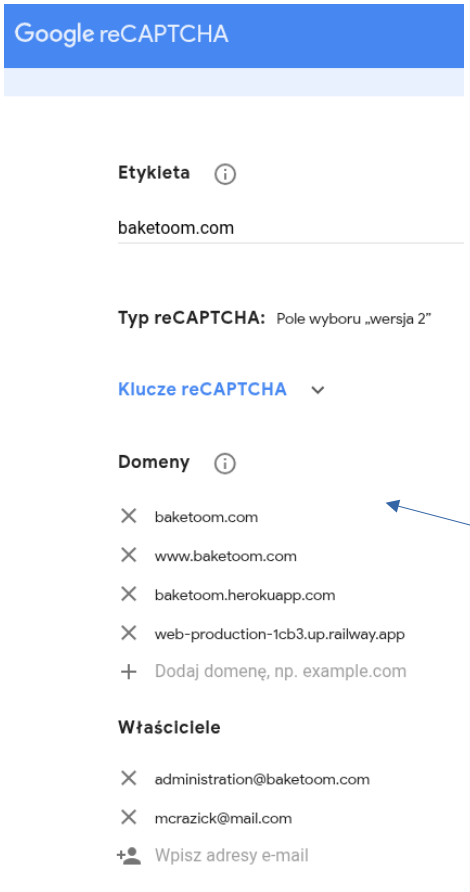
```python
from django import forms
from django_recaptcha.fields import ReCaptchaField

class MyForm(forms.Form):
    captcha = ReCaptchaField()
```

Just include and initialize **captcha** field to protect your **Form**

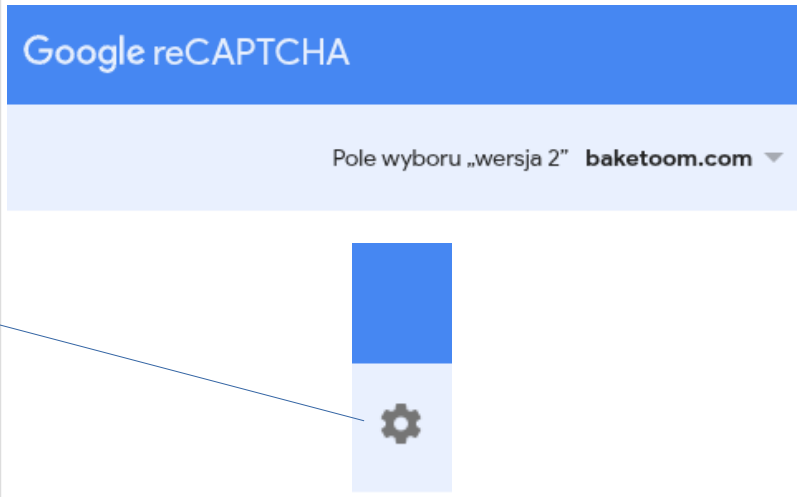
As of Feb/2025, there are 3 types of reCAPTCHA:

- **ReCaptchaV2Checkbox**
- **ReCaptchaV2Invisible**
- **ReCaptchaV3**

```python
from django_recaptcha.widgets import ReCaptchaV2Checkbox

ReCaptchaField(widget=ReCaptchaV2Checkbox) # ← is set by default
```



To ensure that your Django website **fully supports reCAPTCHA** in a **production environment**, it is highly recommended to register any domains that your website operates on.



learn more: [django_recaptcha](), [google docs recaptcha](), [advanced recaptcha docs]()

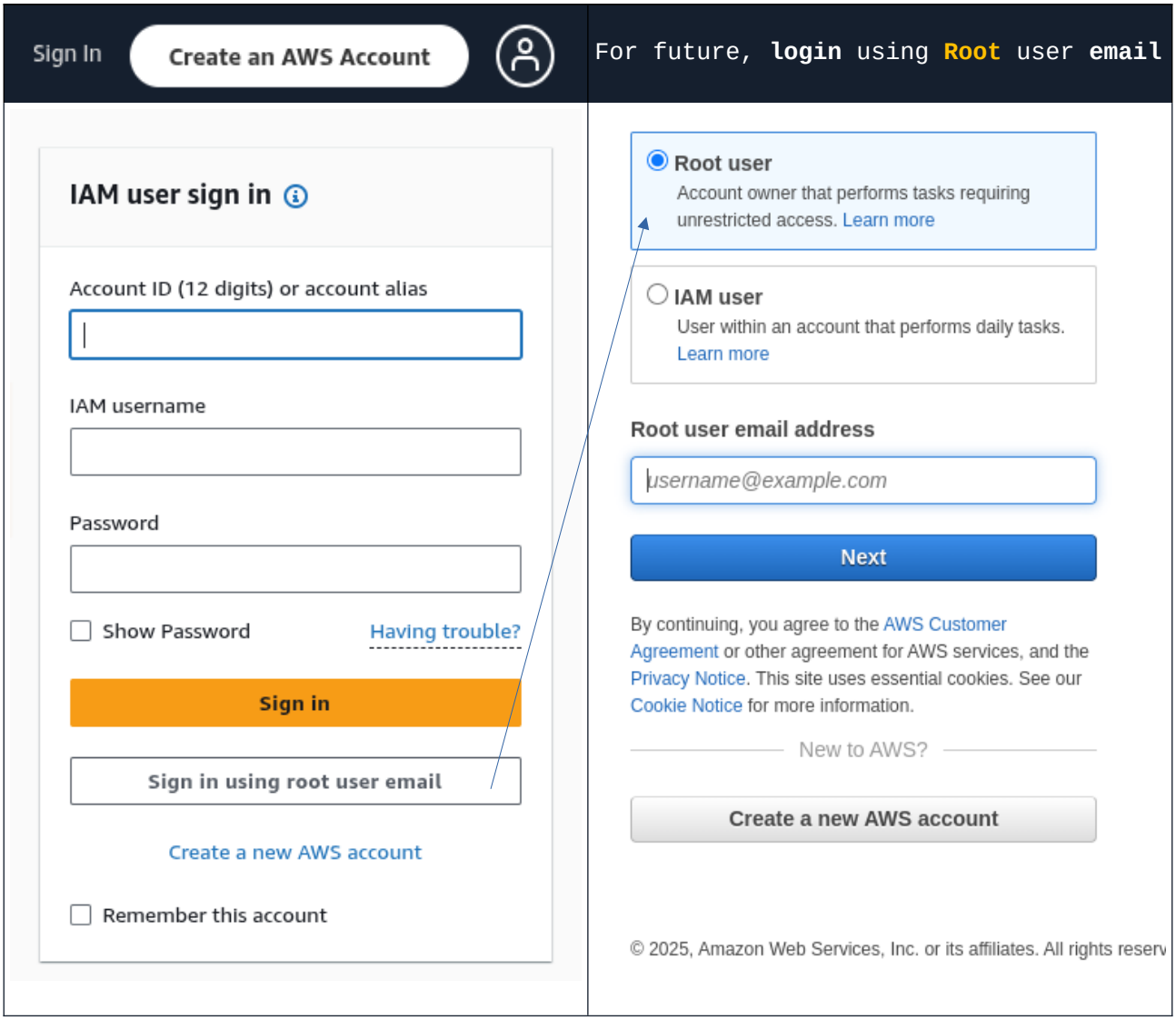
Amazon Web Services (s3 buckets) 🗄️🗂️

Managing user image storage on the server side becomes impractical as platform scales.

As of now, images accumulate in the hosting-service storage under the following directory: 📁 `/media/profile_pics`, restricting the website's growth potential, straining server performance while serving clients, and significantly increasing costs. This is because not all hosting platforms are designed to handle frequent resource updates.

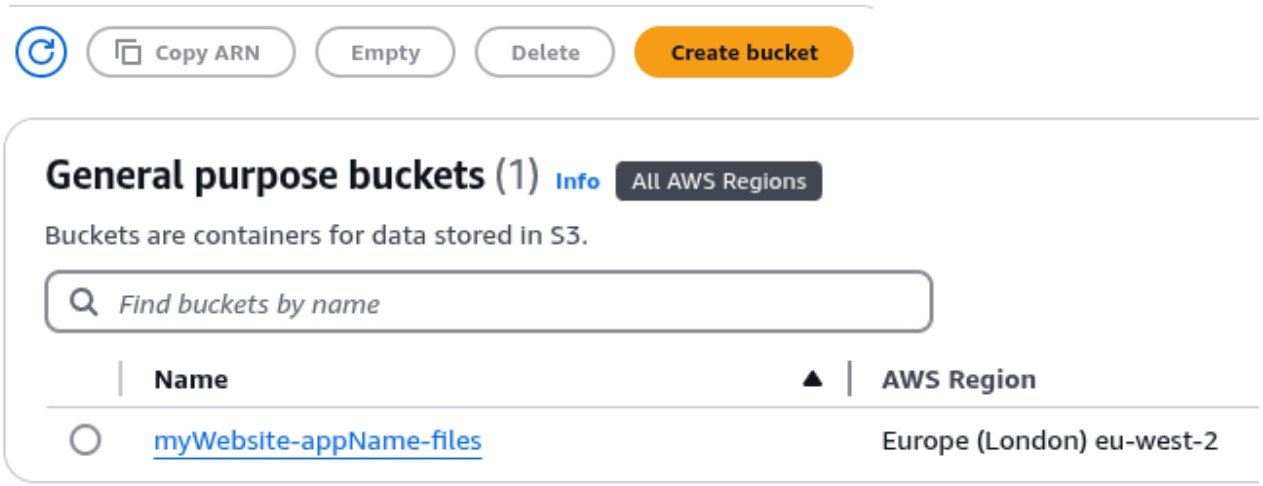
Let's utilize a service specializing in resource management, like AWS S3 buckets, to accommodate our platform's media assets, such as, user's images.

Create Account At - https://aws.amazon.com/s3/



Create General purpose **S3** Bucket at Europe Region: **eu-west-2**

[Official Tutorial]



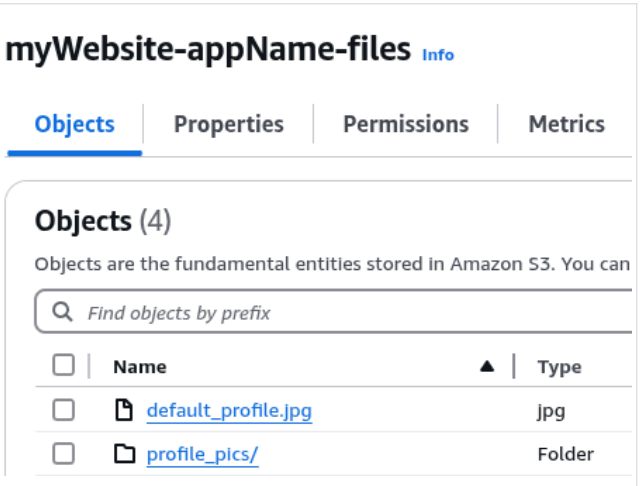
(Note: Bucket name must not contain uppercase characters, this is just example)

Accessing S3 bucket at:
eu-west-2.console.aws.amazon.com/s3

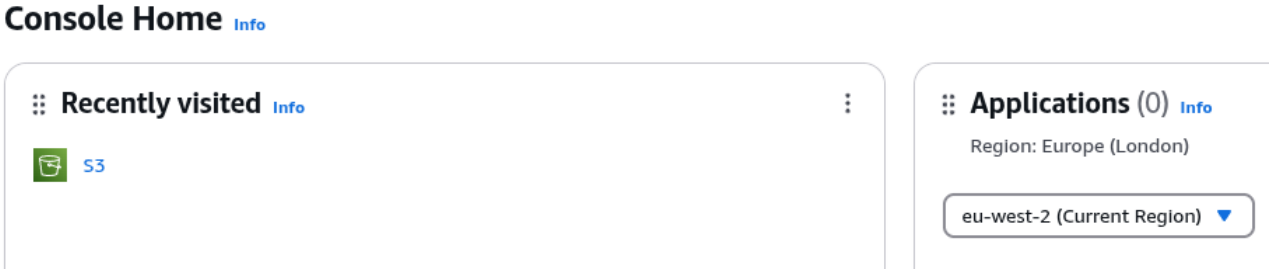
Create 📁 /profile_pics folder

And include your **default** profile picture for newly registered users

NOTE:
📁 /profile_pics
🖼️ default_profile.jpg
at: 📝 project_folder/users/**models.py**

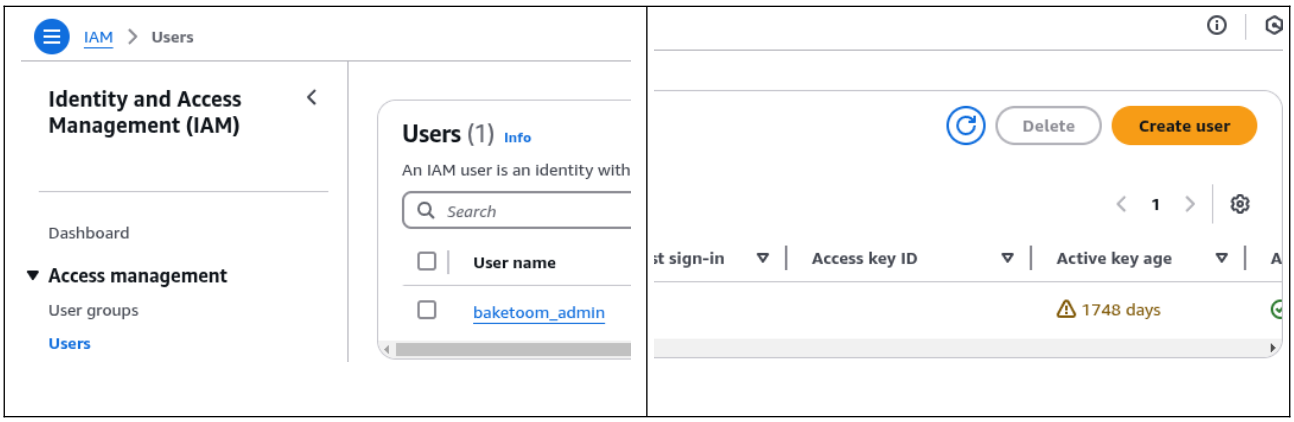


In future, once you login as Root user. You can access S3 bucket's by hitting the green S3 bucket icon, under section: **Recently visited**

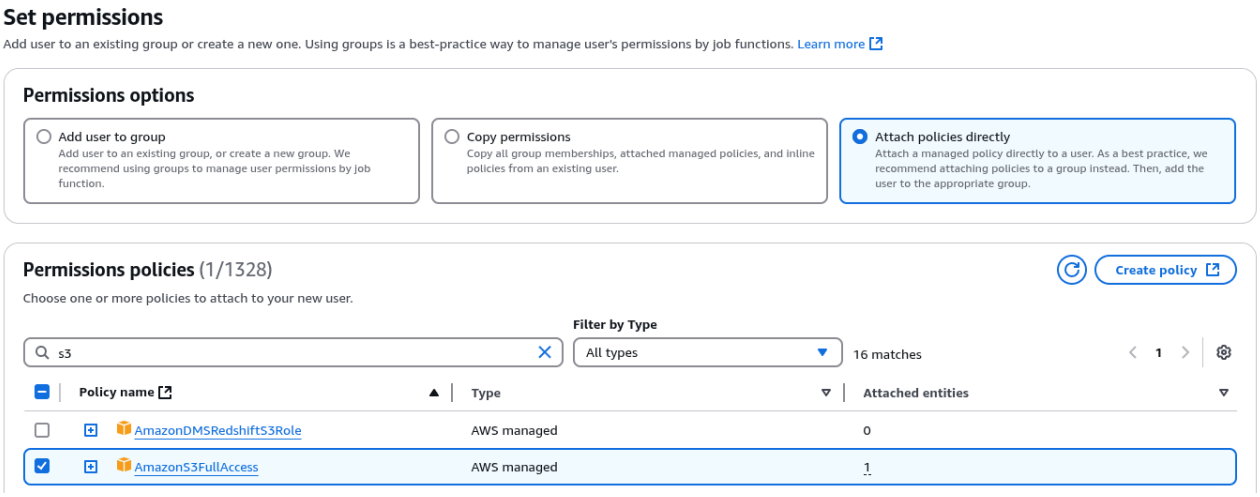


Head to AWS **IAM** (Identity and Access Management): https://us-east-1.console.aws.amazon.com/iamv2

Under **Access management**, head to **Users**, and hit **Create user**



Attach policies: **AmazonS3FullAccess**, to the new user

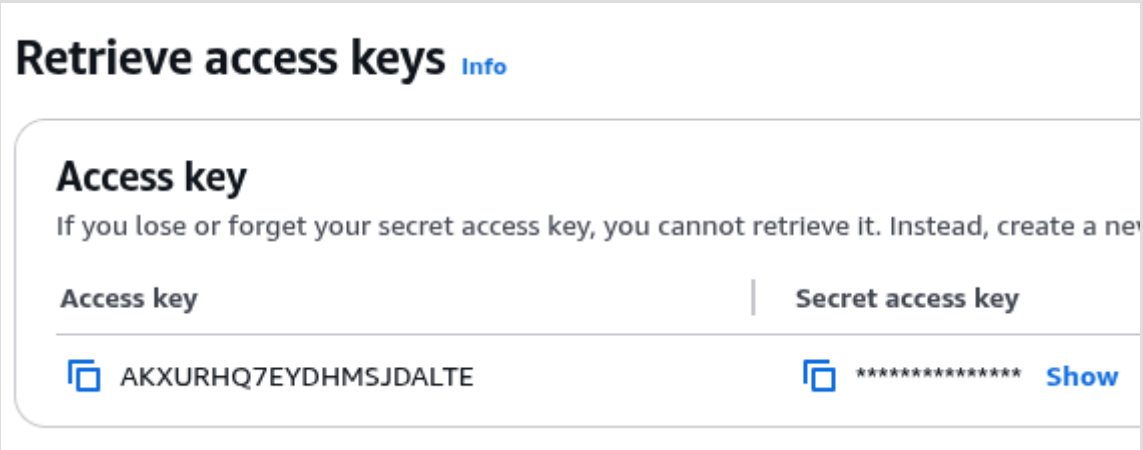


Access the user you've just created, and hit: **Create access key**

Connect to AWS S3 via django-storages

📝 project_folder/**.env** .env

```
...

# Amazon Web Services : s3 bucket for serving media files

AWS_ACCESS_KEY_ID='AKXURHQ7EYDHMSJDALTE'
AWS_SECRET_ACCESS_KEY='YdfudsfhsSJShfje4Jsd328ASDhsjWieuSdr58ap'
AWS_STORAGE_BUCKET_NAME='mywebsite-appname-files'
```



🖥️ (venv) @ project_folder 📚 pip library

```
pip install django-storages boto3
pip freeze > requirements.txt  # update requirements.txt
```

Follow this librarie's documentation: Amazon S3 (django-storages)

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
INSTALLED_APPS = [
    ...
    # Add libraries above apps
    'storages',
]
```

```
# AWS S3 Bucket CONFIG

AWS_ACCESS_KEY_ID = os.getenv('AWS_ACCESS_KEY_ID')
AWS_SECRET_ACCESS_KEY = os.getenv('AWS_SECRET_ACCESS_KEY')
AWS_STORAGE_BUCKET_NAME = os.getenv('AWS_STORAGE_BUCKET_NAME')

AWS_S3_REGION_NAME = 'eu-west-2'
AWS_S3_FILE_OVERWRITE = False
AWS_DEFAULT_ACL = None
DEFAULT_FILE_STORAGE = 'storages.backends.s3boto3.S3Boto3Storage'

                    (...more below on next page)
```

```python
# Include STORAGES dictionary only if you're in Django version >= 4.2

STORAGES = {
    "default": {
        "BACKEND": DEFAULT_FILE_STORAGE,
        "OPTIONS": {
            "access_key": AWS_ACCESS_KEY_ID,
            "secret_key": AWS_SECRET_ACCESS_KEY,
            "bucket_name": AWS_STORAGE_BUCKET_NAME,
        },
    },
    "staticfiles": {
        "BACKEND": "django.contrib.staticfiles.storage.StaticFilesStorage",
        "OPTIONS": {
            "location": STATIC_ROOT,
        },
    },
}
```

🖥️ (venv) @ project_folder

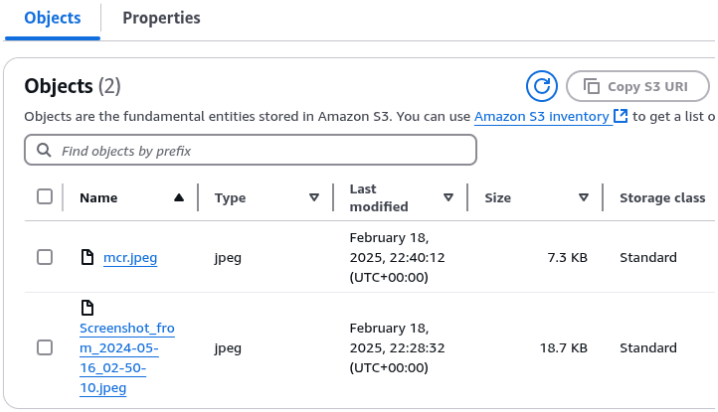
🐍 manage.py (shell)

