Employee Management System (Django + DRF)

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GitHub: https://github.com/gmpranami/employee_project
Render Deployment: https://employee-project-pza8.onrender.com/

Date: October 09, 2025

Abstract

The Employee Management System (Django + DRF) is a backend application designed to streamline and automate core HR operations such as managing employees, departments, attendance, and performance data. It provides secure, scalable, and efficient data handling through RESTful APIs, JWT-based authentication, and interactive Swagger documentation. The system integrates seamlessly with a PostgreSQL database and supports data visualization via Chart.js, offering insightful analytics on workforce metrics. Deployed on the Render cloud platform with Docker support, the EMS ensures a production-ready environment that aligns with real-world enterprise requirements.

Table of Contents

1. Introduction

The Employee Management System (Django + DRF) is an enterprise-grade backend service designed to manage human resource data efficiently. It demonstrates robust API development, scalable data modeling, secure JWT-based authentication, integrated Swagger documentation, and modern deployment practices — delivering a comprehensive solution for managing employees, departments, attendance, and performance data

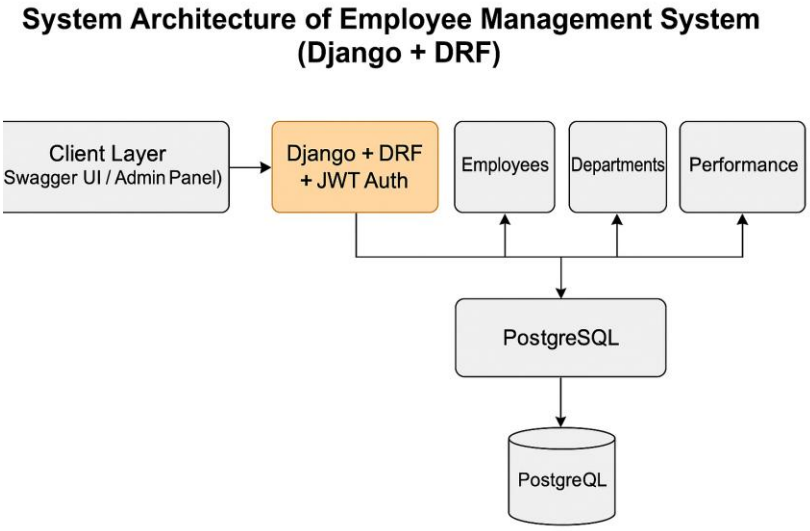
2. Project Overview

The Employee Management System (Django + DRF) is an enterprise-grade backend solution focused on managing HR data with accuracy, security, and scalability. It demonstrates robust API development, well-structured data modeling, secure JWT-based authentication, and integrated Swagger API documentation. The project is built using a modular Django structure with dedicated apps for Employees, Departments, Attendance, and Performance, ensuring clean separation of concerns and maintainability.

It supports pagination, filtering, and sorting, includes a seed data management command powered by Faker, and provides optional Chart.js visualizations for analytics. With deployment configured through Docker and hosted on Render, the system showcases modern DevOps practices. The EMS adheres to Django best practices and REST design principles, making it a scalable and reliable backend solution for real-world HR systems.

3. System Architecture

The project follows Django's MVT architecture integrated with Django REST Framework for API endpoints.
Each component has a clear responsibility:
- **employees/**: Handles employee and performance data.
- **departments/**: Manages department information.
- **attendance/**: Tracks attendance records.
- **analytics/**: Provides visualization using Chart.js.



4. Implementation Details

Key components include:
- Django Models for Employee, Department, Attendance, and Performance.
- `seed_data.py` management command for populating fake data using Faker.
- CRUD APIs using Django REST Framework.
- JWT Authentication using SimpleJWT.
- Swagger documentation via drf-yasg.
- Docker and docker-compose setup for deployment.

5. Features

✅ CRUD operations for Employees, Departments, Attendance, and Performance.
✅ JWT-based authentication for secure API access.
✅ Swagger UI documentation at `/swagger/`.
✅ Pagination, Filtering, and Sorting support.
✅ Chart.js visualizations for analytics.

✅ PostgreSQL database integration.
✅ Docker containerization for deployment on Render.

6. Deployment on Render

The system is deployed on the Render Cloud Platform using Docker.
Gunicorn serves as the WSGI HTTP server, and WhiteNoise handles static files.

