Contents

E-commerce system with microservices **1**
Main technologies 1
Description 1
Logging 3
Service Discovery and Load Balancer 3
Class Diagrams 4
API Documentation 4
How to run 10

E-commerce system with microservices

Main technologies

- Python
- Django
- Django REST Framework (DRF)
- PostgreSQL
- JWT (JSON Web Token)
- Redis
- Traefik
- Consul
- Docker
- Docker Compose
- Vite (frontend)

Description

The **eCommerce with Microservices** project tests the Django REST Framework for microservices-based architectures.

The project uses the following technologies:

1. **Docker** – containerises services.
2. **Docker Compose** – orchestrates multi-container setup.
3. **Traefik** – acts as a dynamic **API Gateway** and **Reverse Proxy**, routes HTTP(S) traffic to appropriate microservices based on domain names and paths. It also manages **SSL certificates** (Let's Encrypt) and integrates with **Consul** for service discovery.
4. **Consul** – provides **Service Discovery** and simple **Load Balancing** by registering available services and their health.
5. **PostgreSQL** – used as the **relational database (RDBMS)**.
6. **Redis** – in-memory **cache** to reduce database load.

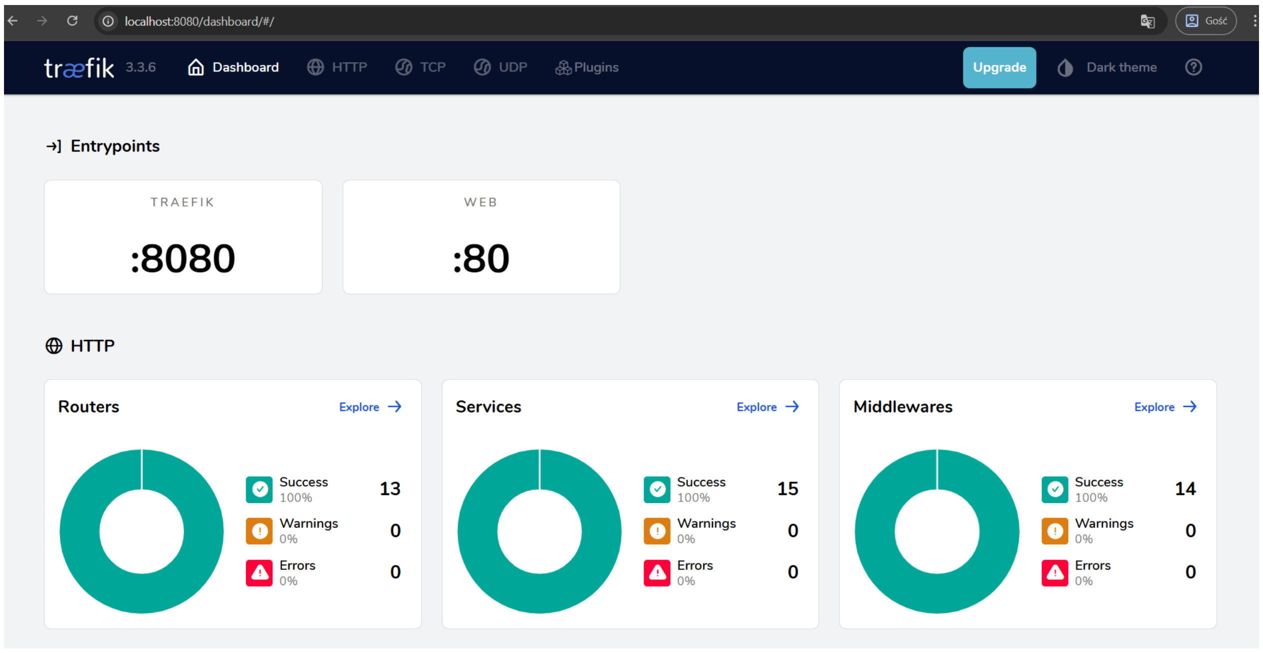
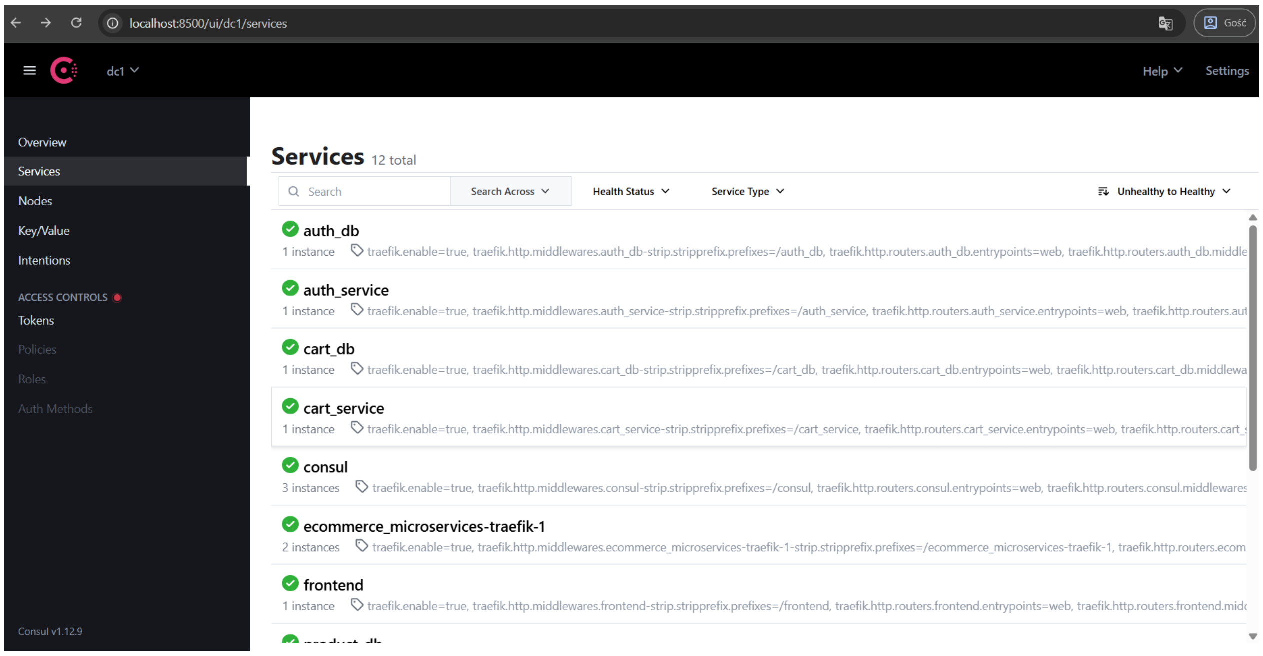