```
(InteractiveConsole)
>>> import boto3
>>> s3 = boto3.resource('s3')
>>> for bucket in s3.buckets.all():
...     print(bucket.name)
...
baketoom-recipes-files
mywebsite-appname-files
```

```
python manage.py shell

>>> import boto3
>>> s3 = boto3.resource('s3')
>>> for bucket in s3.buckets.all():
...     print(bucket.name)


← Should display buckets from AWS
  IF it does, it means it works
```

Now, create a user and update its profile picture. The newly added image should land in S3 bucket, instead of local 🗂️ `/media` directory.

profile_pics/



Profile + 📁 /recycle_pics
AWS S3 Buckets 🗄️🧰

Users can upload an image to set their profile picture. The issue is that every time a user uploads an image, it gets automatically added with a unique hashed name if there are duplicates.

Consequently, the 📁 /profile_pics directory in our S3 bucket will quickly fill up with images. This design flaw makes it difficult to identify and remove unused images, which can lead to limited storage space and increased expenses for maintaining the bucket.

We could re-design the model to replace the user's profile picture in the S3 bucket with the newly uploaded picture, which would be the most efficient solution. However, I propose a different approach.

We will create a new folder in our S3 bucket called 📁 /recycle_pics. This folder will store users' unused profile pictures once they update their profile picture in the 📁 /profile_pics folder of the S3 bucket.

This setup allows us to monitor the images used. In the future, we could even attach user IDs to these images and make the folder private. This would help us ensure compliance with our terms and services, particularly regarding the uploading of NSFW images. These files could also be used as evidence for law enforcement when requested in reasonable timeframe. Additionally, this approach will be useful if a user wishes to retrieve their past data.

The 📁 /recycle_pics folder can be maintained with different policies and configured to clear the pictures periodically and automatically directly via AWS.

Head to the next page

to learn how to mplement these solutions, and

feel free to integrate one that suits your ogrganization’s needs

📝 project_folder/users/**models.py** (**profile** users) 🐍 models.py

```
from django.conf import settings

from botocore.exceptions import ClientError
import boto3
```

```


s3 = boto3.client(
    's3',
    aws_access_key_id=settings.AWS_ACCESS_KEY_ID,
    aws_secret_access_key=settings.AWS_SECRET_ACCESS_KEY,
    region_name=settings.AWS_S3_REGION_NAME
)
```

```


def is_profile_pic(image_key):
    try:
        s3.head_object(
            Bucket=settings.AWS_STORAGE_BUCKET_NAME,
            Key=f"profile_pics/{image_key.split('/')[-1]}"
        )
        return True

    except ClientError as e:
        if e.response['Error']['Code'] == '404':
            return False
        else:
            raise e
```

Include the above imports and function: **is_profile_pic()**, as they are required for:

The functions: **remove_profile_pic** and **recycle_profile_pic**

```python
def remove_profile_pic(image_key):

    if is_profile_pic(image_key):

        # Delete the old image from the original location
        s3.delete_object(
            Key=f"profile_pics/{image_key.split('/')[-1]}",
            Bucket=settings.AWS_STORAGE_BUCKET_NAME
        )
```

```python
def recycle_profile_pic(image_key):

    if is_profile_pic(image_key):

        profile_pic_key = f"profile_pics/{image_key.split('/')[-1]}"
        recycle_pic_key = f"recycle_pics/{image_key.split('/')[-1]}"

        # Copy the image to the recycle_pics folder
        s3.copy_object(
            Key=recycle_pic_key,
            Bucket=settings.AWS_STORAGE_BUCKET_NAME,
            CopySource={
                'Key': profile_pic_key,
                'Bucket': settings.AWS_STORAGE_BUCKET_NAME
            }
        )
        # Delete the image from the original location
        s3.delete_object(
            Key=profile_pic_key,
            Bucket=settings.AWS_STORAGE_BUCKET_NAME
        )

    else:
        message = f'Image {image_key} not found in bucket: '
        message += f'{settings.AWS_STORAGE_BUCKET_NAME}'
        message += ', skipping copy and delete.'
        print(message)
```

NOTE: Implement one of the above functions

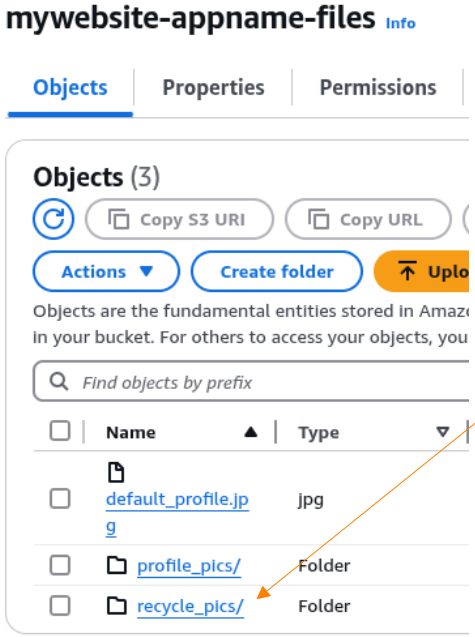
remove_profile_pic OR **recycle_profile_pic**

because you don’t need both

```python
class Profile(models.Model):
    user = models.OneToOneField(User, on_delete=models.CASCADE)
    phone_number = models.CharField(max_length=15)
    image = ResizedImageField(
        size=[300, 300],
        crop=['middle', 'center'],
        quality=75,
        force_format='JPEG',
        upload_to='profile_pics',
        default='default_profile.jpg'
    )
```

```python
    def save(self, *args, **kwargs):
        try:
            this = Profile.objects.get(user=self.user)
            # Only move the old image if there is an existing image
            # and it's different from the new image
            if this.image and this.image.name != self.image.name:
                recycle_profile_pic(this.image.name)
                remove_profile_pic(this.image.name)

        except Profile.DoesNotExist:
            pass # This is a new profile, so no need to move any image

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

Include **recycle_profile_pic()** OR **remove_profile_pic()** only



IF you decided to use **recycle_profile_pic()**

THEN

You have to add new folder at AWS S3 Bucket:

📁 /recycle_pics

Filter **NSFW** (not safe for work) Profile 🖼️ **images** 🍑🍆

🖥️ (venv) @ project_folder — 📚 pip library

```
pip install requests
pip freeze > requirements.txt  # update requirements.txt
```

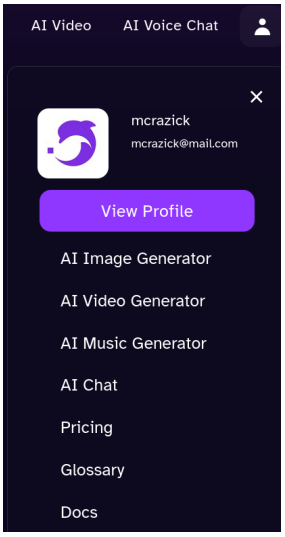
📝 project_folder/my_website/**settings.py** — 🐍 settings.py

Requests is just a pip library, it is not specifically a Django package
Hence, **NO NEED** to install it in the **INSTALLED_APPS**

```
# DeepAI for NSFW image detection

DEEPAI_API_KEY = os.getenv('DEEPAI_API_KEY')
DEEPAI_NSFW_DETECTOR_URL = 'https://api.deepai.org/api/nsfw-detector'
DETECT_NSFW_IMAGES = os.getenv('DETECT_NSFW_IMAGES', 'False').lower() in ['true', '1']
```

📝 project_folder/**.env** — .env

```
# Deepai for NSFW

DETECT_NSFW_IMAGES='True'
DEEPAI_API_KEY='DEEPAI_API_KEY'
```



Head to the deepai.org, create an account → View Profile

I will continue with a free plan account

Scroll Down to API Keys, and copy your API into

DEEPAI_API_KEY at .env file

NOTE: Free Plan has limited number of API requests per month
Reconsider upgrading plan in future, like to: Pay as you Go

📝 project_folder/users/**utils.py** (**profile** users) 🐍 utils.py

```python
import requests
from django.core.files.uploadedfile import UploadedFile
from django.conf import settings

---

def is_image_nsfw(image_file: UploadedFile):

    # Push image to DeepAI API, to get NSFW score ( deepai.org/docs#Python )
    response = requests.post(
        url=settings.DEEPAI_NSFW_DETECTOR_URL,
        files={'image': image_file.open('rb')},
        headers={'api-key': settings.DEEPAI_API_KEY}
    )

    result = response.json()

    # Check for status and handle errors
    if result.get('status') != 'success':
        message = "API request failed with status:"
        message += f" {result.get('status')} -"
        message += f" {result.get('error', 'No error message provided')}"
        raise ValueError(message)

    nsfw_score = result.get('output', {}).get('nsfw_score')
    if nsfw_score is None:
        raise ValueError("Unexpected response format: 'output' or 'nsfw_score' key missing.")

    # Adjust the threshold as needed (0.5 = 50%)
    return nsfw_score > 0.5
```

📝 project_folder/users/**signals.py** (**profile** users) 🐍 signals.py

```python
from django.db.models.signals import pre_save
from django.dispatch import receiver
from .models import Profile
from .utils import is_image_nsfw

---

@receiver(pre_save, sender=Profile)
def check_nsfw_image(sender, instance, **kwargs):

    if instance.image:
        if is_image_nsfw(instance.image):
            raise ValueError('NSFW images are not allowed.')
```

📝 project_folder/users/**apps.py** (**profile** users) 🐍 apps.py

```python
from django.apps import AppConfig
from django.conf import settings


class UsersConfig(AppConfig):
    default_auto_field = 'django.db.models.BigAutoField'
    name = 'users'

    def ready(self):
        if settings.DETECT_NSFW_IMAGES:
            from users.signals import check_nsfw_images
```

Register your signals at apps.py of your app

Signals

In Django, signals are a way to allow certain events to notify other parts of your application when certain actions have occurred. They help in decoupling your application by allowing different components to communicate with each other without direct dependencies. Common signals include actions like model instance saving, deleting, or creating, where you can attach custom behavior to these events.

Utils (Utilities)

Django provides various utilities to assist with common tasks, making development more efficient. These utilities are helper functions or modules that simplify operations such as text processing, timezone handling, cryptographic operations, and more. They enhance readability and maintainability of your code by abstracting complex or repetitive tasks into reusable functions.

NOTE - We've created our own, cutsom:

signal: check_for_nsfw_image(), and **util**: is_image_nsfw() function

---

And custom setting options, to manage our NSFW functionality:

DEEPAI_API_KEY
DEEPAI_NSFW_DETECTOR_URL
DETECT_NSFW_IMAGES

Class-based views:

list, form, detail,
create, update and delete

Class-based views (CBVs) in Django provide a more structured and object-oriented approach to handling HTTP requests compared to function-based views. They offer a way to encapsulate and reuse view logic by defining views as classes. Here's an overview of CBVs:

Types of Class-Based Views

- **Base Views**: The simplest form, used as a foundation for more complex views. Example: **View**, **TemplateView**. (@ django/views/generic/base.py)

- **Generic Views**: Pre-built views that provide common functionality. Example:

1. **ListView:** Displays a list of objects.
2. **DetailView:** Displays a single object.
3. **CreateView:** Handles the creation of a new object.
4. **UpdateView:** Handles updating an existing object.
5. **DeleteView:** Handles the deletion of an object.

Advantages of CBVs

- **Code Reuse**: By using inheritance, common functionality can be shared across multiple views.
- **Organization**: Encapsulating logic within a class provides a clean and organized structure.
- **Extensibility**: Easily extend and customize functionality by overriding class methods.

Key Components of CBVs

- **Mixin Classes**: Reusable classes that provide specific functionality and can be combined to create complex behavior.
- **HTTP Methods**: Class-based views have methods for handling different HTTP requests (GET, POST, etc.).
- **Attributes and Methods**: Use attributes (like **template_name**, **model**) and methods (like **get_context_data**, **form_valid**) to customize view behavior.

Example - Import class-based-views

class-based views are under **django.contrib.auth.views** module:

📝 project_folder/app_name/**views.py** 🐍 views.py

```
from django.views.generic import (
    ListView,
    UpdateView,
    DetailView,
    ...
)
```

📝 project_folder/app_name/**urls.py** 🐍 urls.py

```
path('pathname/', MyClassBasedView.as_view(), name='path-name')
```

NOTE:

MyClassBasedView is a **class**. Hence, use **as_view**() to convert it to a supported format.

We've used some build-in views before, with some mixins, when creating user
Register and Login new Users at Page 19

I decided to introduce class-based views at this stage so that we can understand the usecase of functional-views and to experience the struggles of its inclusion, all in order to appreciate the class-based views.

They can become complicated when we decide to overwrite their behaviour without understanding their inherited classes. Hence, I advice to study Django's codebase of class-based views at: https://github.com/django/django/tree/main/django/views/generic

Example - UpdateView

This means, we don't have to constantly write, for example:

```
def updateUserView(request, user_id):
    user_instance = get_object_or_404(User, pk=user_id)

    if request.method == 'POST':
        form = MyForm(request.POST, instance=user_instance)
        if form.is_valid():
            form.save()
            message.success(request, 'Updated profile')
            redirect('index')
        else:
            message.error(request, 'Failed to update profile')
    else:
        form = MyForm(instance=user_instance)

    context = {'form': form}
    return render(request, 'template.html', context)
```

Instead, we can do:

```
from django.urls import reverse_lazy


class UpdateUserView(UpdateView):
    model = User
    form_class = MyForm
    template_name = 'template.html'
    success_url = reverse_lazy('index')
    # error_url = reverse_lazy('index')
    context_object_name = 'context'

    def get_object(self, queryset=None):
        return get_object_or_404(User, pk=self.kwargs['user_id'])

    def form_valid(self, form):
        messages.success(self.request, 'Updated profile')
        return super().form_valid(form)

    def form_invalid(self, form):
        messages.error(self.request, 'Failed to update profile')
        return super().form_invalid(form)
```

Notice how a class-based view is comprehensive and semantic. (Eliminates boiler-plate)

(**NOTE**: class in django is in **PascalCase**)

(**NOTE**: kwargs, stands for - keyword arguments)

{‘**form**’: form} is created and passed automatically.
Use: **get_context_data**, to update context data:

```
...

    def get_context_data(self, **kwargs):
        context = super().get_context_data(**kwargs)

        context['custom_message'] = 'custom data for template.html'
        context['extra_info'] = 'another custom data for template.html'

---------------------------------------------------------------------

        # IF URI = localhost:port/?param1=Hello&param2=World

        # Extract query parameters from the URL
        param1 = self.request.GET.get('param1') # ← Hello
        param2 = self.request.GET.get('param2') # ← World

---------------------------------------------------------------------

        return context
```

super() : A Python feature used to call inherited methods from its parent class

Example - ListView

```
from django.views.generic import ListView
from django.urls import reverse_lazy
from .models import ModelName
from .forms import FormName
```

```
class ModelNameListView(ListView):
    model = ModelName
    template_name = 'template.html'
    context_object_name = 'context'
    # paginate_by = 10

    def get_queryset(self):
        queryset = super().get_queryset()
        form = FormName(self.request.GET or None)

        if form.is_valid():
            # Get <input name="my_input"> values from template's form
            search_query = form.cleaned_data.get('search_query')
            country_code = form.cleaned_data.get('country_code')
            creator_id = form.cleaned_data.get('creator_id')
            creator = form.cleaned_data.get('creator')

            if search_query:
                queryset = queryset.filter(title__icontains=search_query)
            if country_code:
                queryset = queryset.filter(country=country_code)
            if creator_id:
                queryset = queryset.filter(creator=creator_id)
            if creator:
                queryset = queryset.filter(creator__username__icontains=creator)

        return queryset
```

```
    def get_context_data(self, **kwargs):
        context = super().get_context_data(**kwargs)
        context['form'] = FormName(self.request.GET or None)
        return context
```

Django & HTMX

🖥️ (venv) @ project_folder 📚 pip library

```
pip install django-htmx
pip freeze > requirements.txt  # update requirements.txt
```

</> htmx

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
INSTALLED_APPS = [
    # Add libraries above apps
    'django_htmx',
]
```

```
MIDDLEWARE = [
    'django.middleware.common.CommonMiddleware',
    'django_htmx.middleware.HtmxMiddleware',
    'django.middleware.csrf.CsrfViewMiddleware',
]
```

🖥️ (venv) @ project_folder/app_name/**static**/app_name/**js** (**app_name** static/js)

```
wget https://unpkg.com/htmx.org@latest/dist/htmx.min.js
```

This Linux command will **download** the **HTMX** to current terminal location

OR download manually from https://unpkg.com/browse/htmx.org@latest/dist/
argument @latest is not always the most recent available version.

📝 project_folder/**app_name**/templates/app_name/**base.html** </> base.html

```
{% load django_bootstrap5 %}
{% load static %}
<!DOCTYPE html>
   <html lang="en">
   <head>
       <meta charset="UTF-8">
       <meta name="viewport" content="width=device-width, initial-scale=1.0">
       <title>{% block title %}{% endblock %}</title>
       {% bootstrap_css %}
       <script src="{% static 'app_name/js/lib/htmx.min.js' %}" defer></script>
       {% block head %}{% endblock %}
   </head>
<body>
```

Official HTMX Documentation: https://htmx.org/docs/

Please read the documentation of HTMX, I will show basic options only:

hx-post & hx-get	form's attribute: action="" with method=""
hx-trigger	submit, click, keyup, keydown, load, change, focus, blur, resize, revealed, mouseenter, mouseleave, **delay** (optional) → click delay:1s (or delay:500ms)
hx-targer	document.querySelector → #id, .class [attribute="value"] … Server response is send directly to the target
hx-swap	beforebegin, beforeend, afterbegin, afterend, innerHTML, outerHTML Server response replaces the target's content
hx-swap-oob (out of band)	Server side only feature. Has same keywords as hx-swap. (The use case of `hx-swap-oob` is demonstrated in the **chat** app) The `hx-swap-oob` attribute replaces the content of any target with the same ID as the HTML element. The target element must have an ID for the `hx-swap-oob` operation to work.

Example

```
<div id="target"></div>

<input type="button" ...
    hx-post="/url-path"
    hx-trigger="click delay:1s"
    hx-target="#target"
    hx-swap="innerHTML">
```

Avoid adding multiple <elements> with **hx** attribute inside the <form> because the responses may repeat unnecessarlly! Also, use delay as it minimizes spam responses (throttling), improving server's performance. Do this instead:

```
<form
    hx-post="/url-path"
    hx-trigger="keyup delay:500ms"
    hx-target="#target"
    hx-swap="innerHTML">
    <input type="text" name="forename">
    <input type="text" name="surname">
</form>
```

Response is made to the server for each input updation.

Infinite Scroll - **Update** index.html AND **Extension** models_list.html

(Continuation of - **Search** for users' **models** 🔎)

📝 project_folder/**app_name**/templates/app_name/**index.html** </> index.html

```
<form action="{% url 'index' %}" enctype="multipart/form-data" method="POST"
   hx-post="{% url 'index' %}"
   hx-target="#models"
   hx-trigger="keyup delay:500ms"
   hx-swap="innerHTML"
   hx-include="[name='search_query'], [name='creator_value'], [name='country_code_value']"
>
  . . .
```

```
</form>

<hr class="pt-3">

{% if models %}
   <ul id="models" class="list-group pb-3">
      {% include 'app_name/extensions/models_list.html' %}
   </ul>
{% endif %}
```

NOTE: <form> dosen't need - **action**, nor **method** with HTMX

We will include them anyways, to show additional functionality: parse request with URL parameters on <button type="submit">

Update <form> with action to indexView, and include **models_list.html** below it

NOTE: **models_list.html** is defined at the next page
NOTE: app_name/extensions/models_list.html (optional path)

```
<a href="{% url 'form' %}" class="float-start">add model</a>
<a href="{% if request.user.is_authenticated %}{% url 'profile' request.user.id %}{% else %}{% url
'login' %}{% endif %}" class="float-end">
   <button type="submit" class="btn btn-primary ms-3">profile</button>
</a>
<form action="{% url 'logout' %}" method="POST" class="float-end">
   {% csrf_token %}
   <button type="submit" class="btn btn-warning">logout</button>
</form>

<form action="{% url 'index' %}" enctype="multipart/form-data" method="POST"  . . .
```

It's better to hoist the other optoins, since we gonna scroll infinitelly

📝 project_folder/**app_name**/templates/app_name/**extensions/models_list.html** </>

```
{% if models %}
  {% for model in models %}
    <li class="list-group-item">
      <h2>{{ model.title }}</h2>
      <p>{{ model.country }}</p>
      <small class="text-muted">{{ model.created_at }}</small>
      <section class="d-flex justify-content-between" aria-label="model-options">
        <a href="{% url 'edit_model' model.id %}">
          <button class="btn btn-secondary" aria-label="edit-model">Edit</button>
        </a>
        <a href="{% url 'delete_model' model.id %}">
          <button class="btn btn-danger" aria-label="delete-model">Delete</button>
        </a>
      </section>
    </li>
  {% endfor %}
{% endif %}
```

```
{% if models %}
  <div class="loader mx-auto my-5"
    hx-trigger="revealed"
    hx-swap="outerHTML"
    hx-get="{% url 'index' %}?page={{ next_page_number }}{% if search_filter_params %}&{{
search_filter_params }}{% endif %}">
  </div>
{% else %}
  <p class="text-center mx-auto my-5">No more models to load</p>
{% endif %}
```

📝 project_folder/**app_name**/static/app_name/css/extensions/**model_list.css**