Live URLs:
- 🌐 Main App: https://employee-project-pza8.onrender.com/
- 📘 Swagger Docs: https://employee-project-pza8.onrender.com/swagger/
- ⚙️ Admin Panel: https://employee-project-pza8.onrender.com/admin/
- 📊 Charts: https://employee-project-pza8.onrender.com/api/v1/analytics/charts/
- 🩺 Health Check: https://employee-project-pza8.onrender.com/health/

7. Local Setup & Environment Configuration

Follow the steps below to run the project locally:
1️⃣ Clone the Repository:

```
git clone https://github.com/gmpranami/employee_project.git
cd employee_project
```

2️⃣ Create and Configure Environment Variables (.env):

```
DEBUG=True
SECRET_KEY=change-me
ALLOWED_HOSTS=127.0.0.1,localhost
DATABASE_URL=postgresql://user:password@localhost:5432/employee_db
```

3️⃣ Install Dependencies: pip install -r requirements.txt

4️⃣ Apply Migrations:

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

5️⃣ Create a Superuser: python manage.py createsuperuser

6️⃣ Seed Demo Data: python manage.py seed_data --employees 50 --days 60

7️⃣ Run Server: python manage.py runserver

8️⃣ Docker Setup (Optional):

docker-compose up --build
docker-compose down

8. Authentication (JWT)

Authentication is handled via JSON Web Tokens (JWT) using the SimpleJWT library.

Endpoints:
- Obtain Token: `/api/auth/token/`
- Refresh Token: `/api/auth/token/refresh/`

Request Example:
POST /api/auth/token/
{
 "username": "your_username",
 "password": "your_password"
}

Response Example:
{
 "refresh": "<refresh_token>",
 "access": "<access_token>"
}

Use header: `Authorization: Bearer <access_token>`

9. API Reference Table

Complete list of API endpoints:

Resource	Local Endpoint	Render Endpoint	Methods	Description
Employees	/api/v1/employees/	https://employee-project-pza8.onrender.com/api/v1/employees/	GET, POST	Manage employees
Employee Detail	/api/v1/employees/{id}/	https://employee-project-pza8.onrender.com/api/v1/employees/{id}/	GET, PATCH, DELETE	Retrieve or update specific employee
Departments	/api/v1/departments/	https://employee-project-pza8.onrender.com/api/v1/departments/	GET, POST	Manage departments
Attendance	/api/v1/attendance/	https://employee-project-pza8.onrender.com/api/v1/attendance/	GET, POST	Track attendance records
Performance	/api/v1/performance/	https://employee-project-pza8.onrender.com/api/v1/performance/	GET, POST	Performance reviews
Charts	/api/v1/analytics/charts/	https://employee-project-pza8.onrender.com/api/v1/analytics/charts/	GET	Visual analytics
Health Check	/health/	https://employee-project-pza8.onrender.com/health/	GET	Check server status

10. Screenshots & Visual Results

Below are screenshots showing the working features and interfaces of the system:

📁 1. Server Setup

Figure 1: Django Development Server Running Successfully

The Django development server is up and running on localhost, indicating that the application and dependencies have been configured correctly.