Figure 1: Traefik screenshot



Services 12 total

auth_db
1 instance traefik.enable=true, traefik.http.middlewares.auth_db-strip.stripprefix.prefixes=/auth_db, traefik.http.routers.auth_db.entrypoints=web, traefik.http.routers.auth_db.middle

auth_service
1 instance traefik.enable=true, traefik.http.middlewares.auth_service-strip.stripprefix.prefixes=/auth_service, traefik.http.routers.auth_service.entrypoints=web, traefik.http.routers.aut

cart_db
1 instance traefik.enable=true, traefik.http.middlewares.cart_db-strip.stripprefix.prefixes=/cart_db, traefik.http.routers.cart_db.entrypoints=web, traefik.http.routers.cart_db.middlewa

cart_service
1 instance traefik.enable=true, traefik.http.middlewares.cart_service-strip.stripprefix.prefixes=/cart_service, traefik.http.routers.cart_service.entrypoints=web, traefik.http.routers.cart_

consul
3 instances traefik.enable=true, traefik.http.middlewares.consul-strip.stripprefix.prefixes=/consul, traefik.http.routers.consul.entrypoints=web, traefik.http.routers.consul.middlewares

ecommerce_microservices-traefik-1
2 instances traefik.enable=true, traefik.http.middlewares.ecommerce_microservices-traefik-1-strip.stripprefix.prefixes=/ecommerce_microservices-traefik-1, traefik.http.routers.ecom

frontend
1 instance traefik.enable=true, traefik.http.middlewares.frontend-strip.stripprefix.prefixes=/frontend, traefik.http.routers.frontend.entrypoints=web, traefik.http.routers.frontend.mid

Figure 2: Consul screenshot

7. **JWT** – used for secure authentication and authorization between services.
8. **Vite** – for building the frontend.