```
#models li {
  animation: linear 0.5s fadeIn;
}

@keyframes fadeIn {
  0% {
    opacity: 0;
  }
  100% {
    opacity: 100;
  }
}
```

Fade-In animation when **models** are included in **indexView**

```
                Custom Loader / Spinning Circle  .spinner-border in bootstrap5
.loader {
    width: 48px;
    height: 48px;
    border-radius: 50%;
    position: relative;
    animation: rotate 1s linear infinite;
}

.loader:before {
    content: "";
    box-sizing: border-box;
    position: absolute;
    inset: 0px;
    border-radius: 50%;
    border: 5px solid gray;
    animation: prixClipFix 2s linear infinite;
}

@keyframes rotate {
    100% {
        transform: rotate(360deg);
    }
}

@keyframes prixClipFix {
    0% {
        clip-path: polygon(50% 50%, 0 0, 0 0, 0 0, 0 0, 0 0);
    }
    25% {
        clip-path: polygon(50% 50%, 0 0, 100% 0, 100% 0, 100% 0, 100% 0);
    }
    50% {
        clip-path: polygon(50% 50%, 0 0, 100% 0, 100% 100%, 100% 100%, 100% 100%);
    }
    75% {
        clip-path: polygon(50% 50%, 0 0, 100% 0, 100% 100%, 0 100%, 0 100%);
    }
    100% {
        clip-path: polygon(50% 50%, 0 0, 100% 0, 100% 100%, 0 100%, 0 0);
    }
}
```

📝 project_folder/**app_name**/templates/app_name/**index.html** </> index.html

```
{% block head %}
    <link rel="stylesheet" href="{% static 'app_name/css/extensions/model_list.css' %}">
{% endblock %}
```

Infinite Scroll - Update indexView

📝 project_folder/app_name/**views.py** 🐍 views.py

Update **indexView**. You may even scrap it and replace it with the following code

```python
def indexView(request):

    model_list = ModelName.objects.all()

    context = {}
    R = request.GET

    # Handle POST request (search form submission)
    if request.method == 'POST':
        R = get_request_with_valid_search_filter_parameters(request)
        params = get_encoded_parameters_from_request(R)
        request.session['search_filter_params'] = params
        # Redirect to indexView with search filter parameters in URI
        return http_response_redirect_with_parameters('index', params)

    # Retrieve search parameters from session
    if 'search_filter_params' in request.session:
        context['search_filter_params'] = request.session['search_filter_params']
```

NOTE: **context** and **R.** Hoisting them, allows us to apply changes at any time

NOTE: indexView() is called, when POST or GET request is sent via template

---

Therefore, **R** will be overwritten at - if request.method == 'POST'. However,
updated **R** has no effect on the rest of the codebase due to a **return** keyword

We can remove the return http_response_redirect_with_parameters() and the code will still work, however, the client will no longer be able to parse the whole website with the new request containing search filter query parameters. (localhost:port/**?param1**=Hello%20World**&param2**=Hi)

NOTE: request.session['search_filter_params']. Think of it as a cookie, it saves value locally on a client

---

This value, can be accessed at later point, such as when we call **indexView**() again.
Hence, if 'search_filter_params' in request.session: .

search_filter_params is set in **context**, so that it can be sent to the **models_list.html** - hx-get request

Django automatically initializes an expiry event for sessions.
Session is removed upon browser's termination. (For example; when client closes the browser)

```
# Get all models ordered by title
model_list = ModelName.objects.all().order_by('title')

# Filter search_models based on request parameters
search_models = model_list
```

```
for key, value in R.items():
    if not value:
        continue
    if key == 'search':
        search_models = search_models.filter(title__icontains=value)
    elif key == 'country_code':
        search_models = search_models.filter(country=value)
    elif key == 'creator_id':
        search_models = search_models.filter(creator=value)
    elif key == 'creator':
        search_models = search_models.filter(creator__username__icontains=value)
```

```
# Get other_models (irrelevant to search)
search_models_ids = search_models.values_list('id', flat=True)
other_models = model_list.exclude(id__in=search_models_ids)
```

Update `filtered` **model** `to` **search_models**

Models that are NOT relevant to the search, will be stored in **other_models**
we will render them, after all **search_models** in **models_list.html** template extension

```
paginator = Paginator(model_list, 5) # Show 5 models per page
page_number = request.GET.get('page', 1) # Get 'page' from request's query:

try:
    models = paginator.page(page_number)
except PageNotAnInteger:
    # If page is not an integer, deliver the first page
    models = paginator.page(1)
except EmptyPage:
    # If page is out of range (e.g., 9999), delive
    models = paginator.page(paginator.num_pages)
```

Remove `old model paginator`

```
# Paginate 'search_models' and 'other_models'
paginator_search = Paginator(search_models, 5)
paginator_other = Paginator(other_models, 5)
```

```
# Get page number from request
try:
    page_number = int(request.GET.get('page', 1))
except ValueError:
    page_number = 1
```

`Paginate - search_models, and other_models`

`NOTE: page_number - localhost:port/?page=N - page_number = N`

---

hx-get in **div.loader**, at **models_list.html** template extension, will request 5 models from **indexView**()

```
# Start of - Determine which paginator to use ----------------------------------------

if page_number <= paginator_search.num_pages:
    # Get relevant to search results. (models = search_models)
    models = paginator_search.get_page(page_number)
    models_type = 'search_relevant'

elif page_number <= paginator_search.num_pages + paginator_other.num_pages:
    # Get irrelevant to search results. (models = other_models)
    page_number_other = page_number - paginator_search.num_pages
    models = paginator_other.get_page(page_number_other)
    models_type = 'search_irrelevant'

else:
    models = False
    models_type = False
    next_page_number = False

# END of - Determine which paginator to use ----------------------------------------
```

`Prepare models for template's context data.`

`NOTE: IF page_number exeeds total page count of paginated search_models, THEN other_models will be served until their page count is also exeeded.`

```
    # Update context
    context.update({
        'models': models,
        'models_type': models_type,
        'next_page_number': page_number + 1,
    })

    # Render the appropriate template
    template = 'app_name/extensions/models_list.html' if request.htmx else
'app_name/index.html'

    return render(request, 'app_name/index.html', {'models': models})
    return render(request, template, context)
```

```
NOTE: page_number is incremented, and served as next_page_number
```

```
NOTE: models_list.html extension, makes a HTMX response using context data:
localhost:port/?page={{ next_page_number }}&{{ search_filter_params }}
```

```
NOTE: IF request has been made by the HTMX,
THEN models_list.html extension template, is returned back to the client.
```

Great Job!

That was a lot, though minor improvement is needed. Let’s show the client their search result relevancy.

Infinite Scroll - Models relevency message

📝 project_folder/app_name/**views.py** 🐍 views.py

```
def indexView(request):
...

    elif page_number <= paginator_search.num_pages + paginator_other.num_pages:
        # Get irrelevant to search results. (models = other_models)
        page_number_other = page_number - paginator_search.num_pages
        models = paginator_other.get_page(page_number_other)
        models_type = 'search_irrelevant'

        # One time message - End of relevant search results
        if page_number == paginator_search.num_pages + 1:
            context.update({'start_other_models_message': True})

    else:
        models = False
        models_type = False
...
```

Add following statement for a one time message, at **indexView**()

📝 project_folder/**app_name**/templates/app_name/**extensions/models_list.html** </>

```
{% if models and start_other_models_message %}
    <p class="text-center bg-dark my-4 mx-auto w-100 p-3 fs-4 text-white">
        Irrelevant models will start to appear
    </p>
{% endif %}

...
```

Add the following statement **at the top** of the modesl_list.html extension

Chat Rooms 💬💥📝💭

made with: HTMX + Dafne ASGI WebSockets

This is the most complicated part of the documentation. It's best to proceed with 3 months of active Django development experience. Additionally, this section is based of a following

YouTube tutorial - Chat App with Django Channels by Andreas Jud
(Accessed: 10 March 2025)

Please watch the tutorial before commiting to this chat-app development.

Terminology

Client	In this context, a browser prompting **requests** to the server
Request	Method: POST, GET, UPDATE, DELETE, **HTMX**, **WS** etc… made by the **client**, which then is sent to the **server**
Response	Content-Type: text / html / json / xml / csv / application etc… made by the **server**, which then serves it to the **client**
WebSocket	Communication protocol. Provides consistent **connection** between **client** & **server**
Web Server Gateway Interface (WSGI)	Handles **requests** and **responses**, **synchronously**. (like **procedurally**, where a task must finish before another can start) Is configured by default @ settings.py
Asynchronous Server Gateway Interface (ASGI)	Handles **requests** and **responses**, **synchronously** & **asynchronously**. (like **concurrently**, where tasks are being proccessed idependently) And is requried for processing **WebSocket** connections. Can be configured as default @ settings.py Like WSGI, it relies on a: **request response cycle** Additionally includes a: **handshake**, (hashed keys) to establish a secure connection between **client** & **server**

<table>
<tr><td>Channel</td><td>Django extension for handling real-time functionality & protocols like WebSockets</td></tr>
<tr><td>Channel Layers</td><td>Enables communication between different parts of an app & Handles, asynchronous tasks and real-time features for: consumers

- Has to be configured @ settings.py
- Can broadcard message to multiple consumers

For production-based applications,
initialize Channel Layers with in-memory data structure, like:
<table><tr><th>Redis</th><th>Valkey</th></tr><tr><td>Redis is a multi-purpose tool: a cache, a database (RAM storage with RDB snapshots), and a message broker (publish/subscribe).

Once open-source, it was later acquired, and license changes diminished user trust in it.</td><td>A Redis version predating the policy changes.

Many Redis open-source developers shifted to Valkey, ensuring a trustworthy, open-source alternative.

Numerous companies impacted by Redis policies now financially back Valkey.</td></tr></table></td></tr>
<tr><td>Consumer</td><td>Similar to a Django View, but it supports asynchronous communication and real-time events.</td></tr>
<tr><td>Routing</td><td>Django Channels - routing.py, is like urls.py, where we can define paths(), in this context for ASGI protocols. We will use this file to define WebSocket routs/paths only.

urls.py defines URL routing only for HTTP requests</td></tr>
<tr><td>Out of Band

(OOB)

Ignore this note</td><td>Security testing technique that focuses on identifying and detecting security vulnerabilities through external interactions, such as; blind routing code executions

HTMX includes OOB, for example: hx-swap-oob
However, it is just a naming convension.

In this context, it focuses on updating parts of the DOM that are not the direct target of the request.</td></tr>
</table>

Create **Chat** App 💬📝

🖥️ (venv) @ project_folder — 🐍 manage.py

```
python manage.py startapp chat
```

Register Chat **App** and it's **Urls** to Django Website

📝 project_folder/my_website/**settings.py** — 🐍 settings.py

```
INSTALLED_APPS = [
    'django.contrib.admin',
    ...

    # Add libraries above apps
    'crispy_forms',
    'crispy_bootstrap5',
    ...

    # Add apps below
    'app_name.apps.AppNameConfig',
    'chat.apps.ChatConfig',
]
```

app_name > apps.py

```
from django.apps import AppConfig


Codeium: Refactor | Explain
class AppNameConfig(AppConfig):
    default_auto_field = 'django.db.models.BigAutoField'
    name = 'app_name'
```

📝 project_folder/my_website/**urls.py** — 🐍 urls.py

```
urlpatterns = [
    ...
    path('', include('app_name.urls')),

    # imports URLs from my_website/users/urls.py
    path('chat/', include('chat.urls')),
]
```

📝 project_folder/chat/**urls.py** — 🐍 urls.py

```
from django.urls import path
from . import views

urlpatterns = [
    path('', views.roomView, name='room'),
]
```

📝 project_folder/chat/**models.py** (**Room** & **Message**) 🐍 models.py

```python
from django.db import models

class Room(models.Model):
    name = models.CharField(max_length=128, unique=True)

    def __str__(self):
        return self.name

class Message(models.Model):
    room = models.ForeignKey(
        Room,
        related_name='messages',
        on_delete=models.CASCADE
    )
    author = models.ForeignKey('auth.User', on_delete=models.CASCADE)
    message = models.CharField(max_length=1000)
    created_at = models.DateTimeField(auto_now_add=True)

    class Meta:
        ordering = ['-created_at']

    def __str__(self):
        return f'{self.author.username}: {self.message}'
```

NOTE: **User** = 'auth.User', and
does NOT require: django.contrib.auth.models import **User**

NOTE: class Meta - **ordering** includes: "-", this will make a DESCENDING order

related_name in **Message** models.ForeignKey(…)
allows you to access all **Message** instances of related **Room** instances

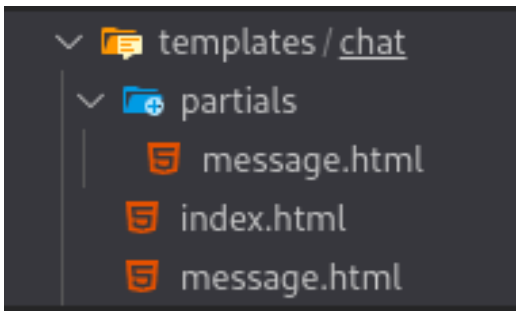
room = get_object_or_404(...)
room.messages → All instance_**message** of instance_**room**

📝 project_folder/chat/**admin.py** (Register **Room** & **Message**) 🐍 admin.py

```
from django.contrib import admin
from .models import Room, Message

# Register your models here.
admin.site.register(Room)
admin.site.register(Message)
```

📝 project_folder/chat/**forms.py** (Chat index.html <input>) 🐍 forms.py

```
from .models import Message
from django import forms

class MessageForm(forms.ModelForm):
    class Meta:
        model = Message
        fields = ['message']
```



CREATE:

templates/chat/partials/**message**.html

templates/chat/**message**.html

templates/chat/**index**.html

📝 project_folder/chat/**views.py** 🐍 views.py

```python
from django.shortcuts import render, redirect, get_object_or_404
from django.contrib.auth.decorators import login_required
from django.http import HttpResponse
from django.utils import timezone

from .forms import MessageForm
from .models import Room
```

```python
@login_required
def roomView(request):

    room = get_object_or_404(Room, name='public')
    form = MessageForm()
```

```python
    if request.htmx:
        form = MessageForm(request.POST)

        if form.is_valid():
            message = form.save(commit=False)
            message.author = request.user
            message.room = room
            message.save()

            context = {
                'msg': message,
                'user': message.author,
                'today': timezone.now().date().strftime("%Y-%m-%d")
            }
            return render(request, 'chat/partials/message.html', context)
```

```python
    context = {
        'form': form,
        'user': request.user,
        'room_name': room.name,
        'room_messages': room.messages.all()[:30],
        'today': timezone.now().date().strftime("%Y-%m-%d")
    }

    return render(request, 'chat/index.html', context)
```

Create **Room** with name “public” in the **database** (localhost:port/admin)

📝 project_folder/chat/templates/chat/**index.html** </> index.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}


{% block content %}

---

<h1>{{ room_name|title }}</h1>
<hr>

---


{% if request.user.is_authenticated %}

   <section id="chat-messages" class="overflow-auto" style="height: 50vh">
      {% if room_messages %}
         {% for msg in room_messages reversed %}
            {% include 'chat/message.html' %}
         {% endfor %}
      {% endif %}
   </section>

   <hr class="my-5">

   <form id="chat-form"
      hx-post="{% url 'room' %}"
      hx-trigger="submit delay:500ms"
      hx-target="#chat-messages"
      hx-swap="beforeend">
      {% csrf_token %}
      {{ form|crispy }}
   </form>

{% endif %}


---

{% endblock %}
```

NOTE: **reversed** in - {% for **msg** in **room_messages** ... %} - iterates backwards

NOTE: custom variable - **msg**, is usable in **templates/chat/partials/message.html**

📝 project_folder/chat/templates/chat/**partials/message.html** </> message.html

```
{% include 'chat/message.html' %}
```

📝 project_folder/chat/**templates**/chat/**message.html** </> message.html

```
<message>
  <div style="width: clamp(350px, 32vw, 500px)" class="msg-container
    {% if user == msg.author %} bg-info ms-auto
    {% else %} bg-secondary me-auto
    {% endif %} message text-white my-4 p-3">

    <p class="msg-body fw-bold">{{ msg.message }}</p>

    <label class="msg-author
      {% if user == msg.author %} text-end{% else %} w-100{% endif %}">
      {% if user == msg.author %}Me{% else %}{{ msg.author }}{% endif %}
    </label>
  </div>

  <div class="msg-date
    {% if user == msg.author %} text-end{% else %} text-start{% endif %}">
    {% if today == msg.created_at|date:"Y-m-d" %}
      {{ msg.created_at|date:"H:i" }}
    {% else %}
      {{ msg.created_at|date:"d M Y, H:i" }}
    {% endif %}
  </div>

</message>
```

NOTE: Additional spaces are added to the `class` attributes because of the way this code is spaced out with the **IF-ELSE** statements.

The HTML template works. However, extra spacing may obfuscate the `class` attribute, worsening debugging experience in developer tools

We can enhance the template response by stripping off these extra, unneccesary space characters.

Let's implement **CUSTOM {% strip %}** template tag (OPTIONAL)

📝 project_folder/app_name/**templatetags/strip_spaces.html** 🐍 strip_spaces.py

```
from django import template
import re # regular expression


register = template.Library()

class StripSpacesNode(template.Node):
    def __init__(self, nodelist):
        self.nodelist = nodelist

    def render(self, context):
        output = self.nodelist.render(context)
        return re.sub(r'\s+', ' ', output).strip()

    @register.tag(name='strip')
    def do_strip_spaces(parser, token):
        nodelist = parser.parse(('endstrip',))
        parser.delete_first_token()
        return StripSpacesNode(nodelist)
```

Create new directory, **templatetags** inside app: **app_name**, and

Include empty file named: __init__.py inside **templatetags** directory

NOTE: @register.tag(name='strip') → {% strip %}, and
parser.parse(('endstrip',)) → {% endstrip %}

You can create **templatetags** folder in any of the apps, like **chat**. I decided to implement it in **app_name**, because it is the main app.

Once the template tag is registered, it is then accessible across all applications of the **project_folder** directory, regardles of which application contains the **templatetags** folder.

📝 project_folder/chat/**templates**/chat/**message.html** </> message.html

```
{% load strip_spaces %}
{% strip %}
<message>...</message>
{% endstrip %}
```

Include - HyperScript (OPTIONAL)

📝 project_folder/chat/templates/chat/**index.html** </> index.html

```
...

  <hr class="my-5">
  <form
    hx-post="{% url 'room' %}"
    hx-trigger="submit delay:500ms"
    hx-target="#chat-messages"
    hx-swap="beforeend"
    _="on htmx:afterRequest reset() me"    ← clears <input> after submit
  >
    {% csrf_token %}
    {{ form|crispy }}
  </form>

...
```

NOTE: "_" is HyperScript. Include CDN @ app_name/templates/app_name/**base**.html

```
<script name="hyperscript.js"
        src="{% static 'app_name/js/lib/hyperscript.min.js' %}" defer></script>
```

HyperScript is compatable with **HTMX** because both have been created by the same developer: "Carson Gross".

HyperScript is a JavaScript library that provides different approach to programming. Like jQuery, it minimizes lengthy JavaScript syntax into a more compact base.

HyperScript can be used in a script tag: `<script name="text/hyperscript">`

The HyperScript syntax is not yet fully adopted by the large AI models (As of 11/March/2025).

Therefore, you should follow the official documentation instead, if you plan on using this library.

```
...

{% block base %}
<script name="chat-messages.js" type="text/javascript">

---

    const chatForm = document.getElementById('chat-form');
    const chatMessages = document.getElementById('chat-messages');

    const scrollToBottom = () => {
        chatMessages.scrollTop = chatMessages.scrollHeight;
    }

---

    const observer = new MutationObserver(scrollToBottom);
    observer.observe(chatMessages, { childList: true });

---

    document.addEventListener('htmx:afterRequest', scrollToBottom);
    scrollToBottom();

---

</script>
{% endblock %}
```

IF you are **NOT** using **HyperScript**, **THEN** extend htmx:afterRequest EventListener

```
...

    const observer = new MutationObserver(scrollToBottom);
    observer.observe(chatMessages, { childList: true });

    document.addEventListener('htmx:afterRequest', () => {
        chatForm.reset();
        scrollToBottom();
    });

    scrollToBottom();

</script>
{% endblock %}
```

NOTE: This script is essential to scroll the client to the newest message.
NOTE: hx-swap="beforeend scroll:bottom" can be used to display newest message.

However, we will use **WebSockets** to support real-time conversations.
hx-swap unfortunately, is not a viable option when using **WebSockets**.