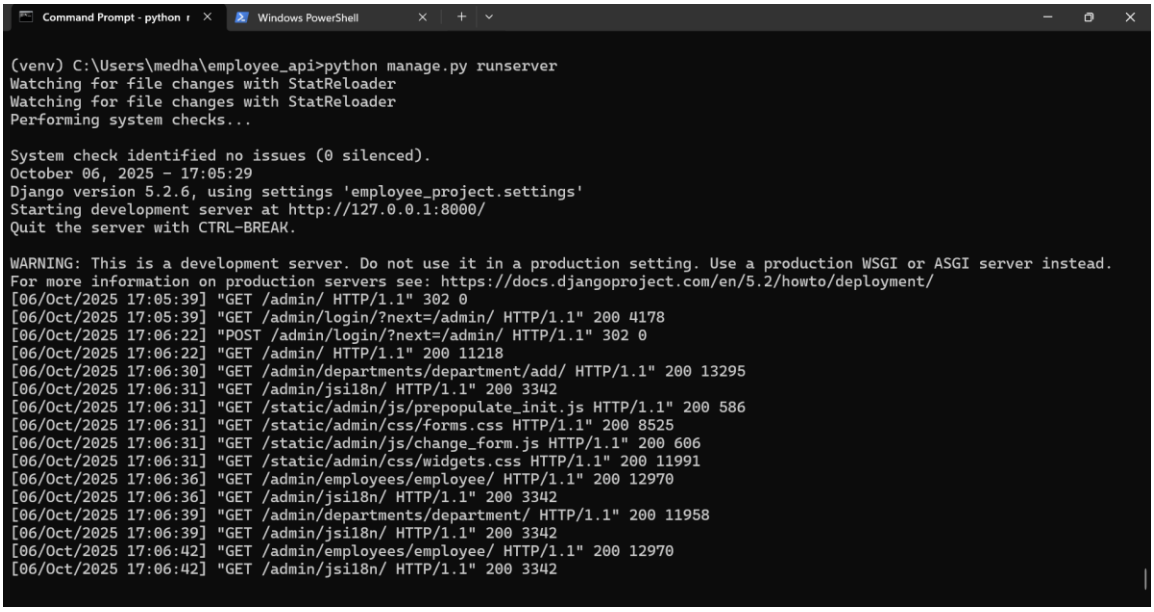


Figure 2: Admin Login Page

The Django admin panel login interface allows superusers to manage employees, departments, and other models via a graphical interface.

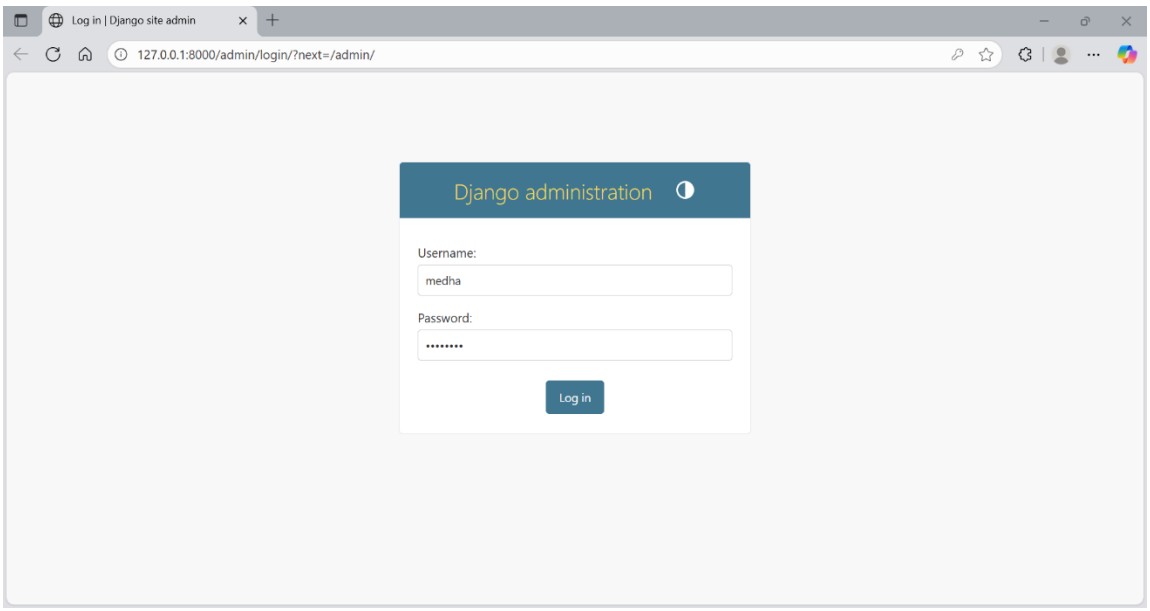


Figure 3: Superuser Creation

The createsuperuser command has been executed successfully, enabling administrative access to the application.