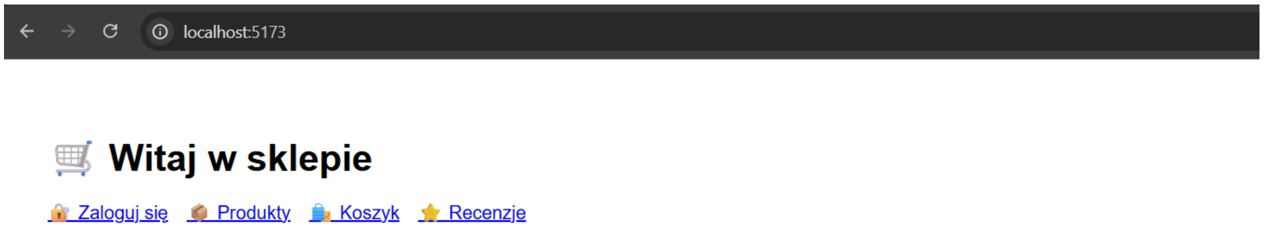


Figure 3: Frontend screenshot

Note: Each microservice has its **own database instance**.

Logging

All services log their activity. Each service has a `logs` directory. The logging level is set in the `api.env` file. Available logging levels:

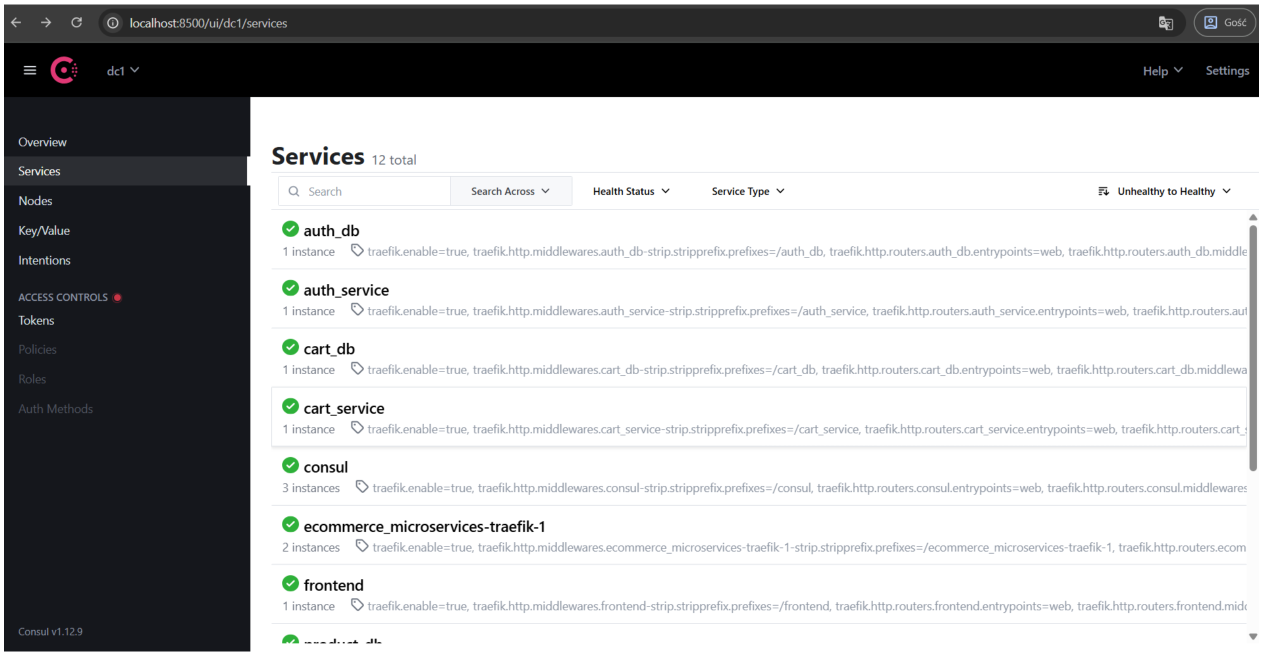
- DEBUG
- INFO
- ERROR

Service Discovery and Load Balancer

Consul handles service discovery and load balancing. All services register automatically using the `service_registrar` script during startup (via Docker Compose).