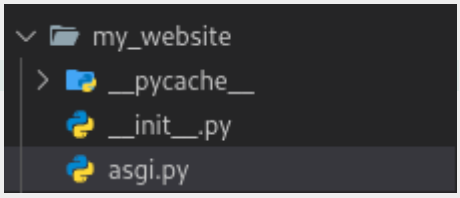
Chat with Django Channels 💬📝

🖥️ (venv) @ project_folder 📚 pip library

```
pip install -U 'channels[daphne]'
pip freeze > requirements.txt # update requirements.txt
```

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
INSTALLED_APPS = [
    'daphne', # Add to the top
    'django.contrib.admin',
    ...
]
```




```
# WSGI_APPLICATION = 'my_website.wsgi.application' ← comment out the WSGI setup
ASGI_APPLICATION = 'my_website.asgi.application'
```

📝 project_folder/my_website/**asgi.py** 🐍 asgi.py

```
...
For more information on this file, see
https://docs.djangoproject.com/en/5.1/howto/deployment/asgi/
"""

import os

from django.core.asgi import get_asgi_application
from channels.auth import AuthMiddlewareStack
from channels.routing import ProtocolTypeRouter, URLRouter
from channels.security.websocket import AllowedHostsOriginValidator
from chat import routing # routing.py in chat application

os.environ.setdefault('DJANGO_SETTINGS_MODULE', 'my_website.settings')

application = get_asgi_application()
application = ProtocolTypeRouter({
    "http": get_asgi_application(),
    "websocket": AllowedHostsOriginValidator(
        AuthMiddlewareStack(URLRouter(routing.websocket_urlpatterns))
    )
})
```

Update **ASGI** application to rout **WebSocket** connections

📝 project_folder/my_website/**routing.py** 🐍 routing.py

```python
from django.urls import path
from .consumers import *

websocket_urlpatterns = [
    path('ws/chatroom/<str:room_name>/', ChatroomConsumer.as_asgi()),
]
```

Think of **routing** AS urls.py - These are **WebSocket** connections instead of **HTTP**

📝 project_folder/my_website/**consumers.py** 🐍 consumers.py

```python
from channels.generic.websocket import WebsocketConsumer
from django.shortcuts import get_object_or_404
from django.template.loader import render_to_string
from django.utils import timezone

from .models import Message, Room
import json

---

class ChatroomConsumer(WebsocketConsumer):

    def connect(self):
        self.user = self.scope['user']
        self.room_name = self.scope['url_route']['kwargs']['room_name']
        self.room = get_object_or_404(Room, name=self.room_name)
        self.accept()

    def receive(self, text_data):
        text_data_json = json.loads(text_data)

        message = Message.objects.create(
            room=self.room,
            author=self.user,
            message=text_data_json['message']
        )
        context = {
            'msg': message,
            'today': timezone.now().date().strftime("%Y-%m-%d"),
            'user': self.user
        }

        html = render_to_string('chat/partials/message.html', context)
        self.send(text_data=html)
```

NOTE: WebSocket Views/Consumers **DO NOT** have **request** Object

NOTE: Consumers uses different functions for responding back to the client(s)

NOTE: We **can't use**: **{% url 'websocket_pathname' %}**
because it is handled by HTTP Django Channel

Use `self.scope` **object**
to retrieve data, such as, user or path's parameters: `path('chat/<str:parameter>', …)`

Some differences between **Views** & **Consumers**

views.py	consumers.py
HttpResponse() sends response data to client: HTML, XML, JSON…	**render_to_string**(template, context) similar to **render**() in views.py, and does NOT require **request** object
render(request, template, context) renders templates {% if … %}{% else %} , before sending them using **HttpResponse**() with **context** data	
def myView(request, **parameter**) to retrieve data, such as path's params: path('chat/<str:**parameter**>', views.myView, name…)	self.scope['url_route']['kwargs']['**ID**'] to retrieve data, such as path's params: path('ws/<int:**ID**>', myConsumer.as_asgi())
form.cleanned_data['input_name'] is used to **get POST data** like <form>'s <input> when **form.is_valid**()	**json.loads**(text_data) at def receive() like **form.cleanned_data**, is used to **get POST data**. `json.loads(text_data)['input_name']`
return **HttpResponse**() return **render**()	self.send(text_data=**render_to_string**())

📝 project_folder/**app_name**/templates/app_name/**base.html** </> base.html

NOTE: HTMX does NOT support WebSockets by default

Hence, include HTMX WebSockets Extension from:
https://v1.htmx.org/extensions/web-sockets/

```
...

<script name="htmx.js" src="{% static 'app_name/js/lib/htmx.min.js' %}" defer></script>
<script name="htmx-websockets.js" src="{% static 'app_name/js/lib/htmx_websockets.js' %}" defer></scri...
<script name="hyperscript.js" src="{% static 'app_name/js/lib/hyperscript.min.js' %}" defer></script>
{% block head %}{% endblock %}

...
```

POST message via WebSocket Channel

📝 project_folder/chat/templates/chat/**index.html** </> index.html

```
...
  <form id="chat-form"
    hx-post="{% url 'room' %}"
    hx-trigger="submit delay:500ms"
    hx-target="#chat-messages"
    hx-swap="beforeend">
    {% csrf_token %}
    {{ form|crispy }}
  </form>
...

...
addEventListener('htmx:afterRequest'
...
```

```
...
  <form id="chat-form"
    hx-ext="ws"
    ws-connect="/ws/chatroom/public/"
    ws-send>
    {% csrf_token %}
    {{ form|crispy }}
  </form>

...

...
addEventListener('htmx:wsAfterSend'
...
```

NOTE: “public” at ws-connect, is the created **Room** model with name=”public”

This form POSTs <input> message TO → **ChatroomConsumer** at 🐍 customers.py

📝 project_folder/**chat**/templates/chat/**partials/message.html** </> message.html

```
<div id="chat-messages" hx-swap-oob="beforeend">
    {% include 'chat/message.html' %}
</div>
```

NOTE: hx-swap-oob (out of band)
is used only with a server-response. Hence, the use of a message.html partial

---

It targets any DOM element with id: #chat-messages

& in this context

It appends, the wrapped innerHTML, at the end of the target

Broadcast message to **Consumers** with **Channel Layers**

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
CHANNEL_LAYERS = {
    'default': { 'BACKEND': 'channels.layers.InMemoryChannelLayer' }
}
```

InMemoryChannelLayer is **NOT** suitable in **production**!
Use it in DEBUG=True ONLY. For production USE Redis or **Valkey**

📝 project_folder/my_website/**consumers.py** 🐍 consumers.py

```
...
from channels.generic.websocket import WebsocketConsumer # ← AsyncWebs...
from asgiref.sync import async_to_sync    # ← you can also import sync_to_async
...
```

```
class ChatroomConsumer(WebsocketConsumer):

    def connect(self):
        self.user = self.scope['user']
        self.room_name = self.scope['url_route']['kwargs']['room_name']
        self.room = get_object_or_404(Room, name=self.room_name)

        async_to_sync(self.channel_layer.group_add)(
            self.room_name, self.channel_name
        )

        self.accept()
...
```

NOTE: **async_to_sync()** → Allows asynchronous calls in synchronous functions

NOTE: **group_add()** → Connects **channel** to the **group** = **room_name**

Alternatively, you can replace: **WebsocketConsumer** TO **AsyncWebsocketConsumer**

```
class ChatroomConsumer(AsyncWebsocketConsumer):

    async def connect(self):
        await self.user = self.scope['user']
        await self.room_name = self.scope['url_route']['kwargs']['room_name']
        await self.room = get_object_or_404(Room, name=self.room_name)
        await self.channel_layer.group_add(self.room_name, self.channel_name)
        await self.accept()
```

```
    def disconnect(self, close_code):
        async_to_sync(self.channel_layer.group_discard)(
            self.room_name, self.channel_name
        )
```

ADD **disconnect**() method TO LEAVE the **group** when the **channel** DISCONNECTS

```
    def receive(self, text_data):
        text_data_json = json.loads(text_data)

        message = Message.objects.create(
            room=self.room,
            author=self.user,
            message=text_data_json['message']
        )
        context = {
            'msg': message,
            'today': timezone.now().date().strftime("%Y-%m-%d"),
            'user': self.user
        }

        html = render_to_string('chat/partials/message.html', context)
        self.send(text_data=html)

        event = {
            'type': 'message_handler',
            'message_id': message.id
        }
        async_to_sync(self.channel_layer.group_send)(
            self.room_name, event
        )
```

NOTE: **group_send**() → sends **response** TO all connected **Consumers**
Create **message_handler**() method below **receive**() method

```
    def message_handler(self, event):
        message_id = event['message_id']
        message = Message.objects.get(id=message_id)
        context = {
            'msg': message,
            'today': timezone.now().date().strftime("%Y-%m-%d"),
            'user': self.user
        }

        html = render_to_string('chat/partials/message.html', context)
        self.send(text_data=html)
```

Online Status (Offline ⚪ 5 Online 🟢)

📝 project_folder/chat/**models.py** (**Room** & **Message**) 🐍 models.py

```python
from django.db import models
from django.contrib.auth.models import User

---

class Room(models.Model):
    name = models.CharField(max_length=128, unique=True)
    users_online = models.ManyToManyField(
        User,
        related_name='online_in_rooms',      ← user_instance.online_in_rooms
        blank=True
    )

    def __str__(self):
        return self.name

---

class Message(models.Model):
    room = models.ForeignKey(
        Room,
        related_name='messages',
        on_delete=models.CASCADE
    )
    author = models.ForeignKey(User, on_delete=models.CASCADE)
    message = models.CharField(max_length=1000)
    created_at = models.DateTimeField(auto_now_add=True)

---

    class Meta:
        ordering = ['-created_at']

    def __str__(self):
        return f'{self.author.username}: {self.message}'
```

Update **DATABASE**: python manage.py makemigrations **THEN** python manage.py migrate

📝 project_folder/my_website/**consumers.py** 🐍 consumers.py

```python
...

class ChatroomConsumer(WebsocketConsumer):

    def connect(self):
        ...

        # ADD User TO online list, AND UPDATE online count
        if self.user not in self.room.users_online.all():
            self.room.users_online.add(self.user)
            self.update_online_count()

        self.accept()


    def disconnect(self, close_code):
        async_to_sync(self.channel_layer.group_discard)(
            self.room_name, self.channel_name
        )
        # REMOVE User FROM online list, AND UPDATE online count
        if self.user in self.room.users_online.all():
            self.room.users_online.remove(self.user)
            self.update_online_count()


    def update_online_count(self):
        online_count = self.room.users_online.count()
        event = {
            'type': 'online_count_handler',
            'online_count': online_count
        }
        async_to_sync(self.channel_layer.group_send)(
            self.room_name, event
        )


    def online_count_handler(self, event):
        online_count = event['online_count']
        partial = 'chat/partials/online_count.html'

        html = render_to_string(partial, {'online_count': online_count})
        self.send(text_data=html)
```

📝 project_folder/**chat**/templates/chat/**partials**/**online_count.html** </>

```
{% with online_count|add:"-1" as online_count %}
{% load strip_spaces %}
{% strip %}

<div id="online-status" hx-swap-oob="outerHTML">
    <span class="icon">
        {% if online_count > 0 %}🟢
        {% else %}⚪
        {% endif %}
    </span>
    <span class="online-count
      {% if online_count > 0 %} text-success
      {% else %} text-secondary
      {% endif %}">
        {% if online_count > 0 %} {{ online_count }}
        {% else %} 0
        {% endif %} Online
    </span>
</div>
{% endstrip %}
{% endwith %}
```

📝 project_folder/**chat**/templates/chat/**index.html** </> index.html

```
...

<h1>{{ room_name|title }}</h1>
<hr>
<div id="online-status" class="text-primary">
    <span class="spinner-grow spinner-grow-sm"></span>
    <span role="status">Connecting...</span>
</div>
<hr>

...
```

(Next step requires a break… Take a break from the **Chat** app!)

Optimize **Chat** app with **Valkey** TO improve server performance

In this tutorial, **Valkey** is used as a, **Message Broker**:

Message Broker

A software component that facilitates communication between different applications or services by translating, routing, and managing messages. It acts as an intermediary, ensuring that messages are delivered reliably and efficiently, even if the sender and receiver are not directly connected or use different protocols.

Redis: While primarily an in-memory data store;
It can act as a lightweight message broker using its **Pub/Sub** (Publish/Subscribe) feature.
It allows messages to be published to **channels** and received by subscribers in real-time.

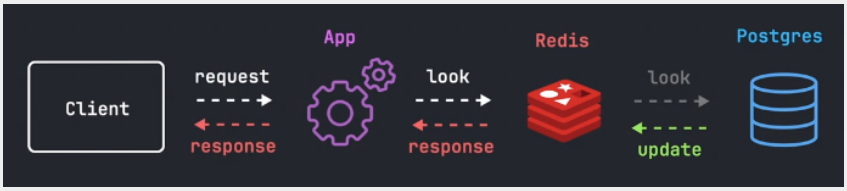
(AI Generated: Copilot @ copilot.microsoft.com, 18/Mar/2025)

Django + Redis, Architecture

```
Client requests App FOR a resource


---


THEN App searches for the resource IN Redis

IF resource IS FOUND IN Redis
  THEN Redis sends resource to App which passes it to the Client


---


ELSE IF resource IS NOT FOUND IN Redis
  THEN Redis searches for the resource IN Database

    IF resource IS FOUND IN Database
      THEN Redis FETCHES resource AND sends it to App → Client
```

NOTE: Application in this context is: **chat**

NOTE: Fetching resource to **Redis**, allows us to access it when needed directly from **Redis**, instead of the **Database**



Chat with Valkey Channels

🖥️ (venv) @ project_folder — 📚 pip library

```
pip install channels-valkey
pip freeze > requirements.txt # update requirements.txt
```

📝 project_folder/my_website/**settings.py** — 🐍 settings.py

```
CHANNEL_LAYERS = {}

if DEBUG:
    CHANNEL_LAYERS = {
        'default': { 'BACKEND': 'channels.layers.InMemoryChannelLayer' }
    }
else:
    CHANNEL_LAYERS = {
        'default': {
            'BACKEND': 'channels_valkey.pubsub.ValkeyPubSubChannelLayer',
            'CONFIG': {
                'hosts': [(os.getenv('VALKEY_HOST_URL'))],
            },
        },
    }
```

NOTE:

InMemoryChannelLayer is **NOT** suitable in **production**! Hence, the integration of **Valkey**

`"BACKEND": "channels_valkey.core.ValkeyChannelLayer",`
is the **original** layer, and implements channel and group handling itself.

`"BACKEND": "channels_valkey.pubsub.ValkeyPubSubChannelLayer",`
is newer and leverages Valkey Pub/Sub for message dispatch. This layer is currently at ***Beta*** status, meaning **it may be subject to breaking** changes whilst it matures.

📝 project_folder/**.env** — .env

```
DEBUG='False' ← Set the DEBUG to False, in order to, test the Valkey channel
                NOTE: You should always set DEBUG to False in production
...

# Railway App | deploy valkey in railway.com

VALKEY_HOST_URL='create redis app at railway.com, and paste redis_url here'
```

Private Chat Rooms 💬📝🔒

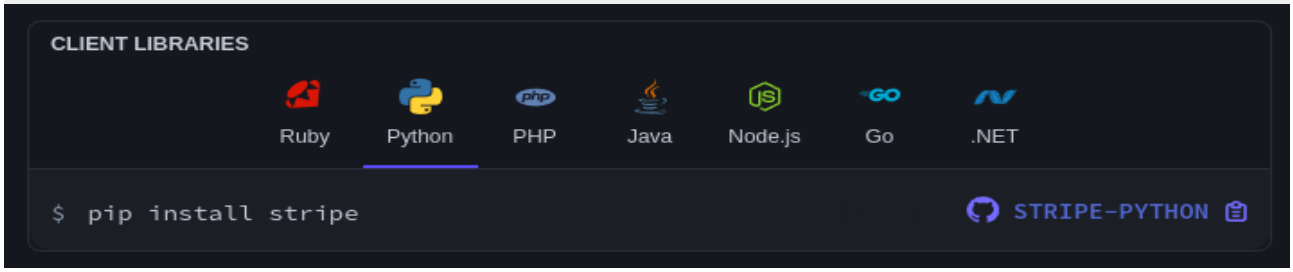
(in progresss ...)

Install **Stripe** 💳💸🏦

🖥️ (venv) @ project_folder 📚 pip library

```
pip install stripe
pip freeze > requirements.txt # update requirements.txt
```

→ We will explore **Payment Element** (stripe UI elements) after **Card Element**
→ **Payment Element** and **Card Element** differences: click me
→ **Dummy Cards** used for Testing: https://docs.stripe.com/testing#cards
→ **Stripe** API: https://docs.stripe.com/api



📝 project_folder/app_name/**views.py** (Stripe API **Example**) 🐍 views.py

```
import stripe
stripe.api_key = 'secret key (sk)' # https://dashboard.stripe.com/test/apikeys
```

```
@login_required
def paymentView(request):

    basket_instance = get_object_or_404(BasketModel, owner=request.user)
    if request.method == 'POST':
```

```
        # Below code makes the purchase.
        # The successful transaction is saved at your stripe account.

        customer = stripe.Customer.create(
            email=request.POST['email'],
            name=request.POST['username'],
            source=request.POST['stripeToken']
        )
        charge = stripe.Charge.create(
            customer,
            amount=int(basket_instance.totalCost * 100), # amount=500 → $5.00
            currency='USD',
            description='My description'
        )
```

NOTE: Stripe's attribute: 'amount', can't accept float-type-numbers (decimals)
Stripe API **works only** in certified with **SSL** & **TLS** domains (**https://** protocol)

Initialize **API Keys**

📝 project_folder/**.env** .env

```
# Stripe API Keys

STRIPE_PUBLIC_KEY='pk_live_FldsSDFjkasdASd…'
STRIPE_SECRET_KEY='sk_live_dSDlasdWEpdI3Iw…'

STRIPE_PUBLIC_TEST_KEY='pk_test_oREsdkAWEj…'
STRIPE_SECRET_TEST_KEY='pk_test_SDerEjWEs0…'
```

API KEYS: https://dashboard.stripe.com/test/apikeys

📝 project_folder/my_website/**settings.py** 🐍 settings.py

```
# Stripe Payment System API keys

STRIPE_PUBLIC_KEY =
os.getenv('STRIPE_PUBLIC_TEST_KEY') if DEBUG else os.getenv('STRIPE_PUBLIC_KEY')

STRIPE_SECRET_KEY =
os.getenv('STRIPE_SECRET_TEST_KEY') if DEBUG else os.getenv('STRIPE_SECRET_KEY')
```

NOTE: STRIPE_PUBLIC_KEY Are custom variables out of preference
STRIPE_SECRET_KEY **DO NOT USE** TEST_KEYs in production!

PCI and **Data Protection** Compliance ⚖️

To ensure compliance with **PCI DSS**, **Stripe** helps safeguard sensitive payment data and adheres to local regulations. By handling and storing sensitive payment information, **Stripe** provides tokens for secure payment processing, protecting both clients and the company.

It is essential to transparently **inform clients** about where their data is stored and processed. **Stripe's** terms and **policies must be included on payment forms**, allowing clients to review and agree before proceeding with any transactions.

For additional protection and verification, implementing 3D Secure (e.g., **two-factor** authentication) is recommended. This helps prevent fraud and protects the company from liability for chargebacks due to fraudulent claims.

We must comply with **GDPR**, the **Data Protection Act 2018**, **RODO**, and similar laws to build trust, protect client data, and enhance our credibility. Clients should know where their data is stored, how it is processed, and that no unnecessary information is collected beyond what is required for our services.

To align with data protection regulations, **users** must be allowed to **deactivate** and permanently **delete** their data. This should be handled within a reasonable timeframe (30–90 days), during which payments can be processed, and checks for unlawful activities can be completed if requested by local authorities. Beyond this timeframe, all user data must be removed when possible, respecting clients' rights and fostering trust.

Finally, collaborating with legal advisors or consultants specializing in payment and data protection laws can ensure comprehensive compliance and anticipate potential challenges, reducing risks for both the company and its clients.

Payment System **Vat Tax** ⚖️

VAT Compliance: (Make OWN RESEARCH! Info may change)

If your business exceeds the VAT threshold in the UK but your clients are based in France, the VAT rules depend on the nature of your transactions:

1. **Business-to-Business (B2B)**: If you're providing services or goods to VAT-registered businesses in France, the "place of supply" is considered to be France. In this case, the reverse charge mechanism often applies, meaning your French clients account for the VAT on their end. You wouldn't need to register for VAT in France, but you must ensure proper documentation, such as your client's VAT number, and include the reverse charge statement on your invoices.
2. **Business-to-Consumer (B2C)**: If you're selling to individual consumers in France, you may need to register for VAT in France. This is because the "place of supply" rules for B2C transactions often require VAT to be charged in the customer's country. The threshold for VAT registration in France is typically much lower than in the UK, or it may not exist at all for cross-border sales.

If you're selling digital services, you might also need to use the VAT One Stop Shop (OSS) to simplify VAT compliance across EU countries. To comply with VAT rules, **you may need to collect multiple pieces of evidence** to determine the customer's location. For example

1. **IP Address**: Approximate location of the customer.
2. **Billing Address**: Provided during checkout.
3. **Card Issuing Country**: Based on the card's BIN.

If your, registered in UK online service-based business, exceeds the VAT threshold (e.g. £90,000 turnover), you would need to register for VAT in the relevant country (e.g. in France, if your primary online customers are from this country) & remit taxes accordingly.

Practical Steps

1. **Collect Evidence**:
   Use **Stripe**'s (an online service that we will use to create checkout form) tools to gather IP address, billing address, and card issuing country.
2. **Automate VAT Calculation**:
   Integrate a VAT calculation tool to automatically apply the correct tax rate based on the customer's location.
3. **Consult a Tax Professional**:
   Ensure compliance with international VAT rules to avoid penalties.

Stripe's **Customer** 🪪

We will use **stripe**'s API, to create a **Customer**

The **Customer** is going to be our registered **User**

We will also use stripe's API - **Payment Intent** TO mount **Card Element UI** in our <form>

It is important to use stripe's UI elements, in order to, NOT store client's sensitive payment data, on our server. Stripe's UI elements will give us the TOKENIZED client's payment method, which we can use to make payments.

📝 project_folder/**users/utils.py** 🐍 utils.py

```python
from django.core.files.uploadedfile import UploadedFile
from django.conf import settings

import requests, stripe
stripe.api_key = settings.STRIPE_SECRET_KEY
```

```python
def get_or_create_stripe_customer(user):

    stripe_customer_id = None

    if hasattr(user, 'profile'):
        # Retrieve the user's Stripe customer ID from its profile
        stripe_customer_id = getattr(user.profile, 'stripe_customer_id', None)

    if stripe_customer_id is None:
        # Create a new Stripe customer
        customer = stripe.Customer.create(
            name=user.username,
            email=user.email,
            metadata={'user_id': str(user.id)}
        )
        stripe_customer_id = customer.id

        if hasattr(user, 'profile'):
            # Update the user's profile with the new Stripe customer ID
            user.profile.stripe_customer_id = stripe_customer_id
            user.profile.save()

    return stripe_customer_id
```

📝 project_folder/**users/models.py** 🐍 models.py

```python
from django.db import models
from django.contrib.auth.models import User
from django_resized import ResizedImageField
from django.conf import settings

from .utils import get_or_create_stripe_customer

from botocore.exceptions import ClientError
import boto3


class Profile(models.Model):
    user = models.OneToOneField(User, on_delete=models.CASCADE)
    stripe_customer_id = models.CharField(
        max_length=255, blank=True, null=True, unique=True, editable=False)
    phone_number = models.CharField(max_length=15)
    image = ResizedImageField(
        size=[300, 300],
        crop=['middle', 'center'],
        quality=75,
        force_format='JPEG',
        upload_to='profile_pics',
        default='default_profile.jpg'
    )

    def save(self, *args, **kwargs):
       try:
          this = Profile.objects.get(user=self.user)

          # Create Stripe customer for new Profile. (used for payments)
          if not hasattr(this, 'stripe_customer_id'):
             self.stripe_customer_id = get_or_create_stripe_customer(self.user)

          # Only move the old image if there is an existing image and it's...
          if this.image and this.image.name != self.image.name:
             #recycle_profile_pic(this.image.name) ← AWS S3 bucket
             remove_profile_pic(this.image.name)   ← AWS S3 bucket

       except Profile.DoesNotExist:
          # This is a new profile, so no need to move any image.
          pass

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

python manage.py **makemigrations** users → python manage.py **migrate** users

📝 project_folder/**users/views.py** 🐍 views.py

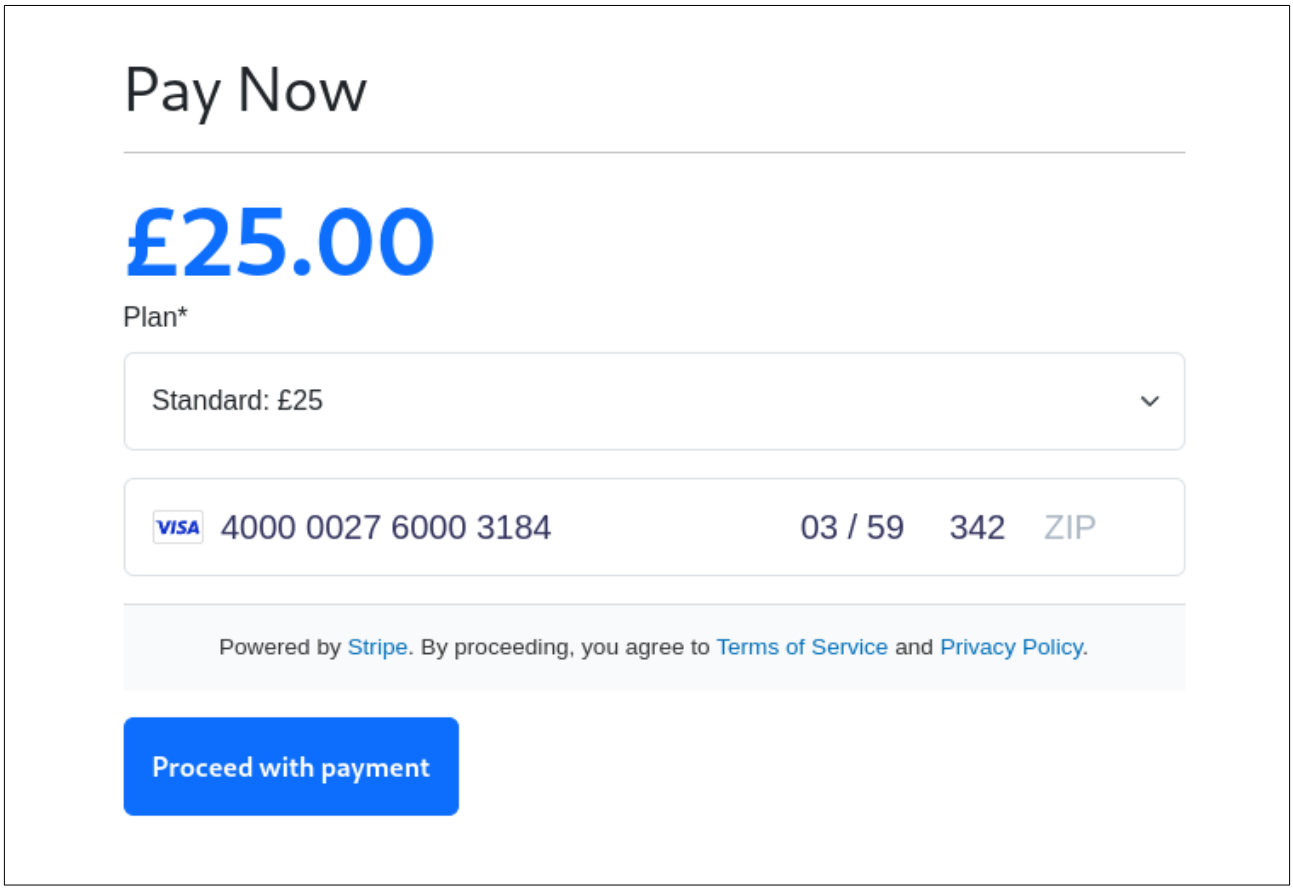
```
...
from django.conf import settings
from .models import Profile
from .forms import UserRegisterForm, UserUpdateForm, ProfileForm

import stripe
stripe.api_key = settings.STRIPE_SECRET_KEY


----------

@login_required
def profileView(request, user_id):
    user_instance = get_object_or_404(User, pk=user_id)
    ...
----------

        if form_user.is_valid() and form_profile.is_valid():
            confirm_password = form_user.cleaned_data.get('confirm_password')
            if check_password(confirm_password, user_instance.password):
                form_user.save()
                form_profile.save()
                stripe.Customer.modify(
                    user_instance.profile.stripe_customer_id,
                    name=user_instance.username,
                    email=user_instance.email
                )
               ...
```

User's Stripe Customer's data: **name** and **email**, is also being updated

📝 project_folder/**users/admin.py** 🐍 admin.py

```
from django.contrib import admin
from .models import Profile

----------


class ProfileAdmin(admin.ModelAdmin):
    readonly_fields = ('stripe_customer_id',)
    list_display = [field.name for field in Profile._meta.fields]


# Register your models here.
admin.site.register(Profile, ProfileAdmin)   ← Added ProfileAdmin
```

Buy Plan with Stripe's **Card Element UI** 💳



📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
class PlanForm(forms.Form):
    UNIT = '£'
    PLANS = {
        'basic': 12.25, # Hence, £12.25
        'standard': 25,
        'premium': 50
    }
    OPTION = [
        ('', '--- Select a plan ---'),
        ('basic', f'Basic: {UNIT}{PLANS.get('basic')}'),
        ('standard', f'Standard: {UNIT}{PLANS.get('standard')}'),
        ('premium', f'Premium: {UNIT}{PLANS.get('premium')}')
    ]

    plan = forms.ChoiceField(
        label='Plan',
        choices=OPTION,
        required=True
    )
```

📝 project_folder/**app_name/views.py** 🐍 views.py

```python
...
from django.http import HttpResponseRedirect, JsonResponse ← Added JsonResponse

from django.views.generic import ListView
from users.utils import get_or_create_stripe_customer
from .forms import ModelForm, ContactUsForm, PlanForm ← Added PlanForm
from .models import ModelName

import stripe, json
stripe.api_key = settings.STRIPE_SECRET_KEY

---

@login_required
def buyPlanView(request):

    context = {
        'form': PlanForm(),
        'plans': PlanForm.PLANS,
        'payment_unit': PlanForm.UNIT,
        'display_price': 0, # initial price to be displayed
        'stripe_public': settings.STRIPE_PUBLIC_KEY
    }

    return render(request, 'app_name/buy_plan.html', context)
```

```python
@login_required
def buyPlanPaymentIntentView(request):

    form = PlanForm(request.POST)
```

```python
    # Validate plan from POST request
    if request.method == 'POST' and form.is_valid():
        plan = request.POST.get('plan')
    else:
        return JsonResponse(
        {'error': 'Invalid form, try refreshing the page'}, status=400)

    if plan not in PlanForm.PLANS.keys():
        return JsonResponse(
        {'error': 'Selected plan is not registered, please report this issue'}, status=400)
```

```python
    # Retrieve the user's Stripe customer ID from its profile
    stripe_customer_id = get_or_create_stripe_customer(request.user)
    # Stripe's amount is in pennies. Hence, amount=500 → £5.00
    amount = int(PlanForm.PLANS.get(plan) * 100)
```

```python
    intent = stripe.PaymentIntent.create(
        amount=amount,
        currency="gbp",
        customer=stripe_customer_id,
        payment_method_types=["card"],
        description=f"Purchased '{plan}' plan",
        metadata={"purchased_plan": str(plan)}
    )

    return JsonResponse({'client_secret': intent.client_secret})
```

NOTE: **client_secret** is required for security reasons, and to proceed a charge

```python
def paymentSuccessView(request):
    return render(request, 'app_name/payment_success.html')
```

📝 `project_folder/app_name/urls.py` 🐍 urls.py

```
urlpatterns = [
    . . .
    path('buy-plan/', views.buyPlanView, name='buy_plan'),
    path('buy-plan/intent/', views.buyPlanPaymentIntentView, name='buy_plan_intent'),
    path('payment-success/', views.paymentSuccessView, name='payment_success'),
]
```

📝 `project_folder/app_name/buy_plan.html` </> buy_plan.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}
{% block title %}Checkout Page{% endblock %}

{% block head %}
<style>

form * {
    font-family: "Helvetica Neue", Helvetica, sans-serif;
}

.stripe-agreement {
    text-align: center;
    font-size: 0.85rem;
    color: #333;
    padding: 15px 20px;
    background-color: #f9fafb;
    border-top: 1px solid #ddd;
}
.stripe-agreement a {
    color: #0070ba;
    text-decoration: none;
}
.stripe-agreement a:hover {
    text-decoration: underline;
}
.stripe-agreement p {
    margin: 0;
}

</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>        ← Stripe API in JavaScript
{% endblock %}
```

```
{% block content %}

<h1>Pay Now</h1>
<hr>
<h2 id="total-cost" class="display-3 fw-bold text-primary mb-0">
{{ payment_unit }}{{ display_price|floatformat:2 }}
</h2>

<form id="payment-form"
        action="{% url 'buy_plan' %}"
        method="POST"
        data-secret="{{ client_secret }}">
  {% csrf_token %}
  {{ form|crispy }}
  <div id="card-element" class="form-control p-3">
    <!-- Elements will create form elements here -->
  </div>

  <section class="stripe-agreement mt-3">
    <p>
      Powered by
      <a href="https://stripe.com" target="_blank">Stripe</a>.
      By proceeding, you agree to
      <a href="https://stripe.com/legal" target="_blank">Terms of Service</a>
      and
      <a href="https://stripe.com/privacy" target="_blank">Privacy Policy</a>.
    </p>
  </section>

  <button type="submit" id="submit-button" class="btn btn-primary fw-bold my-3 p-3">
    Proceed with payment
  </button>
  <div id="card-errors" role="alert" class="text-danger">
    <!-- Display error message to your customers here -->
  </div>

</form>

{% endblock %}
```

```
DO NOT RENAME: payment-form, card-element and card-errors  ← (stripe elements)
```

```
{% block base %}

---

<script name="select-plan-form" type="text/javascript">

const objPlans = {{ plans|safe }};
let elmTotalCost = elmSelectPlan = undefined;

document.addEventListener('DOMContentLoaded', () => {

    elmTotalCost = document.getElementById('total-cost');
    elmSelectPlan = document.querySelector('select[name="plan"]');
    elmSelectPlan.classList.add('p-3');

    elmSelectPlan.addEventListener('change', (event) => {
        const totalCost = objPlans[event.target.value] || 0;
        elmTotalCost.innerHTML = `{{ payment_unit }}${totalCost.toFixed(2)}`;
    });

});

</script>

---

<script name="stripe-payment-form" type="text/javascript">

// Initialize Stripe with your publishable key
const stripe = Stripe('{{ stripe_public }}');
// Create an instance of Elements
const elements = stripe.elements();

// Options for customizing the Card Element styles
const style = {
    base: {
        color: "#32325d",
        fontFamily: '"Helvetica Neue", Helvetica, sans-serif',
        fontSmoothing: "antialiased",
        fontSize: "20px",
        "::placeholder": { color: "#aab7c4", },
    },
    invalid: {
        color: "#fa755a",
        iconColor: "#fa755a",
    },
};

// Create an instance of the Card Element  &  Add the Card Element to the page
const card = elements.create("card", { style });
card.mount("#card-element");
```

```
const form = document.getElementById("payment-form");
const errorElement = document.getElementById("card-errors");

// Handle real-time validation errors
card.on("change", (event) => {
    errorElement.textContent = (event.error) ? event.error.message : "";
});

// Handle form submission
form.addEventListener("submit", async (event) => {
    event.preventDefault();

    const formData = new FormData();
    formData.append("plan", elmSelectPlan.value);

    // Send the selected plan to the backend
    const response = await fetch("{% url 'buy_plan_intent' %}", {
        method: "POST",
        headers: {
            "X-CSRFToken": "{{ csrf_token }}",
        },
        body: formData,
    });

    const data = await response.json();

    if (!response.ok) {
        // Handle errors returned from the backend
        errorElement.textContent = data.error;
    }

    const clientSecret = data.client_secret;
```

NOTE: card.on(“change”) - adds realtime validation errors for **.card-errors**

NOTE: **response**, sends **request** with **plan** input’s value TO **buyPlanIntentView**

NOTE: IF **plan** passes a validation at the backend, THEN we get **clientSecret**

NOTE: **clientSecret** is required TO **make/confirm** the payment

```
    // Confirm the card payment
    const { error } = await stripe.confirmCardPayment(clientSecret, {
        payment_method: {
            card: card,
        },
    });

    if (error) {
        // Handle errors from the stripe card payment
        errorElement.textContent = error.message;
    } else {
        // The card has been paid successfully
        // Reset form inputs
        card.clear();
        form.reset();
        // Redirect to the success page
        window.location.href = "{% url 'payment_success' %}";
    }

});

---

</script>
{% endblock %}
```

NOTE: **card** is a stripe element, mounted as: **#card-element** <input>

NOTE: **client** is **redirected** TO **payment_success.html**
template on a successful payment transaction

📝 project_folder/**app_name/payment_success.html** </> payment_success.html

```
{% extends 'app_name/base.html' %}
{% block head %}
<style>
body {
    text-align: center;
    padding: 40px 0;
}
h1 {
    color: #88B04B;
    font-family: "Nunito Sans", "Helvetica Neue", sans-serif;
    font-weight: 900;
    font-size: 40px;
    margin-bottom: 10px;
}
p {
    color: #404F5E;
    font-family: "Nunito Sans", "Helvetica Neue", sans-serif;
    font-size:20px;
    margin: 0;
}
i {
    color: #9ABC66;
    font-size: 100px;
    line-height: 200px;
    margin-left:-15px;
}
.card {
    padding: 60px;
    display: inline-block;
    border: 0;
    margin: 0 auto;
    animation: pop-in 1s;
}
.btn-success {
    animation: pop-in 1s, 1s scale-up 1s ease;
}
@keyframes pop-in {
    0% { opacity: 0; transform: scale(0.1); }
    100% { opacity: 1; transform: scale(1); }
}
@keyframes scale-up {
    0% { transform: scale(1); }
    50% { transform: scale(1.5); }
    100% { transform: scale(1); }
}
</style>
{% endblock %}
```

```
{% block content %}
<div class="card">
    <div style="
        border-radius: 200px;
        height: 200px;
        width: 200px;
        background: #F8FAF5;
        margin:0 auto;">
        <i class="checkmark">✓</i>
    </div>
    <h1 class="mt-5">Success</h1>
    <p>We have successfully received your purchase</p>
    <a href="{% url 'index' %}">
        <button class="btn btn-success my-3">
            Continue to
            <strong>Home Page</strong>
        </button>
    </a>
</div>
{% endblock %}
```

DonateView - Modifiable **Payment Element UI** 💳

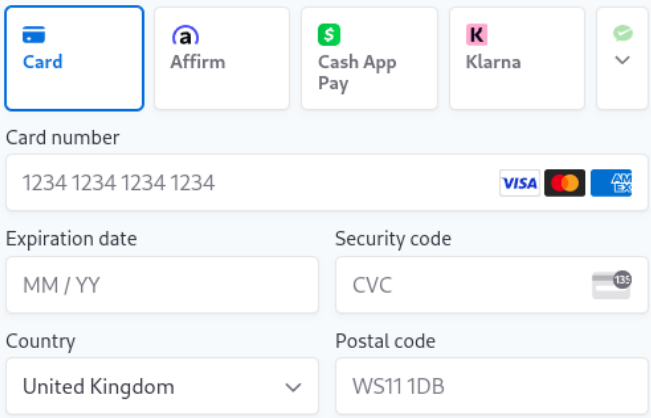
Payment Element is a **recommended** implementation of stripe.

Similar to **Card Element**, **Payment Element** must be created in backend to get essential key: **client_secret** (used only in **frontend**)

intent has property **intent_id**, which can be used to modify the Payment Intent.
(**NEVER** send **indent_id** to the **frontend**)

Many payment method types, such as; **paypal**, **p24**, **klarna**… require a **Hook**, to verify transaction state of a third-party service.
(To ease the tutorial, **DonateView** will include default payment method only)

Payment Element Form is **mounted** from the **frontend** and **requires client_secret**, and the state of new **Payment Element** is added on stripe, even if client hasn't finished their form.



Backend View

```python
intent = stripe.PaymentIntent.create(
    # amount of 100 → $1.00
    amount=100,
    currency="pln", # ← Polish złoty
    #customer=stripe_customer_id,
    payment_method_types=[
        "card",
        "paypal",
        "p24",
    ],
    description=f"Donation",
    #metadata={ "key": value }
)
```

```python
context = {
    'client_secret': intent.client_secret,
    'stripe_public':  settings.STRIPE_PUBLIC_KEY
}
```

Frontend Template

```javascript
const stripe = Stripe('{{ stripe_public }}'),
const options = {
    clientSecret: '{{ client_secret }}',
    appearance: { theme: 'tabs', /* stripe | tabs | night */ },
};
const elements = stripe.elements(options);
```

```javascript
const paymentElementOptions = {
    layout: {
        type: 'tabs', // accordion | tabs | auto
        defaultCollapsed: false,
    },
};
const paymentElement = elements.create(
    'payment', paymentElementOptions
);
paymentElement.mount('#payment-element');
```

```javascript
let url  = window.location.origin + "{% url 'payment_success' %}"

const {error} = await stripe.confirmPayment({
    elements, // If form is valid → redirect client
    confirmParams: {  return_url: url, },
});

if (error) { /* confirmPayment failed, print error */  }
```

Create DonateView - Template + Payment Element

📝 project_folder/**app_name/views.py** 🐍 views.py

```python
@login_required
def donateView(request):
```

```python
    min_value = 5 # 5 -> 5,00zł

    context = {
        'locale': 'pl',
        'payment_unit': 'zł',
        'display_price': min_value, # 5 -> 5,00zł
        'stripe_public': settings.STRIPE_PUBLIC_KEY
    }

    # Retrieve the user's Stripe customer ID from its profile
    stripe_customer_id = get_or_create_stripe_customer(request.user)
```

```python
    intent = stripe.PaymentIntent.create(
        amount=int(min_value * 100), # 5 -> 0.05zł
        currency="pln",
        customer=stripe_customer_id,
        payment_method_types=["card"],
        description=f"Donation",
    )

    context.update({
        'client_secret': intent.client_secret
    })

    return render(request, 'app_name/donate.html', context)
```

NOTE: **donateView** is made for Polish customers

📝 project_folder/**app_name/urls.py** 🐍 urls.py