Services are visible at:

```
http://localhost:8500/
```



Services 12 total

auth_db
1 instance traefik.enable=true, traefik.http.middlewares.auth_db-strip.stripprefix.prefixes=/auth_db, traefik.http.routers.auth_db.entrypoints=web, traefik.http.routers.auth_db.middle

auth_service
1 instance traefik.enable=true, traefik.http.middlewares.auth_service-strip.stripprefix.prefixes=/auth_service, traefik.http.routers.auth_service.entrypoints=web, traefik.http.routers.aut

cart_db
1 instance traefik.enable=true, traefik.http.middlewares.cart_db-strip.stripprefix.prefixes=/cart_db, traefik.http.routers.cart_db.entrypoints=web, traefik.http.routers.cart_db.middlewa

cart_service
1 instance traefik.enable=true, traefik.http.middlewares.cart_service-strip.stripprefix.prefixes=/cart_service, traefik.http.routers.cart_service.entrypoints=web, traefik.http.routers.cart_

consul
3 instances traefik.enable=true, traefik.http.middlewares.consul-strip.stripprefix.prefixes=/consul, traefik.http.routers.consul.entrypoints=web, traefik.http.routers.consul.middlewares

ecommerce_microservices-traefik-1
2 instances traefik.enable=true, traefik.http.middlewares.ecommerce_microservices-traefik-1-strip.stripprefix.prefixes=/ecommerce_microservices-traefik-1, traefik.http.routers.ecom

frontend
1 instance traefik.enable=true, traefik.http.middlewares.frontend-strip.stripprefix.prefixes=/frontend, traefik.http.routers.frontend.entrypoints=web, traefik.http.routers.frontend.midc

Figure 4: Service list screenshot

Class Diagrams

Auth Service

Product Service

Cart Service

Review Service

API Documentation

Auth Service

`http://localhost:8001/api/schema/swagger-ui/#/`

Endpoints

Method	Endpoint	Description
POST	`/api/v1/token/`	Login, returns access & refresh tokens
POST	`/api/v1/token/refresh/`	Refresh access token
GET	`/api/v1/users/`	Get user list
POST	`/api/v1/users/`	Create new user
PUT	`/api/v1/users/`	Update user
DELETE	`/api/v1/users/`	Delete user
GET	`/api/v1/users/{id}/`	Get user by ID

Method	Endpoint	Description
POST	`/api/v1/users/{id}/`	Not standard, additional logic
PUT	`/api/v1/users/{id}/`	Update user by ID
DELETE	`/api/v1/users/{id}/`	Delete user by ID

Product Service

`http://localhost:8002/api/schema/swagger-ui/#/`

Endpoints

Method	Endpoint	Description
GET	`/api/v1/categories/`	List categories
GET	`/api/v1/categories/{id}/`	Category by ID
GET	`/api/v1/categories/{id}/subcategories/`	Subcategories of a category
GET	`/api/v1/products/`	List products
POST	`/api/v1/products/`	Create product
GET	`/api/v1/products/{id}/`	Product details
PUT	`/api/v1/products/{id}/`	Update product
PATCH	`/api/v1/products/{id}/`	Partially update product
DELETE	`/api/v1/products/{id}/`	Delete product

Cart Service

`http://localhost:8003/api/schema/swagger-ui/#/`

Endpoints

Method	Endpoint	Description
GET	`/api/v1/cart/`	Retrieve cart contents
POST	`/api/v1/cart/add/`	Add item to cart