```python
urlpatterns = [
    ...
    path('donate/', views.donateView, name='donate'),
]
```

📝 project_folder/**chat**/templates/chat/**donate.html** </> donate.html

```
{% extends 'app_name/base.html' %}
{% load static %}
{% load crispy_forms_tags %}
{% block title %}Strona Dotacji{% endblock %}

{% block head %}
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
{% endblock %}

---

{% block content %}
<h1>Wesprzyj Nas</h1>
<hr>
<h2 id="total-cost" class="display-3 fw-bold text-primary mb-0">
  <span class="value">{{ display_price|floatformat:2 }}</span>{{ payment_unit }}
</h2>

---

<form id="payment-form" data-secret="{{ client_secret }}">
  {% csrf_token %}
  <div id="payment-element">
    <!-- Elements will create form elements here -->
  </div>

---

  <section class="stripe-agreement mt-3">
    <p>
      Obsługiwane przez
      <a href="https://stripe.com" target="_blank">Stripe</a>.
      Kontynuując, akceptujesz
      <a href="https://stripe.com/legal" target="_blank">Warunki korzystania z usługi</a>
      i
      <a href="https://stripe.com/privacy" target="_blank">Politykę prywatności</a>.
    </p>
  </section>


---

  <button type="submit" id="submit-button" class="btn btn-primary fw-bold my-3 p-3">
    Kontynuuj płatność
  </button>
  <div id="error-message" role="alert" class="text-danger">
    <!-- Display error message to your customers here -->
  </div>
</form>
{% endblock %}
```

```
{% block base %}
<script name="stripe-payment-form" type="text/javascript">

/* --- 3. Collect payment details --- */

// https://docs.stripe.com/payments/checkout/customization/appearance?payment-ui=embedded-components#all-rules

// Set your publishable key: remember to change this to your live publishable key in production
// See your keys here: https://dashboard.stripe.com/apikeys
const stripe = Stripe('{{ stripe_public }}');

const options = {
  clientSecret: '{{ client_secret }}',
  locale: '{{ locale }}',
  // Fully customizable with appearance API.
  appearance: {
    theme: 'tabs', // stripe | tabs | night (NOTE: variables modify the theme)
    variables: {
      colorPrimary: '#0570de',
      colorBackground: '#ffffff',
      colorText: '#30313d',
      colorDanger: '#df1b41',
      fontFamily: 'Ideal Sans, system-ui, sans-serif',
      spacingUnit: '6px',
      borderRadius: '4px',
    },
  },
};

---

// Set up Stripe.js and Elements to use in checkout form,
// passing the client secret obtained in a previous step
const elements = stripe.elements(options);

// Create Payment Element
const paymentElementOptions = {
  layout: {
    type: 'tabs', // accordion | tabs | auto
    defaultCollapsed: false,
  }
};

const paymentElement = elements.create('payment', paymentElementOptions);

// Mount/Show the Payment Element
paymentElement.mount('#payment-element');
```

```
/* --- 4. Submit the payment to Stripe --- */

const form = document.getElementById('payment-form');
const errorElement = document.querySelector('#error-message');

// Handle form submission
form.addEventListener("submit", async (event) => {
  event.preventDefault();

  const {error} = await stripe.confirmPayment({
    //`Elements` instance that was used to create the Payment Element
    elements,
    confirmParams: {
      return_url: window.location.origin + "{% url 'payment_success' %}",
    },
  });

  if (error) {
    // This point will only be reached if there is an immediate error when
    // confirming the payment. Show error to your customer (for example, payment
    // details incomplete)
    errorElement.textContent = error.message;
  }
  else {
    // Your customer will be redirected to your `return_url`. For some payment
    // methods like iDEAL, your customer will be redirected to an intermediate
    // site first to authorize the payment, then redirected to the `return_url`.
  }

});


</script>
{% endblock %}
```

📝 project_folder/**app_name**/templates/app_name/**base.html** </> base.html

```
{% load django_bootstrap5 %}
{% load static %}
<!DOCTYPE html>
  <html lang="{% if locale %}{{ locale }}{% else %}en{% endif %}">
...
```

Including **Payment Element** is straightforward, but modifying it presents challenges regarding security. Let's integrate a **custom form** with a **donation field**, allowing clients to specify their own amount.

Synchrononously mounted, custom **donation** field

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
class DonateForm(forms.Form):
    locale = 'pl' # code e.g. 'pl', 'gb', 'de'
    UNIT = 'zł'

    min_value = 5 # 5 -> 500 groszy (pennies)
    max_value = 100

    donation = forms.DecimalField(
        label='Kwota donacji',
        initial=min_value,
        min_value=min_value,
        max_value=max_value,
        decimal_places=2,
        required=True,
        widget=forms.NumberInput(attrs={
            'placeholder': f'{min_value} do {max_value} zł',
            'aria-required': 'true',
            'title': '',
        })
    )
```

NOTE: The **amount** property of the **Payment Intent** object must be defined and cannot be 0. We've set it to 500 (5.00 zł) at the backend in **donateView**.

To maintain consistency and prevent conflicts, let's initialize the Payment Intent's **amount** using the **min_value** from **DonateForm** before serving it to the client.

We will do the same for the **UNIT** of the currency,
and for the **locale** to translate **Payment Element**.

Additionally, restrict client from providing absurd amount of money to mitigate a probable mistake.

NOTE: **decimal_places** is primarily used for visual
clarity and streamlined backend processing.

To ensure transparency, the client must be clearly informed of the exact amount they are about to pay before finalizing the transaction.

📝 project_folder/**app_name/views.py** 🐍 views.py

```
...
from .forms import (
    ModelForm,
    ContactUsForm,
    PlanForm,
    DonateForm
)

...
```

```
@login_required
def donateView(request):
```

```
    form = DonateForm()
    min_value = form.fields['donation'].min_value

    context = {
        'form': form,
        'locale': DonateForm.locale,
        'payment_unit': DonateForm.UNIT,
        'display_price': min_value, # 5 -> 5,00zł
        'stripe_public': settings.STRIPE_PUBLIC_KEY
    }

    # Retrieve the user's Stripe customer ID from its profile
    stripe_customer_id = get_or_create_stripe_customer(request.user)
```

```
    intent = stripe.PaymentIntent.create(
        amount=int(min_value * 100), # 5 -> 0.05zł
        currency='pln',
        customer=stripe_customer_id,
        payment_method_types=['card'],
        description=f'Donation',
    )

    context.update({
        'client_secret': intent.client_secret
    })

    return render(request, 'app_name/donate.html', context)
```

NOTE: imported forms are wrapped inside a tuple to tidy up the codebase

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...
<form id="payment-form" data-secret="{{ client_secret }}">
  {% csrf_token %}
  {{ form|as_crispy }}
  <div id="payment-element">
    <!-- Elements will create form elements here -->
  </div>
...
```

The **donation** field should only be displayed once the **Payment Element** is fully mounted. However, currently, it loads beforehand, which is unintuitive.

Suppose the stripe API **fails to load the Payment Element**. In that case, the client should know that the form is currently unavailable.

In this tutorial, I will only show how to mount both forms at the same time

```
/* --- Show custom <input> "Donation" --- */

// NOTE: This is NOT part of Stripe's documentation

// Mount Donation (Field), once paymentElement is ready
paymentElement.on('ready', () => {

    // Mount/Show the crispy_form divs
    const crispyFormDivs = document.querySelectorAll('[id^="div_id_"]');

    [...crispyFormDivs].map(div => {
        // Add class mounted
        div.classList.add('mounted');
    });

});

// Mount/Show the Payment Element
paymentElement.mount('#payment-element');
```

NOTE: elements with id: “div_id_...” are generated by crispy forms |filter

```
{% block head %}
<style>[id^="div_id_"]:not(.mounted) { display: none; }</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
{% endblock %}
```

```
...
/* --- Show custom <input> "Donation" --- */

// NOTE: This is NOT part of Stripe's documentation

// Update #total-cost (label) when price is changed on input[name="donation"]
const labelTotal = document.getElementById('total-cost'),
      valueTotal = labelTotal.querySelector('.value'),
      parentDonation = document.querySelector('#div_id_donation'),
      inputDonation = parentDonation.querySelector('input[name="donation"]');

inputDonation.addEventListener('input', () => {
    let value = parseFloat(inputDonation.value);

    value = isNaN(value) ? 0 : value;
    valueTotal.innerText = value.toFixed(2).replace('.',',');

    inputDonation.classList.contains('Input--invalid')
        ? labelTotal.classList.add('text-danger')
        : labelTotal.classList.remove('text-danger');
    });

// Mount Donation (Field), once paymentElement is ready
...
```

Summary: added event listener for **donation** input TO update **#total-cost** (Label)

NOTE: **.Input--invalid** is stripe's CSS style & **.text-danger** is Bootstrap v5 CSS

NOTE: This code does not work yet because it relies on **.Input--invalid** class, which is toggled by **field_error.html** extension which we're about to implement

---

Let's update our donation field to support these stripe styles

```
{% block head %}
<link name="stripe.css" rel="stylesheet" href="{% static 'app_name/css/stripe.css' %}">
<style>

[id^="div_id_"]:not(.mounted) { display: none; }

.form-control {
  height: 56.39px !important;
}

</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
{% endblock %}
```

Stripe CSS **and** field_error.html extension

This extension implements essential, real-time validation, feedback for the custom fields. However, it relies on stripe CSS and ID naming convension: **#Field-Type, .p-FieldError**...

We will implement only the essential styles. All of these styles were imported directly from generated Payment Element's <iframe>, some of them were also modified.

📝 `project_folder/app_name/static/app_name/css/stripe.css` stripe.css

```
:root {
    --p-spacing1: 6px;
    --p-spacing3: 18px;
    --borderRadius: 4px;
    --colorText: #30313d;
    --colorDanger: #df1b41;
    --colorBackground: #ffffff;
    --p-colorBackgroundDeemphasize10: #e6e6e6;
    --colorIconLoadingIndicator: #999999;
    --fontSizeSm: 0.93rem;
    --c-inputPaddingRight: 18px;
}
form * {
    font-family: "SF Pro Text",-apple-system,BlinkMacSystemFont,"Segoe UI","Roboto","Helvetica
Neue","Ubuntu",sans-serif;
    color: var(--colorText);
}
input.Input::placeholder {
    color: gray !important;
    opacity: 1;
}
.Input {
    padding: var(--p-spacing3);
    background-color: var(--colorBackground);
    border-radius: var(--borderRadius);
    transition: background 0.15s ease, border 0.15s ease, box-shadow 0.15s ease, color 0.15s ease;
    border: 1px solid var(--p-colorBackgroundDeemphasize10);
    box-shadow: 0px 1px 1px rgba(0, 0, 0, 0.03), 0px 3px 6px rgba(0, 0, 0, 0.02);
}
.Input--invalid {
    color: var(--colorDanger) !important;
    border-color: var(--colorDanger);
    box-shadow: 0px 1px 1px rgba(0, 0, 0, 0.03), 0px 3px 6px rgba(0, 0, 0, 0.02), 0 0 0 1px var(--colorDanger);
}
```

```css
.p-Input-input {
    -webkit-animation: native-autofill-out 1ms;
    animation: native-autofill-out 1ms;
    display: block;
    width: 100%;
}

/* Field select */

.p-Select-select {
    padding-right: calc(var(--c-inputPaddingRight) + 1em) !important;
}

/* Label above Field input */

.Label, .form-label {
    /* Note .form-label is from bootstrap5 |crispy */
    margin-bottom: var(--p-spacing1);
    font-size: var(--fontSizeSm);
    transition: transform 0.5s cubic-bezier(0.19, 1, 0.22, 1), opacity 0.5s cubic-bezier(0.19, 1, 0.22, 1);
}


/* Field--Error (label under input) */

.Error {
    margin-top: var(--p-spacing1);
    color: var(--colorDanger);
    font-size: var(--fontSizeSm);
}
.AnimateSinglePresenceItem {
    transition: transform 0.35s ease-in-out;
}
.AnimateSinglePresenceItem > p {
    opacity: 1;
    transition: opacity 0.35s ease-in-out;
}
.AnimateSinglePresenceItem > p.Field--hide {
    opacity: 0;
    height: 0;
}
.AnimateSinglePresenceItem:has(p.Field--hide) {
    transform: scale(1.25);
}


/* Stripe terms and policies CSS */

.stripe-agreement {
    text-align: center;
    font-size: 0.85rem;
    color: #333;
    padding: 15px 20px;
    background-color: #f9fafb;
    border-top: 1px solid #ddd;
}
.stripe-agreement a {
    color: #0070ba;
    text-decoration: none;
}
.stripe-agreement a:hover {
    text-decoration: underline;
}
.stripe-agreement p {
    margin: 0;
}
```

As you may have noticed in the example picture, an **Error Label** IS **translated** TO **Polish**. For that, we need a custom function: **translateValidity()**

📝 project_folder/**app_name**/static/app_name/js/**translate_validity_pl.js** JS

```
// AI Generated @ copilot.microsoft.com 26/Mar/2025 & edited by McRaZick

const validityTranslations = {
    valueMissing: "To pole jest wymagane.",
    typeMismatch: "Wprowadź poprawny typ danych (np. email lub URL).",
    patternMismatch: "Wartość nie pasuje do wzorca.",
    tooShort: "Wprowadź co najmniej {minLength} znaków.",
    tooLong: "Wartość przekracza maksymalną liczbę znaków ({maxLength}).",
    rangeUnderflow: "Wprowadź wartość większą lub równą {min}.",
    rangeOverflow: "Wprowadź wartość mniejszą lub równą {max}.",
    stepMismatch: "Wartość musi być zgodna z krokiem {step}.",
    customError: "To pole zawiera błąd niestandardowy.",
    valid: ""
};

const translateValidity = (validity, input) => {
    for (let [key, message] of Object.entries(validityTranslations)) {
        if (validity[key]) {
            // Replace placeholders dynamically if applicable
            message = message
                .replace("{minLength}", input.minLength || "")
                .replace("{maxLength}", input.maxLength || "")
                .replace("{min}", input.min || "")
                .replace("{max}", input.max || "")
                .replace("{step}", input.step || "");
            return message;
        }
    }
    return "";
};
```

NOTE: The application of a custom error **is demonstrated later** in the implementation of postal code field

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...
</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
<script name="translate-validity-pl.js" src="{% static 'app_name/js/translate_validity_pl.js' %}"></script>
{% endblock %}
...
```

📝 .../templates/**app_name**/**extensions**/stripe/**field_error.html** </>

```
<div class="AnimateSinglePresence" aria-live="polite">
    <div class="AnimateSinglePresenceItem">
        <p id="Field-{{ id_type }}" class="p-FieldError Error" role="alert" aria-live="polite">
            {{ content }}
        </p>
    </div>
    <script type="text/javascript">
        // private scope wrapper is used to prevent polluting global scope
        (() => {
            const target = document.querySelector("{{ target }}"),
                  script = document.currentScript,
                  parent = script.parentElement,
                  field  = parent.querySelector("#Field-{{ id_type }}"),
                  input  = ("{{ id_type }}" === 'selectError')
                         ? target.querySelector('select')
                         : target.querySelector('input');
```

```
            input.addEventListener('input', () => {
                let validity = input.validity;

                if (!validity.valid) {
                    input.classList.add('Input--invalid');
                    field.classList.remove('Field--hide');
                    field.textContent = translateValidity(validity, input);
                    return;
                }

                // Valid
                input.classList.remove('Input--invalid');
                field.classList.add('Field--hide');
            });
```

```
            // Append this .AnimateSinglePresence to Target
            target.appendChild(parent);
            // Remove this script
            script.remove();
        })();
    </script>
</div>
```

NOTE: id_type, content, and target. We will import them in **{% include %}** tag

Also, we will NOT be using **content** in this tutorial. It is there as an option

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...
</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
<script name="translate-validity-pl.js" src="{% static 'app_name/js/translate_validity_pl.js' %}"></script>
{% endblock %}
...
```

```
...
<form id="payment-form" data-secret="{{ client_secret }}">
  {% csrf_token %}
  {{ form|as_crispy }}
  {{ form.donation|as_crispy_field }}
  <div id="payment-element">
    <!-- Elements will create form elements here -->
  </div>
  {% include 'app_name/extensions/stripe/field_error.html' with id_type="numberError"
target="#div_id_donation" %}
  <section class="stripe-agreement mt-3">
...
```

NOTE: **|as_crispy** is NOT supported for specific fields. Hence, **|as_crispy_field**
NOTE: **id_type** and **target** are passed to the **field_error.html** extension.

NOTE: You can include many **field_error.html** extensions for many fields,
as long as, the field itself, is an <input> or <select> element.

NOTE: SET **id_type** TO “selectError” TO target <select> element.
Anything else targets the <input> element.

The extension will be included in this HTML template before it is served to client. Its <script> self-envokes: (() => {...})(), to apply an event listener used for real-time, input validation feedback functionality for Polish clients.

In this case, the validation functionality is applied for the **donation** input, which is located in **target** parent: **#div_id_donation**.

Almost done…

Let’s add initial stripe styles to the **donation** field from the **DonateForm**

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
class DonateForm(forms.Form):
    locale = 'pl' # code e.g. 'pl', 'gb', 'de'
    UNIT = 'zł'

    min_value = 5 # 5 -> 500 groszy (pennies)
    max_value = 100

    donation = forms.DecimalField(
        label='Kwota donacji',
        initial=min_value,
        min_value=min_value,
        max_value=max_value,
        decimal_places=2,
        required=True,
        widget=forms.NumberInput(attrs={
            'placeholder': f'{min_value} do {max_value} zł',
            'class': 'p-Input-input Input Input-input--empty p-DonationAmountInput-input',
            'inputmode': 'numeric',
            'aria-required': 'true',
            'title': '',
            'id': 'Field-donationAmountInput',
        })
    )
```

NOTE: Defined in widget attribute: “**id**”, is not used in this tutorial. It’s only an example of stripe fields naming convension.

Now, real-time **feedback should be triggered** when the **donation** input is **invalid**

Take note that the input does not receive the **.text-danger** class when its value is empty unless the **required** attribute is provided

This is because we rely on the **.Input--invalid** class, which is added via **field_error.html**

However, validation from the **field_error.html** only applies when the input is genuinely invalid. By adding the **required** attribute, the input is considered invalid when its value is missing, ensuring proper validation

Stripe API handles POST validation for us on **confirmPayment**(). However, **donation** field originates from **DonateForm** (in forms.py). Thereby, it requires custom validation on POST request at the backend TO correctly handle the updation of client’s payment **intent**.

Proceed transaction, with modified by client, amount

```
NOTE: intent_id is required TO update the amount of client's payment intent

NOTE: intent_id is generated by payment intent

NOTE: intent_id can't be exposed to other clients
```

Hence, register new property for all users: **stripe_last_intent_id**

📝 project_folder/**users/models.py** **(users app)** 🐍 models.py

```
...

class Profile(models.Model):
    user = models.OneToOneField(User, on_delete=models.CASCADE)
    stripe_customer_id = models.CharField(max_length=255, blank=True, null=True, unique=True, editable=False)
    stripe_last_intent_id = models.CharField(max_length=255, blank=True, null=True, unique=True, editable=False)
...
```

Display **stripe_last_intent_id** AS read-only in **admin** panel (OPTIONAL)

📝 project_folder/**users/admin.py** **(users app)** 🐍 admin.py

```
from django.contrib import admin
from .models import Profile


class ProfileAdmin(admin.ModelAdmin):
    readonly_fields = (
        'stripe_customer_id',
        'stripe_last_intent_id'
    )
    list_display = [field.name for field in Profile._meta.fields]

# Register your models here.
admin.site.register(Profile, ProfileAdmin)
```

Finally, let's update the **amount** of client's payment **intent** via a POST request in the backend, and address additional errors on failed validation of **DonateForm**

📝 project_folder/**app_name/views.py** **(app_name app)** 🐍 views.py

```
...

@login_required
def donateView(request):

---

...
    request.user.profile.stripe_last_intent_id = intent.id
    request.user.profile.save()

    context.update({
        'client_secret': intent.client_secret
    })

    return render(request, 'app_name/donate.html', context)
...
```

SET client's **stripe_last_intent_id** at **donateView** (TO **target** client's **intent**)

```
...

@login_required
def donateUpdatePaymentIntentView(request):

---

  if request.method != 'POST':
    return JsonResponse({'error': 'Invalid request, expected POST'}, status=400)

  form = DonateForm(request.POST)

  if not form.is_valid():
    return JsonResponse({'error': 'Invalid form', 'form_errors': form.errors}, status=400)

---

  donation = form.cleaned_data.get('donation')

  # Note: amount is in groszy (PLN)
  intent = stripe.PaymentIntent.modify(
    id=request.user.profile.stripe_last_intent_id,
    amount=int(donation * 100),
    metadata={'donation': str(donation)}
  )

  return JsonResponse({'success': 'Updated payment intent', 'donation': donation}, status=200)
...
```

Create **donateUpdatePaymentIntentView** (TO update **amount** of client's **intent**)

📝 project_folder/**app_name/urls.py** **(app_name app)** 🐍 urls.py

```
urlpatterns = [
  ...
  path('donate/', views.donateView, name='donate'),
  path('donate/update-intent/', views.donateUpdatePaymentIntentView,
name='donate_update_intent'),
]
```

Register new path route: **donateUpdatePaymentIntentView**

Utilize HTMX to send POST request and retreive back a JSON response from the backend

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...
<button type="submit" id="submit-button" class="btn btn-primary fw-bold my-3 p-3"
  hx-post="{% url 'donate_update_intent' %}"
  hx-trigger="click delay:500ms"
  hx-swap="none">
    Kontynuuj płatność
</button>
<div id="error-message" role="alert" class="text-danger">
  <!-- Display error message to your customers here -->
</div>
...
```

```
...
/* --- 4. Submit the payment to Stripe --- */

const form = document.getElementById('payment-form');
const errorElement = document.querySelector('#error-message');

form.addEventListener("submit", async (event) => {
  event.preventDefault();
document.addEventListener('htmx:afterRequest', async (event) => {

  // Receive response from the backend
  let responseText = await event.detail.xhr.responseText,
      response = JSON.parse(responseText),
      formErrors = response.form_errors;

... continues on next page
```

```
  // Display error labels for invalid <input>(s) of DonateForm
  if (formErrors) {
    const inputNames = [...form.querySelectorAll('input')].map(input => input.name);

    inputNames.forEach(name => {
      if (!formErrors.hasOwnProperty(name)) return;

      let parent = document.querySelector(`#div_id_${name}`),
          field = parent.querySelector('.p-FieldError'),
          input = parent.querySelector(`input[name="${name}"]`);

      field.innerText = formErrors[name][0];
      field.classList.remove('Field--hide');
      input.classList.add('Input--invalid');
    });
  }
```

```
  if (response.error) {
    // Failure of Payment Intent's modification in the backend.
    // Hence, it is important to prevent further code executions.
    // Otherwise, client may proceed with the initial donation price,
    errorElement.textContent = response.error;
    throw new Error(response.error);
  }
```

```
  const {error} = await stripe.confirmPayment({
    //`Elements` instance that was used to create the Payment Element
    elements,
    confirmParams: {
      return_url: window.location.origin + "{% url 'payment_success' %}",
    },
  });
```

```
  if (error) {
    // This point will only be reached if there is an immediate error when
    // confirming the payment. Show error to your customer (for example, payment
    // details incomplete)
    errorElement.textContent = error.message;
  }
  else {
    // Your customer will be redirected to your `return_url`. For some payment
    // methods like iDEAL, your customer will be redirected to an intermediate
    // site first to authorize the payment, then redirected to the `return_url`.
  }

});
```

Stripe loader extension and exemption of asterisks (*)

Stripe's API requires time to parse essential elements, necessitating a loading indication. To optimize the user experience. This part of the tutorial demonstrates implementation of a loader for the donation field, ensuring seamless loading feedback during the parsing state.

NOTE: Labels for Payment Element fields do not include an asterisk (*).
NOTE: Django fields and Crispy Forms, by default, include an asterisk for required fields.

📝 .../templates/**app_name**/**extensions**/stripe/**extended_mounting.html** </>

```
<div id="mounting" style="margin-bottom: 18px !important;">
  <div style="">
    <div style="height: 12.8204px !important; background-color: rgba(47, 48, 60, 0.04) !important; position: relative !important; overflow: hidden !important; will-change: transform !important; border-radius: 4px !important; width: 65.1407px !important; box-sizing: border-box !important; margin-bottom: 10.2735px !important; box-shadow: rgba(0, 0, 0, 0.03) 0px 1px 1px 0px, rgba(0, 0, 0, 0.02) 0px 3px 6px 0px !important;">
      <div class="loader" style="position: absolute !important; top: 0px !important; left: 0px !important; height: 100% !important; width: 50% !important; transform: translateX(200%); will-change: transform !important; background: linear-gradient(to right, rgba(47, 48, 60, 0), rgba(47, 48, 60, 0.05) 50%, rgba(47, 48, 60, 0)) !important; transition: transform 3000ms;"></div>
    </div>
    <div style="height: 56.3906px !important; padding: 20.1367px !important; box-sizing: border-box !important; background-color: rgb(255, 255, 255) !important; position: relative !important; overflow: hidden !important; border-radius: 4px !important; box-shadow: rgba(0, 0, 0, 0.03) 0px 1px 1px 0px, rgba(0, 0, 0, 0.02) 0px 3px 6px 0px !important; border-width: 1px !important; border-color: rgb(230, 230, 230) !important; border-style: solid !important;">
      <div style="height: 12.8204px !important; background-color: rgba(47, 48, 60, 0.04) !important; position: relative !important; overflow: hidden !important; will-change: transform !important; border-radius: 4px !important; width: 65.1407px !important; box-sizing: border-box !important;">
        <div class="loader" style="position: absolute !important; top: 0px !important; left: 0px !important; height: 100% !important; width: 50% !important; transform: translateX(200%); will-change: transform !important; background: linear-gradient(to right, rgba(47, 48, 60, 0), rgba(47, 48, 60, 0.05) 50%, rgba(47, 48, 60, 0)) !important; transition: transform 3000ms;"></div>
      </div>
    </div>
  </div>
</div>
```

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
<style>

#mounting:not(.mounted), [id^="div_id_"]:not(.mounted) { display: none; }
...
```

```
...
<form id="payment-form" data-secret="{{ client_secret }}">
    {% csrf_token %}
    {% include 'app_name/extensions/stripe/extended_mounting.html' %}
    {{ form.donation|as_crispy_field }}
    <div id="payment-element">
        <!-- Elements will create form elements here -->
    </div>
...
```

Add Style: #mounting:not(.mounted), **Include Extension:** extended_mounting.html

```
...
function refreshLoaderAnimation() {
    const loaders = [...document.querySelectorAll('.loader')];

    loaders.map(loader => {
        // Get clone of the loader with initial X position: -100%
        const parent = loader.parentNode;
        const clone = loader.cloneNode(true);
              clone.style.transform = 'translateX(-100%)';

        // Remove the original 'loader' element and re-attach it
        parent.removeChild(loader);
        parent.appendChild(clone);

        // Start slide-transition animation after 1 second
        setTimeout(() => {
            clone.style.transform = 'translateX(200%)';
        }, 0);
    });
}

// Mount Donation (Field), once paymentElement is ready
... continues on the next page
```

Add function at section: /* --- Show custom <input> “Donation” --- */

NOTE: This function is used to start the loaders’ animation

```
... function refreshLoaderAnimation() {...} is above

// Select the target node
const targetNode = document.getElementById('payment-element');

// Create an instance of MutationObserver
const observer = new MutationObserver((mutationsList) => {
  mutationsList.forEach((mutation) => {
    const privateStripeLoader = targetNode.querySelector('.__PrivateStripeElementLoader');
    if (!privateStripeLoader) return;

    // Start the loader animation at #mounting
    refreshLoaderAnimation();
    setInterval(refreshLoaderAnimation, 3500);
      document.getElementById('mounting').classList.add('mounted');
      observer.disconnect();
  });
});

observer.observe(targetNode, {childList: true, subtree: true });
...
```

```
Observe: #payment-element FOR .__PrivateStripeElementLoader

This observer .mounts (displays) Extension: extended_mounting.html (loader)
when .__PrivateStripeElementLoader IS parsed in: #payment-element
```

```
...
// Mount Donation (Field), once paymentElement is ready
paymentElement.on('ready', () => {

    // Remove #mounting with .loader(s)
    document.getElementById('mounting').remove();
    clearInterval(refreshLoaderAnimation);

    // Mount/Show the crispy_form divs
    const crispyFormDivs = document.querySelectorAll('[id^="div_id_"]');

    [...crispyFormDivs].map(div => {
        // Remove '*' from label
        let label = div.querySelector('label');
        label.innerText = label.innerText.replace('*', '');
        // Add class mounted
        div.classList.add('mounted');
    });
});
```

```
Interval: refreshLoaderAnimation IS unrequired WHEN paymentElement IS parsed

Let's also REMOVE: the asterisks (*) FROM: the additional fields' <label>
```

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
class DonateForm(forms.Form):
    locale = 'pl' # code e.g. 'pl', 'gb', 'de'
    UNIT = 'zł'

    min_value = 5 # 5 -> 500 groszy (pennies)
    max_value = 100

    donation = forms.DecimalField(...)

    class Meta:
        # Disclude the '*' suffix from the fields
        # NOTE: This does not work for crispy forms
        # Because crispy filters alter the, altered by Meta class, fields
        label_suffix = ''
```

NOTE: This is an **OPTIONAL SOLUTION** for REMOVING **asterisk** (and other suffixes) FROM the fields' <label>.

NOTE: Crispy filters, such as (form**|as_crispy** & form.field**|as_crispy_field**) include asterisk (*) FOR fields containing **requried** attribute.

Now, additional **loading feedback should be displayed only** during the parsing phase of the Payment Element

The initial appearance of the loader extension seems to be synchronous with the loaders generated by the Stripe API in the Payment Element Form. However, it isn't perfect on a slow internet connection and during intensive throttling.

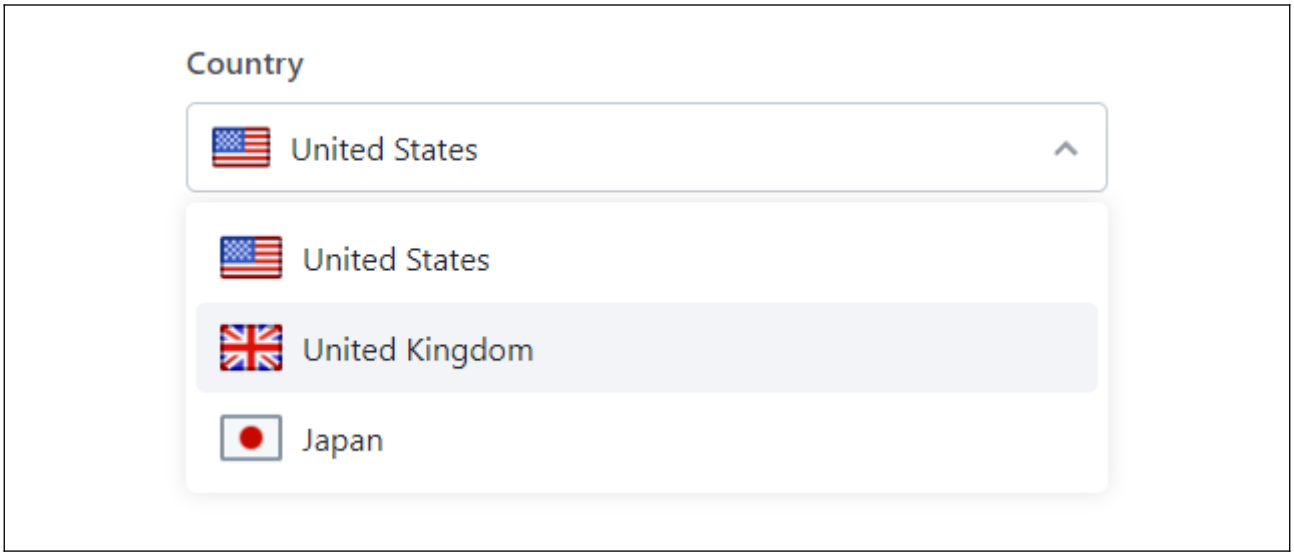
Additionally, Stripe is an external service, which may be prone to change in the future, adding unnecessary maintenance requirements in terms of frontend design. Therefore, it's best not to include additional loaders entirely.

Dynamic Select Images **with** Flag Icons

The main functionality is successfully implemented. However, the default country field in Stripe API lacks visual distinction, as it does not display country flags. This makes it harder for users to quickly identify and select their desired country option.

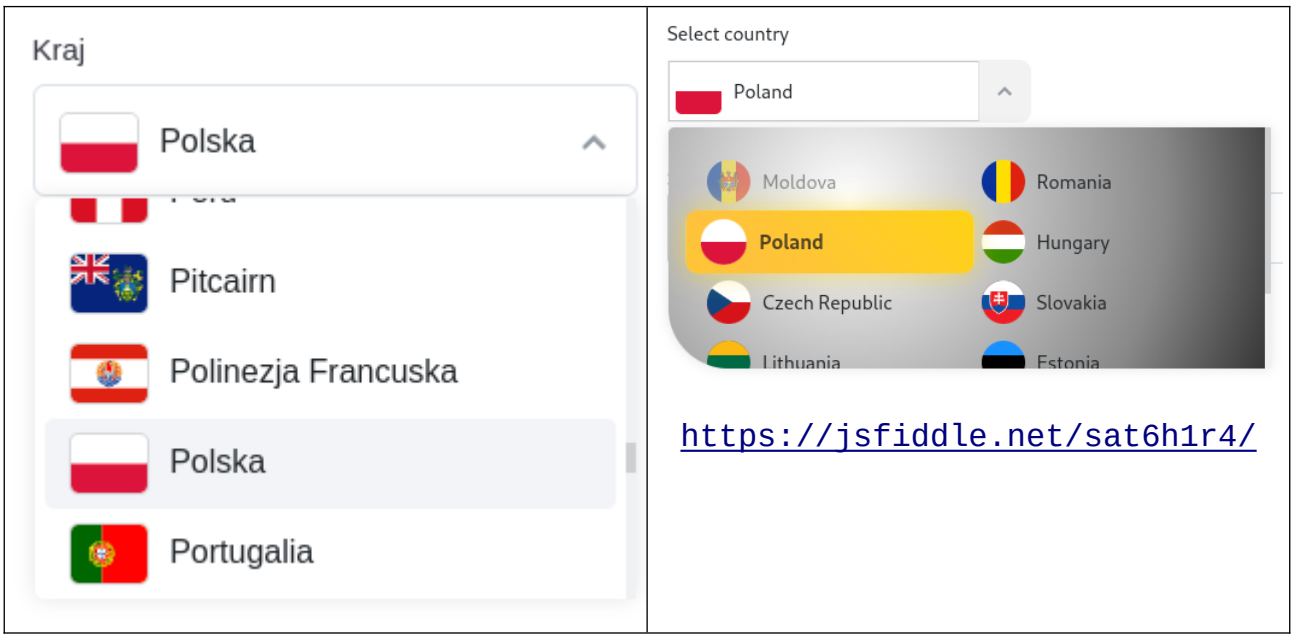
Flag Icons: https://github.com/lipis/flag-icons/
Download Flags from: https://flagicons.lipis.dev/

Dynamic Select Images created by "David Adams" (JS Library)
https://codeshack.io/dynamic-select-images-html-javascript/

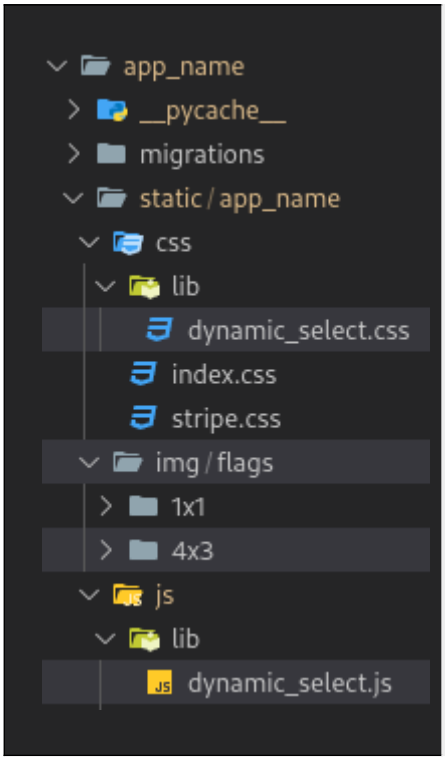


This tutorial utilizes **Dynamic Select Images** with additional "Accessability" functionality.

Dynamic Select Images created by "David Adams" and modified by "McRaZick"
https://github.com/gubrus50/dynamic-select-images-js



https://jsfiddle.net/sat6h1r4/



Install dynamic_select.css

https://raw.githubusercontent.com/gubrus50/dynamic-select-images-js/refs/heads/main/DynamicSelect.css

Install dynamic_select.js

https://raw.githubusercontent.com/gubrus50/dynamic-select-images-js/refs/heads/main/DynamicSelect.js

---

Install flag-icons-main.zip (4x3)

https://flagicons.lipis.dev/

Install django-countries

Countries and territories evolve over time, with some gaining international recognition while others remain disputed due to geopolitical factors. Stripe's API includes an object listing the countries where its services are available. However, making frequent requests for this data at scale is inefficient. Maintaining a custom list of countries presents its own challenges, requiring regular updates.

A more practical approach is to use the django-countries library, which provides an up-to-date list of recognized countries and territories. While some entries in this dataset may lack international recognition, we can filter them out if necessary. Additionally, Stripe's API can validate country data when processing a POST request on **confirmPayment**(), ensuring only supported locations are accepted.

🖥️ (venv) @ project_folder 📚 pip library

```
pip install django-countries
pip freeze > requirements.txt # update requirements.txt
```

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
from django_recaptcha.fields import ReCaptchaField
from django_countries import countries

from django import forms
from .models import ModelName


---


class DonateForm(forms.Form):
    locale = 'pl' # code e.g. 'pl', 'gb', 'de'
    UNIT = 'zł'

    min_value = 5 # 5 -> 500 groszy (pennies)
    max_value = 100

    donation = forms.DecimalField(...)

    # CHOICES = [('PL', 'Poland'), ('GB', 'Great Britain') ...]
    country = forms.ChoiceField(
    label='Kraj',
    choices=[(code, name) for code, name in countries],
    widget=forms.Select(attrs={
        'class': 'Input p-Select-select',
        'inputmode': 'text',
        'aria-required': 'true',
        'autocomplete': 'billing country',
        'title': '',
        'id': 'Field-countryInput',
    }),
    required=True
    )

    class Meta:
        # Disclude the '*' suffix from the fields
        # NOTE: This does not work for crispy forms
        # Because crispy filters alter the, altered by Meta class, fields
        label_suffix = ''
```

NOTE: choices=[] list is populated with django_countries.
However, it should contain country names in Polish.

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...

.dynamic-select img {
  border-radius: 5px;
  border: 1px solid #d4d7da;
}

</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
<script name="DynamicSelect.js" src="{% static 'app_name/js/lib/dynamic_select.js' %}"></script>
<script name="translate-validity-pl.js" src="{% static 'app_name/js/translate_validity_pl.js' %}"></script>
{% endblock %}
...
```

Insert “dynamic_select.js” FROM {% static %} libraries directory

```
...
<form id="payment-form" data-secret="{{ client_secret }}">
    {% csrf_token %}
    {% include 'app_name/extensions/stripe/extended_mounting.html' %}

---

    {{ form.donation|as_crispy_field }}
    <div id="payment-element">
        <!-- Elements will create form elements here -->
    </div>
    {{ form.country|as_crispy_field }}

---

    {% include 'app_name/extensions/stripe/field_error.html' with
id_type="numberError" target="#div_id_donation" %}
    {% include 'app_name/extensions/stripe/field_error.html' with
id_type="selectError" target="#div_id_country" %}
    <section class="stripe-agreement mt-3">
...
```

Include country field **AND** provide real-time validation feedback

```
// Mount Donation & Billing Address (Fields), once paymentElement is ready
paymentElement.on('ready', () => {

    // --- Include flag-icons TO <select> country (using DynamicSelect)

    const __flags = "{% static 'app_name/img/flags/4x3' %}",
          country = document.querySelector('#div_id_country > select'),
          options = country.querySelectorAll('option');

    [...options].map(option => { // NOTE: 'xx' is empty/white flag
        let countryCode = (option.value || 'xx').toLowerCase();
        option.dataset.img = __flags + `/${countryCode}.svg`;
    });

    // https://github.com/gubrus50/dynamic-select-images-js
    new DynamicSelect('#div_id_country > select', {
        class: 'form-control px-0',
        selectedStyle: 'border: 0',
        onChange: function updateAndValidatePostalCode(value, text, option) {

            // Hide invalid field of <dynamic-select> and danger highlight
            let input = document.querySelector('#div_id_country input');
            if (input && input.value.length) {

                let parent = document.querySelector('#div_id_country'),
                    select = parent.querySelector('dynamic-select'),
                     field = parent.querySelector('.p-FieldError');

                select.classList.remove('Input--invalid');
                field.classList.add('Field--hide');
            }
        }
    });

    // Remove #mounting with .loader(s)
    ... previously implemented code
});
```

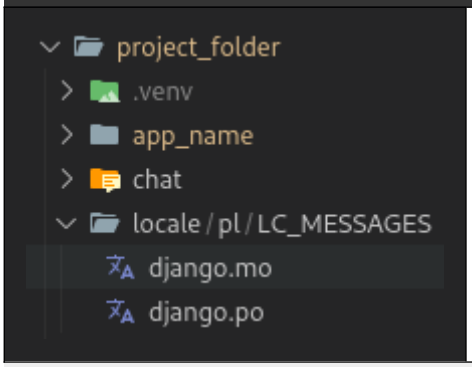
NOTE: new DynamicSelect creates new instance of <dynamic-select> element
Learn about DS: https://github.com/gubrus50/dynamic-select-images-js

Now you should be able to see a country field with flags.

Let's **include translated countries** TO the **country** field.

Translate country names **with** Polish locale messages

(venv) @ project_folder (Linux)