Review Service

`http://localhost:8004/api/schema/swagger-ui/#/`

Endpoints

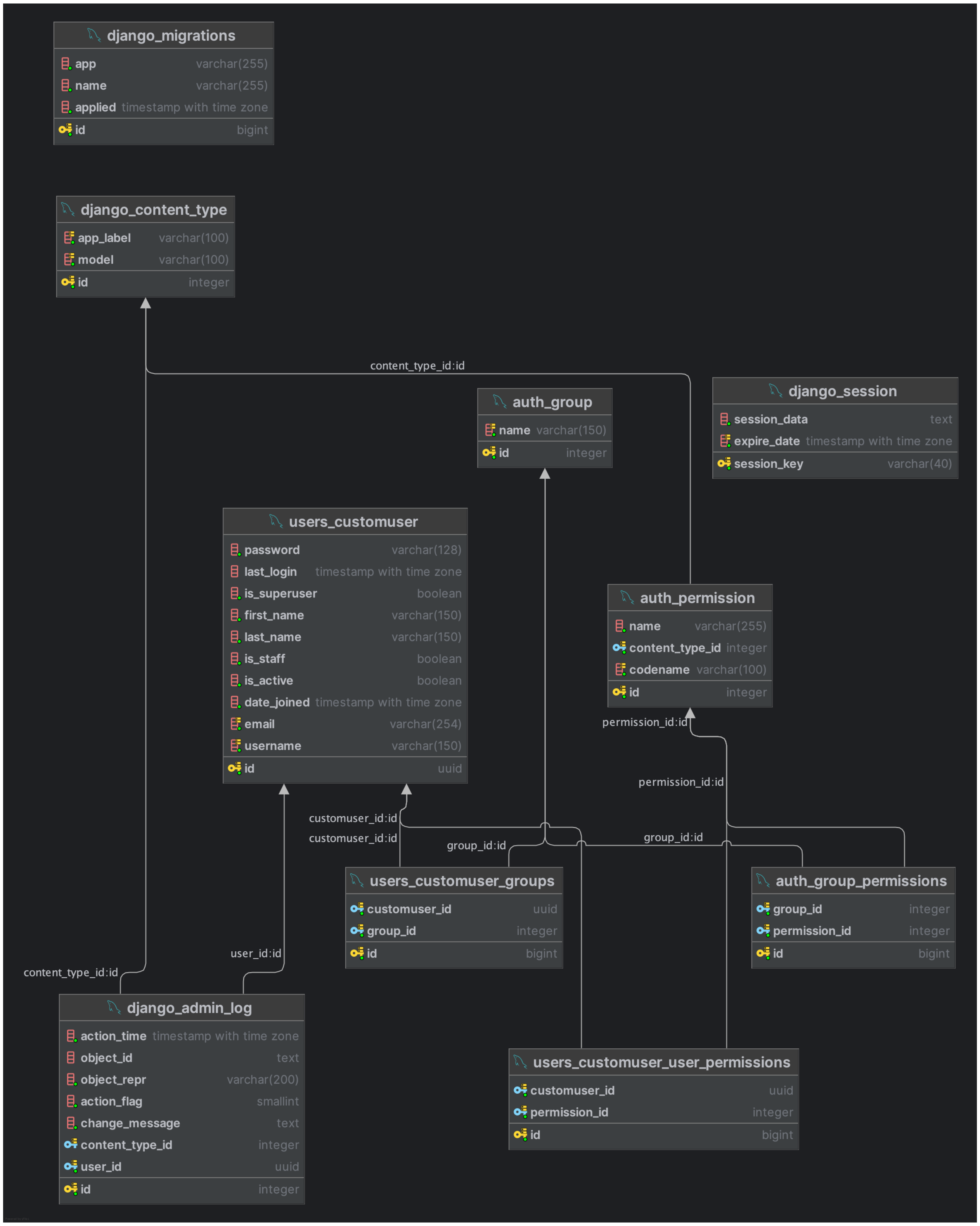


Figure 5: class diagram Auth service

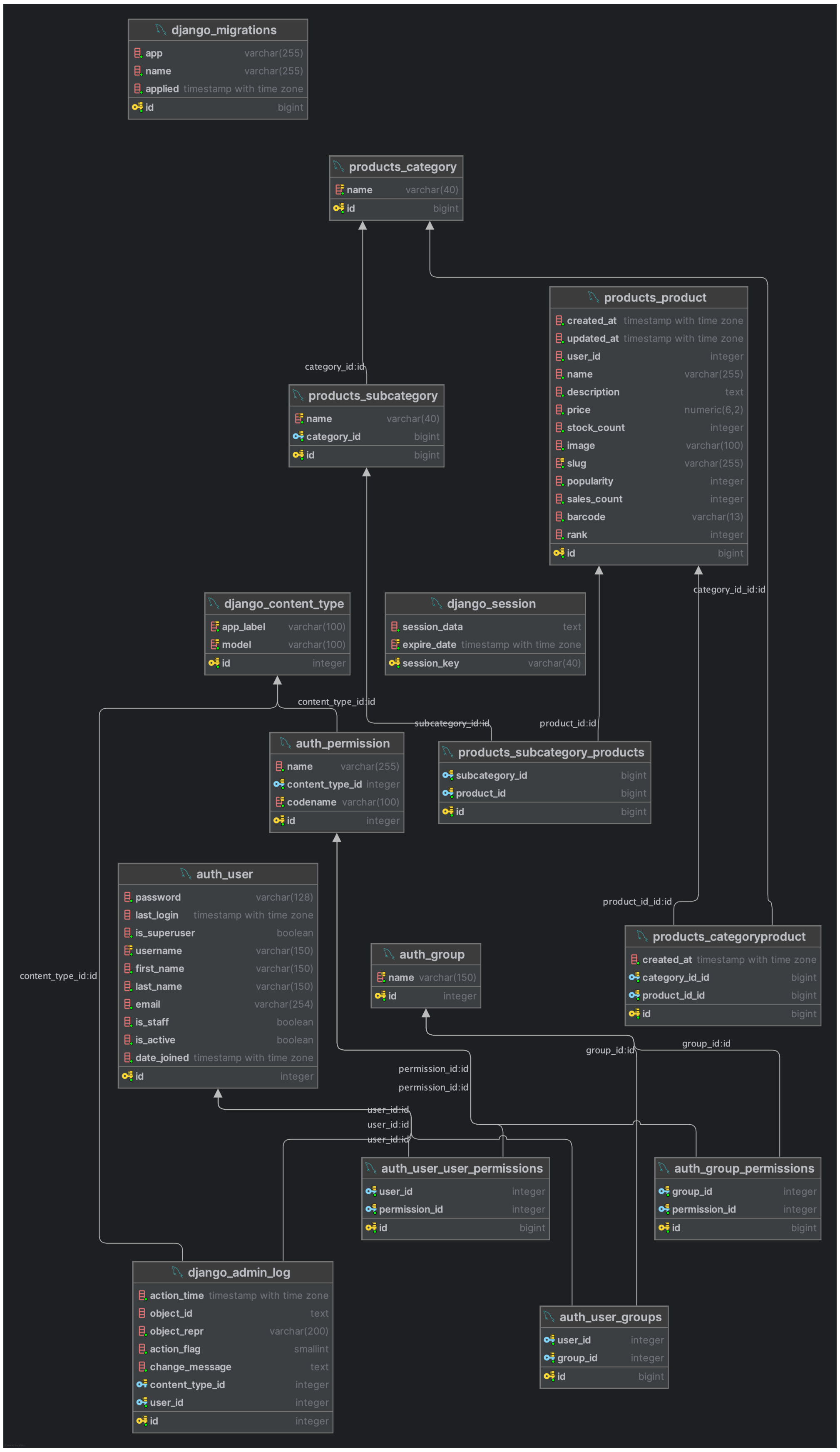


Figure 6: class diagram Product service

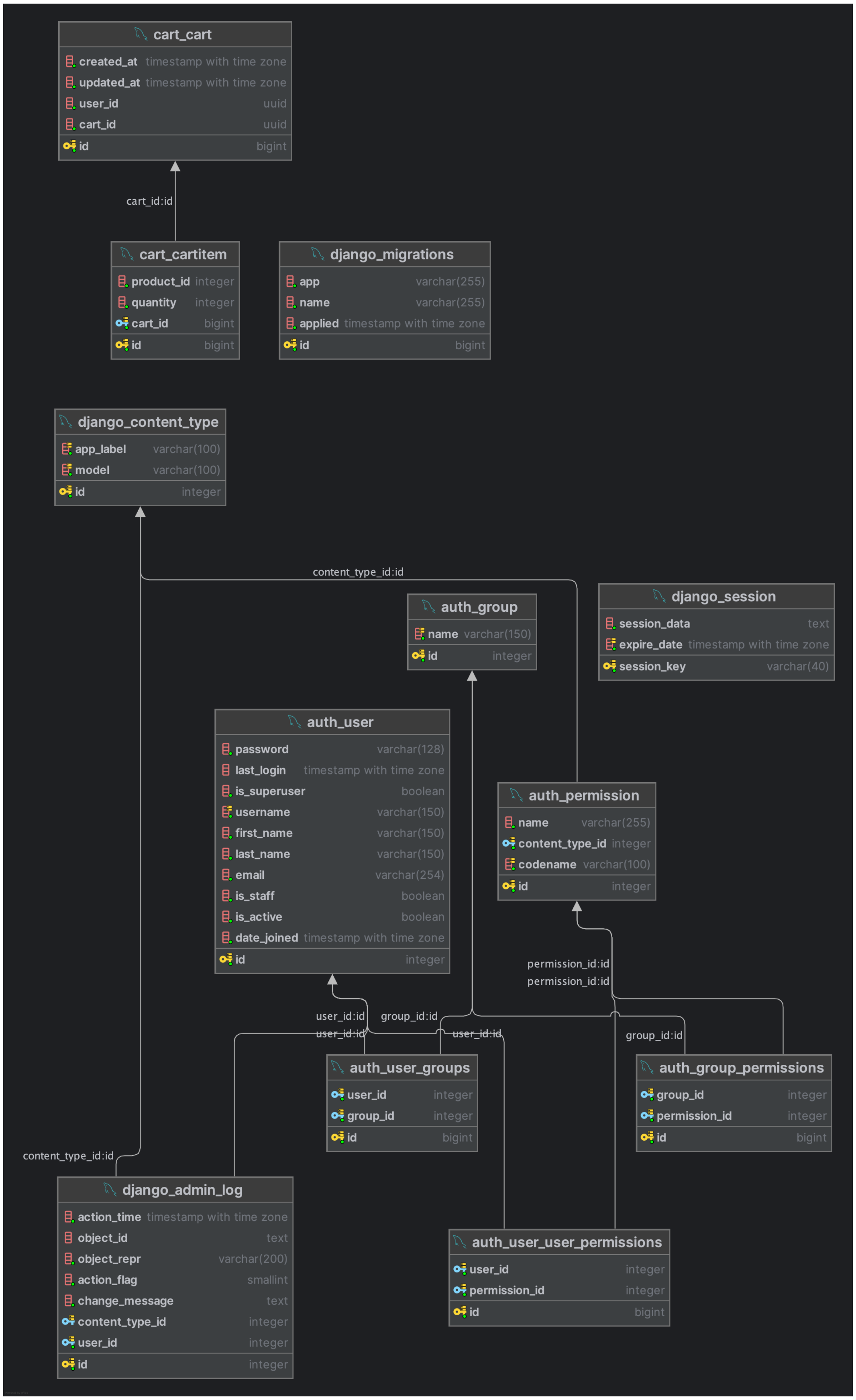


Figure 7: class diagram Cart service

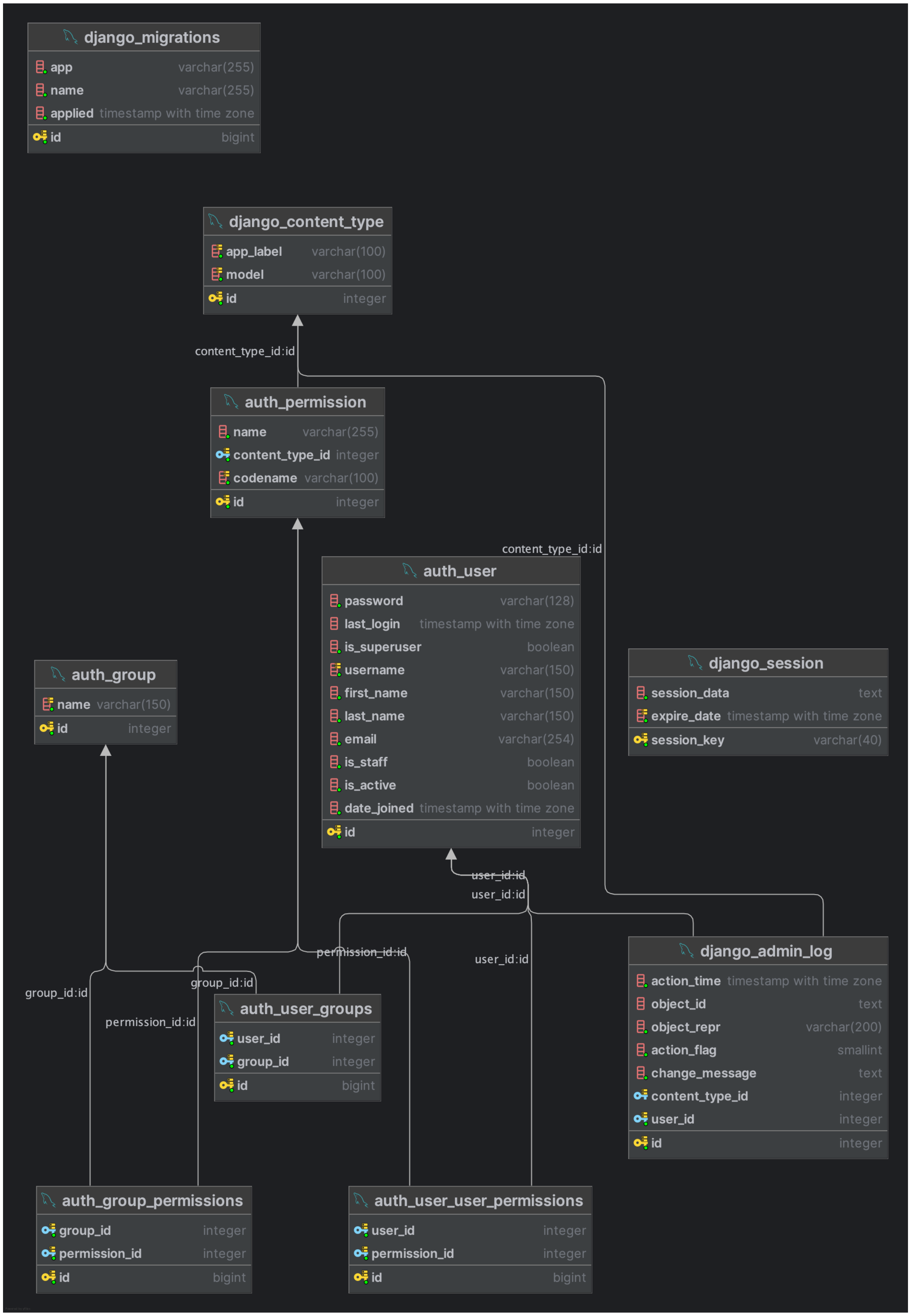


Figure 8: class diagram Review service

Method	Endpoint	Description
POST	/api/v1/reviews/	Add a review
GET	/api/v1/reviews/{product_id}/	Get reviews for a product
GET	/api/v1/reviews/{review_id}/	Get review by ID

How to run

1. Clone or unzip the project:

```
git clone git@github.com:BlazejBielski/ecommerce_microservices.git
```

2. Go to the project directory and copy environment variable templates:

```
cp envs/api.default.env envs/api.env
cp envs/postgres.default.env envs/db.env
```

3. Fill `api.env` with variables:

```
DJ_SECRET_KEY="<your-generated-secret-key>"
DJ_DEBUG=1
DJ_ALLOWED_HOSTS=localhost 0.0.0.0 127.0.0.1
LOGGING_LVL=INFO

DJ_SU_NAME=admin
DJ_SU_EMAIL=admin@example.com
DJ_SU_PASSWORD=admin123
```

To generate secret key:

```
from django.core.management.utils import get_random_secret_key
get_random_secret_key()
```

4. Fill `db.env` with variables:

```
POSTGRES_USER=postgres
POSTGRES_PASSWORD=postgres
POSTGRES_DB=postgres
POSTGRES_HOST=postgres
POSTGRES_PORT=5432

DB_CONNECTION_STRING=postgres://${POSTGRES_USER}:${POSTGRES_PASSWORD}@${POSTGRES
```

5. Start containers:

```
docker compose up --build
```

6. Access services via:

- **Consul UI**: http://localhost:8500/
- **Traefik Dashboard**: http://localhost:8080/
- **Swagger UI** for each service (see above for URLs)