```
← Create tree for locale folder

mkdir -p locale/pl/LC_MESSAGES

← Create messages  django.po template for locale PL

django-admin makemessages -l pl
```

```
NOTE: django.po file IS USED TO generate django.mo
      django.mo is USED FOR translation purposes.
```

DOCS - Internalization & localization: https://docs.djangoproject.com/en/5.1/topics/i18n/

project_folder/my_website/**settings.py** settings.py

```
LOCALE_PATH = [
    os.path.join(BASE_DIR, 'locale')
]
```

```
LANGUAGES = [
    ('en', 'English'),
    ('pl', 'Polish'),
]
```

```
LANGUAGE_CODE = 'en-us'
```

```
USE_I18N = True
```

```
NOTE: LANGUAGE_CODE defines the global language setting.
      However, only donateView is specifically designed for Polish clients.
      Therefore, LANGUAGE_CODE remains set to English.
```

Edit file **django.po** to translate countries (**remove** `# ,fuzzy` at `.po` TO indicate finalized file).

OR - Download template: [django5-tutorial - PL locale - django.po countries and territories]

NOTE: providing both **msgid** with same value results in compilors failure.

📝 project_folder/**locale/pl**/LC_MESSAGES/**django.po** 🔤 django.po

INVALID	VALID

`msgid "Poland"`
`msgstr "Polska"`
 	
`msgid "Poland"`
`msgstr "Polonia"`
	`msgid "Netherlands"`
	`msgstr "Holandia"`
	
	`msgid "Holland"`
	`msgstr "Holandia"`

🖥️ (venv) @ project_folder (Linux)

```
# (All) Recommended when manage.py is initialized.

python manage.py compilemessages
```

```
# (All) Recommended when manage.py is NOT initialized.

django-admin compilemessages
```

```
# (Linux) This option provides a detailed output in terminal, in case something goes wrong.

msgfmt django.po -o django.mo
```

GENERATE django.mo file used for translating

📝 project_folder/**.gitignore** .gitignore

```
# Optional ignore rule for any file with domain .mo at locale/ directory.

locale/*.mo
```

EXCLUDE django.mo files when deploying a project to platforms like GitHub.

These files, similar to compiled SASS/SCSS (output → CSS), do not need to be stored in the repository since they can be generated as needed during development or when the project is served live in a production environment.

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```python
from django_recaptcha.fields import ReCaptchaField
from django.utils.translation import activate, gettext_lazy as _
from django_countries import countries

from django import forms
from .models import ModelName
```

```python
class DonateForm(forms.Form):
...
    # CHOICES = [('PL', 'Poland'), ('GB', 'Great Britain') ...]
    country = forms.ChoiceField(
    label='Kraj',
    choices=[],
...
```

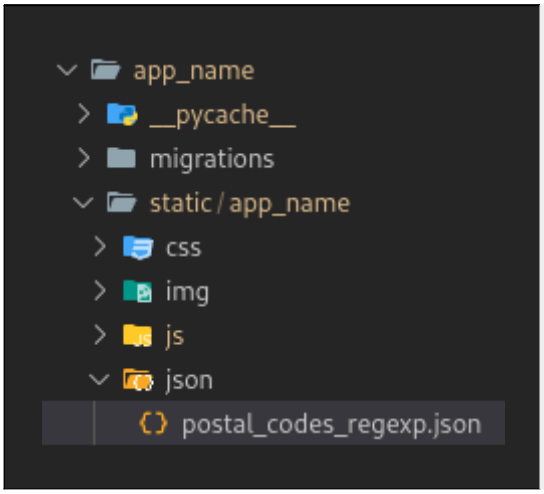
```python
    class Meta:
        # Disclude the '*' suffix from the fields
        # NOTE: This does not work for crispy forms
        # Because crispy filters alter the, altered by Meta class, fields
        label_suffix = ''

    def __init__(self, *args, **kwargs):
        super().__init__(*args, **kwargs)

        # Generate country list in the correct language
        activate(self.locale)
        # Manually translate country names using Django's gettext
        self.fields['country'].choices = [
            (code, _(name)) # Wrap country name in gettext_lazy
            for code, name in countries
        ]

        # Select initial county (currently selected)
        self.fields['country'].initial = self.locale.upper()
```

```
NOTE: activate() initializes the locale, so that gettext_lazy:
            _() can translate the country names.
```

Some **countries requrie postal code** to complete payments,

Let’s implement custom postal code field.

Custom Postalcode Field



Install postal_codes_regexp.json

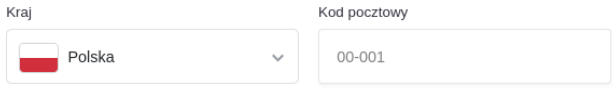
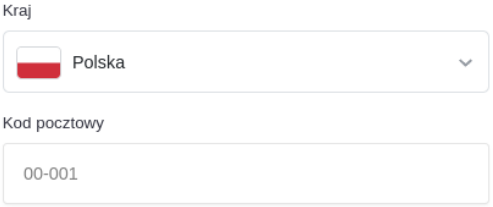
https://github.com/gubrus50/django5-tutorial/blob/main/project_folder/app_name/static/app_name/json/postal_codes_regexp.json

📝 project_folder/**app_name/forms.py** 🐍 forms.py

```
class DonateForm(forms.Form):
...
```

```
    # CHOICES = [('PL', 'Poland'), ('GB', 'Great Britain') ...]
    country = forms.ChoiceField(...)

    postal_code = forms.CharField(
      label='Kod pocztowy',
      max_length=15,
      widget=forms.TextInput(attrs={
        'placeholder': '12-345',
        'class': 'p-Input-input Input Input-input--empty p-PostalCodeInput-
input',
        'inputmode': 'text',
        'aria-required': 'true',
        'data-country-parent': '#div_id_country',
        'autocomplete': 'billing postal-code',
        'title': '',
          'id': 'Field-postalCodeInput',
      }),
      required=True
    )

...
```

NOTE: The dataset **data-country-parent** is required to update the postcode validation expression based on the selected country at **#div_id_country**

Desktop - space between	Mobile - stack
	

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
. . .

.side-by-side > div {
    flex-grow: 1;
    flex-shrink: 1;
    flex-basis: auto;
    width: 100%;
    transition: all 1.25s cubic-bezier(0.68, -0.55, 0.27, 1.55), margin 0.1s ease-out;
}

.smooth-collapse {
    width: 0px !important;
    opacity: 0;
}
.smooth-collapse[data-width="0"] {
    margin: 0px !important;
    position: absolute;
}

/* Desktop - space between */
@media (min-width: 767px) {
    .side-by-side {
        display: flex;
    }
    .side-by-side > div:last-child {
        margin-left: 20px; /* This replaces the spacing div */
    }
}

/* Mobile - stack */
@media (max-width: 766px) {
    .side-by-side > div:last-child {
        margin-top: 10px; /* Space between stacked containers */
        margin-left: 0;
    }
}

.dynamic-select img {
. . .
```

```
...
</style>
<script name="stripe.js" src="https://js.stripe.com/v3/"></script>
<script name="DynamicSelect.js" src="{% static 'app_name/js/lib/dynamic_select.js' %}"></script>
<script name="translate-validity-pl.js" src="{% static 'app_name/js/translate_validity_pl.js' %}"></script>
<script name="postal-code-validation" type="text/javascript">

---

let POSTAL_CODES_REGEXP;

fetch("{% static 'app_name/json/postal_codes_regexp.json' %}")
  .then(response => {
    if (!response.ok) throw new Error(`HTTP error! Status: ${response.status}`);
    return response.json();
  })
  .then(data => {
    POSTAL_CODES_REGEXP = data;
  })
  .catch(error => console.error("Error:", error));

---

const isCountriesPostalCodeValid = (countryCode, postalCode) => {

    let isValid = false;

    POSTAL_CODES_REGEXP.forEach(obj => {
        if (countryCode.toLowerCase() === obj.abbrev.toLowerCase()) {
            // Return if postal-code doesn't match regex
            if (!postalCode.match(new RegExp(obj.postal || ""))) return;
            // Is valid if postal-code matches the regexp-example-length
            if (obj.example) {
                if (obj.example.length == postalCode.length) isValid = true;
                else return;
            }
            // Is valid if postal-code is not empty
            isValid = (postalCode.length > 0);
        }
    });

    return isValid;
}

---

</script>
{% endblock %}
```

```
NOTE: Fetch REQUESTS and PARSES
      → postal_codes_regexp.json AS POSTAL_CODES_REGEXP IN global scope

It will be also used TO enhance the country field <dynamic-select>

isCountriesPostalCodeValid is used TO improve extension: field_error.html
```

Enhance field_error.html extension + translate validity

📝 project_folder/**app_name**/static/app_name/js/**translate_validity_pl.js** JS

```js
// AI Generated @ copilot.microsoft.com 26/Mar/2025 & edited by McRaZick

const validityTranslations = {
    valueMissing: "To pole jest wymagane.",
    typeMismatch: "Wprowadź poprawny typ danych (np. email lub URL).",
    patternMismatch: "Wartość nie pasuje do wzorca.",
    tooShort: "Wprowadź co najmniej {minLength} znaków.",
    tooLong: "Wartość przekracza maksymalną liczbę znaków ({maxLength}).",
    rangeUnderflow: "Wprowadź wartość większą lub równą {min}.",
    rangeOverflow: "Wprowadź wartość mniejszą lub równą {max}.",
    stepMismatch: "Wartość musi być zgodna z krokiem {step}.",
    customError: "To pole zawiera błąd niestandardowy.",
    invalidPostalCode: "Wprowadź poprawny kod pocztowy.",
    valid: ""
};

const translateValidity = (validity, input) => {
    for (let [key, message] of Object.entries(validityTranslations)) {
        if (validity[key]) {
            // Replace placeholders dynamically if applicable
            message = message
                .replace("{minLength}", input.minLength || "")
                .replace("{maxLength}", input.maxLength || "")
                .replace("{min}", input.min || "")
                .replace("{max}", input.max || "")
                .replace("{step}", input.step || "");
            return message;
        }
    }
    return "";
};
```

Let's **update** field_error.html

📝 .../templates/**app_name**/**extensions**/stripe/**field_error.html** </>

```
<div class="AnimateSinglePresence" aria-live="polite">
    <div class="AnimateSinglePresenceItem">
        <p id="Field-{{ id_type }}" class="p-FieldError Error" role="alert" aria-live="polite">
            {{ content }}
        </p>
    </div>
    <script type="text/javascript">
        // private scope wrapper is used to prevent polluting global scope
        (() => {
            const target = document.querySelector("{{ target }}"),
                  script = document.currentScript,
                  parent = script.parentElement,
                  field  = parent.querySelector("#Field-{{ id_type }}"),
                  input  = ("{{ id_type }}" === 'selectError')
                         ? target.querySelector('select')
                         : target.querySelector('input');
```

```
            input.addEventListener('input', () => {
                let validity = input.validity;

                if (!validity.valid) {
                    input.classList.add('Input--invalid');
                    field.classList.remove('Field--hide');
                    field.textContent = translateValidity(validity, input);
                    return;
                }
                else if (input.id === 'Field-postalCodeInput') {
                    let countryParent = document.querySelector(input.dataset.countryParent),
                         countryInput = countryParent.querySelector('input'),
                          countryCode = countryInput.value,
                           postalCode = input.value;

                    // Invalid PostCode
                    if (!isCountriesPostalCodeValid(countryCode, postalCode)) {
                        input.classList.add('Input--invalid');
                        field.classList.remove('Field--hide');
                        field.textContent = translateValidity({
                            'invalidPostalCode': true
                        }, input);
                        return;
                    }
                }
                // Valid
                input.classList.remove('Input--invalid');
                field.classList.add('Field--hide');
            });
...
```

Organize billing address fields country & postal_code

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
...
<form id="payment-form" data-secret="{{ client_secret }}">
    {% csrf_token %}
    {% include 'app_name/extensions/stripe/extended_mounting.html' %}
    ---------------------------------------------------------------
    {{ form.donation|as_crispy_field }}
    <div id="payment-element">
        <!-- Elements will create form elements here -->
    </div>
    {{ form.country|as_crispy_field }}
    <div id="billing-address" class="p-0 m-0">
        <div class="side-by-side">
            {{ form.country|as_crispy_field }}
            {{ form.postal_code|as_crispy_field }}
        </div>
        <script type="text/javascript">
          // Remove <br> nodes from billing-address fields' <label>.
          // And marginate fields vertically like those in Payment Element.
          (() => {
              let script = document.currentScript,
              fields = script.parentElement.querySelectorAll('[id^="div_id_"]'),
              label = null;

              [...fields].map(field => {
                  field.classList.replace('mb-3', 'my-3');
                  label = field.querySelector('label.form-label');
                  label.innerHTML = label.innerText.trim();
              });

              script.remove();
          })();
        </script>
    </div>
    {% include 'app_name/extensions/stripe/field_error.html' with
id_type="numberError" target="#div_id_donation" %}
    {% include 'app_name/extensions/stripe/field_error.html' with
id_type="selectError" target="#div_id_country" %}
    {% include 'app_name/extensions/stripe/field_error.html' with
id_type="postalCodeError" target="#div_id_postal_code" %}
    <section class="stripe-agreement mt-3">
...
```

```
// Mount Donation & Billing Address (Fields), once paymentElement is ready
paymentElement.on('ready', () => {
...
```

```
    let parentPC = document.querySelector('#div_id_postal_code'),
         inputPC = document.querySelector('#div_id_postal_code > input'),
         fieldPC = document.querySelector('#Field-postalCodeError'),
         limitPC = inputPC.getAttribute('maxlength');

    // Set initial maxlength for postal-code input, based on selected country
    POSTAL_CODES_REGEXP.forEach(obj => {
        if (obj.abbrev.toLowerCase() !== country.value.toLowerCase()) return;
        else if (limitPC)
            inputPC.setAttribute('maxlength', obj.example.length ?? limitPC);
    });
```

```
    // https://github.com/gubrus50/dynamic-select-images-js
    new DynamicSelect('#div_id_country > select', {
        class: 'form-control px-0',
        selectedStyle: 'border: 0',
        onChange: function updateAndValidatePostalCode(value, text, option) {
```

```
            POSTAL_CODES_REGEXP.forEach(obj => {
                // Return if country doesn't match
                if (obj.abbrev.toLowerCase() !== value.toLowerCase()) return;
                // Hide & disable #div_id_postal_code IF obj has no postal-code
                if (!obj.postal) {
                    inputPC.setAttribute('disabled', '');
                    inputPC.setAttribute('aria-required', false);
                    parentPC.classList.add('smooth-collapse');
                    return;
                }
                // Otherwise, show & enable #div_id_postal_code
                else if (inputPC.hasAttribute('disabled')) {
                    inputPC.removeAttribute('disabled');
                    inputPC.setAttribute('aria-required', true);
                    parentPC.classList.remove('smooth-collapse');
                }
                // Update placeholder and maxlength for postal-code <input>
                inputPC.setAttribute('placeholder', obj.example ?? '');
                if (limitPC) inputPC.setAttribute(
                    'maxlength', obj.example.length ?? limitPC
                );

                ... continutes on the next page
```

```
                // Clear postal-code <input>, and hide invalid field
                inputPC.value = '';
                inputPC.classList.remove('Input--invalid');
                fieldPC.classList.add('Field--hide');
            });
```

```
            // Hide invalid field of <dynamic-select> and danger highlight
            ... previously implemented code
        }
    });
```

```
    // Remove #mounting with .loader(s)
    ... previously implemented code
});

// Update data-width of #div_id_postal_code (used for transition animation)
setInterval(() => { parentPC.dataset.width = parentPC.clientWidth }, 10);
```

NOTE: Postal code field inherits transition animation FROM **.side-by-side**

NOTE: dataset **width** is used to support **.smooth-collapse** stylesheet class

---

NOTE: Postal code field should collapse (hide) when property: “postal”,
is NOT provided IN **postal_codes_regexp.json** → **POSTAL_CODES_REGEXP**

NOTE: As postal code field is collapsing, the country field should expand
gradually and cover the available width of **#billing-address** wrapper

---

NOTE: Error field OF postal code field IS now corresponding
TO the real-time change OF the country field’s value

Let’s replace Payment Element’s **billing address** with the custom one

Initialize custom billing address as main address line

📝 project_folder/**app_name**/templates/app_name/**donate.html** </> donate.html

```
// Set up Stripe.js and Elements to use in checkout form,
// passing the client secret obtained in a previous step
const elements = stripe.elements(options);

// Create Payment Element
const paymentElementOptions = {
    layout: {
        type: 'tabs', // accordion | tabs | auto
        defaultCollapsed: false,
    },
    fields: {
        billingDetails: {
            address: 'never',
        },
    }
};

const paymentElement = elements.create('payment', paymentElementOptions);

// Mount/Show the Payment Element
paymentElement.mount('#payment-element');
```

NOTE: **billing_details** must be manually provided AT **confirmPayment**
OF payment element with **billing_details** option SET to “never”

NOTE: **billing_details** AT payment_method_data requires properties:
line1, line2, city, state, postal_code, and country

```
document.addEventListener('htmx:afterRequest', async (event) => {
...
```

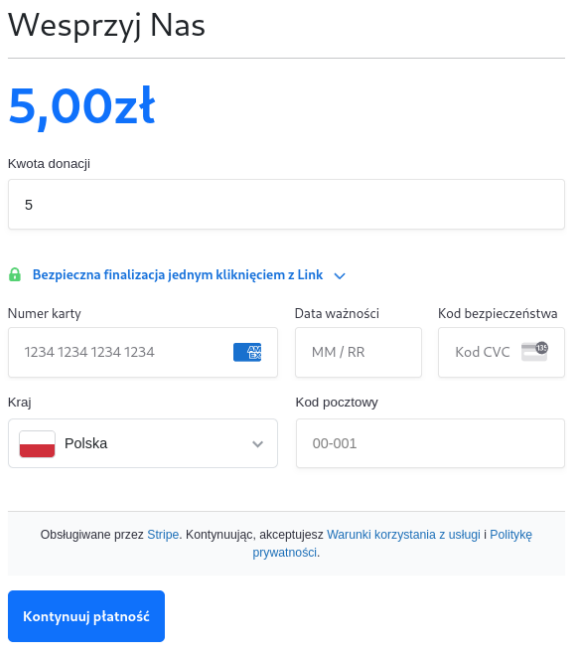
```
    const {error} = await stripe.confirmPayment({
        //`Elements` instance that was used to create the Payment Element
        elements,
        confirmParams: {
            return_url: window.location.origin + "{% url 'payment_success' %}",
            /* IF You've disabled billing_details,
                THEN You must specify payment_method_data manually */
            payment_method_data: {
                billing_details: {
                    address: {
```

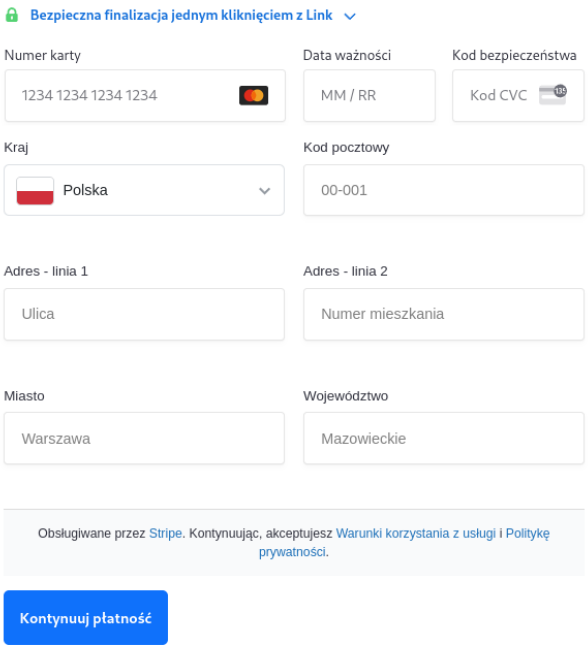
```
... confirmParams {

payment_method_data: {
 billing_details: {
  address: {
   // Get, required for Stripe API, billing data
   line1: document.querySelector('#div_id_line_1 > input:not(:disabled)')?.value || null,
   line2: document.querySelector('#div_id_line_2 > input:not(:disabled)')?.value || null,
   city : document.querySelector('#div_id_city   > input:not(:disabled)')?.value || null,
   state: document.querySelector('#div_id_state  > input:not(:disabled)')?.value || null,
   postal_code: document.querySelector('#div_id_postal_code > input:not(:disabled)')?.value || null,
   // Get the appropriate country code (e.g., 'GB' for the United Kingdom)
   country: document.querySelector('#div_id_country input[name="country"]:not(:disabled)')?.value
         || document.querySelector('#div_id_country > select:not(:disabled)')?.value
         || null,
  },
 },
},

...
```

NOTE: Country value of the target: “#div_id_country > select” is used instead WHEN the select element fails to convert into a <dynamic-select> element

Since this is a donation form, collecting address details such as line1, line2, city, and state is unnecessary unless required for specific purposes - such as, shipping a product purchased through the payment element.

You should be able to implement additional fields when needed by defining them first in the **DonateForm** and by attaching additional functionality using the custom-defined extensions





2FA (Two Factor Authentication) 👤📲🔏

(in progress...)