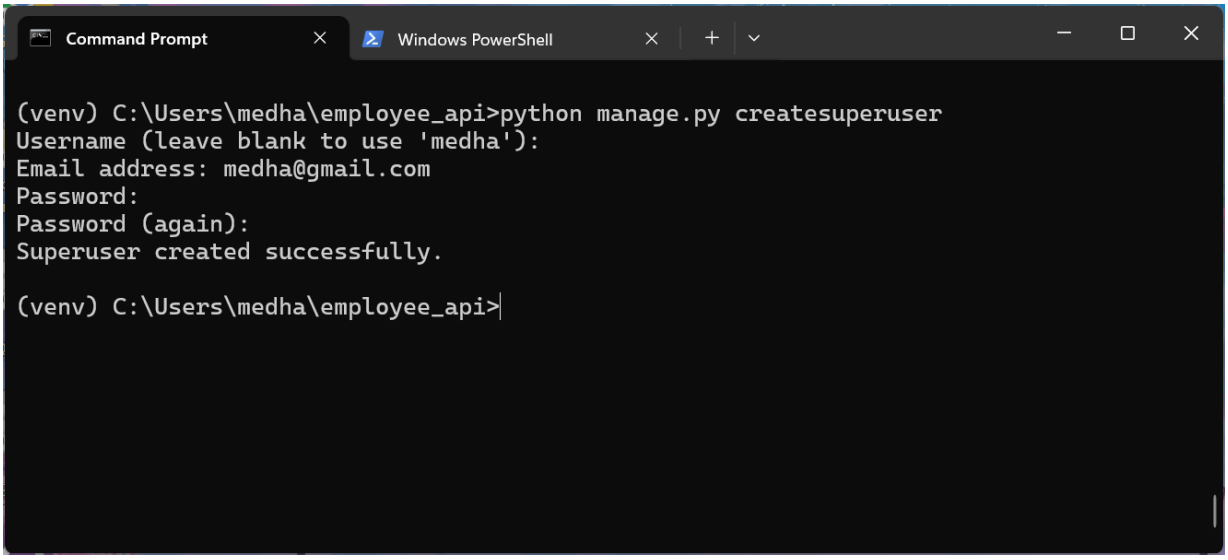
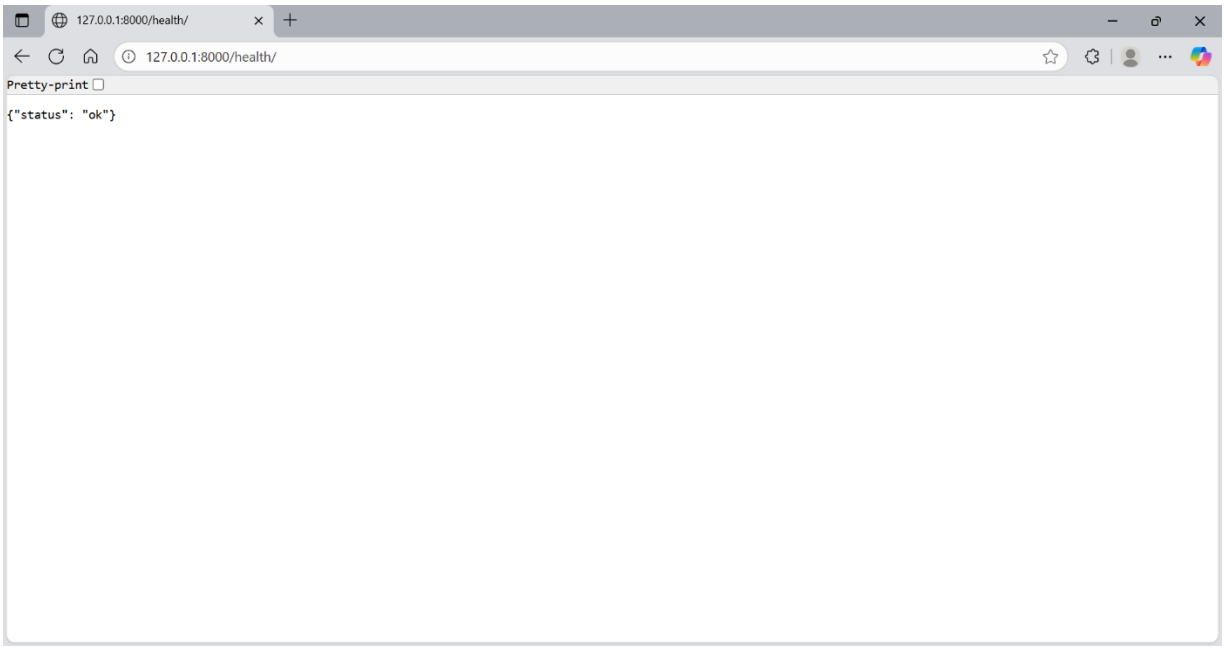
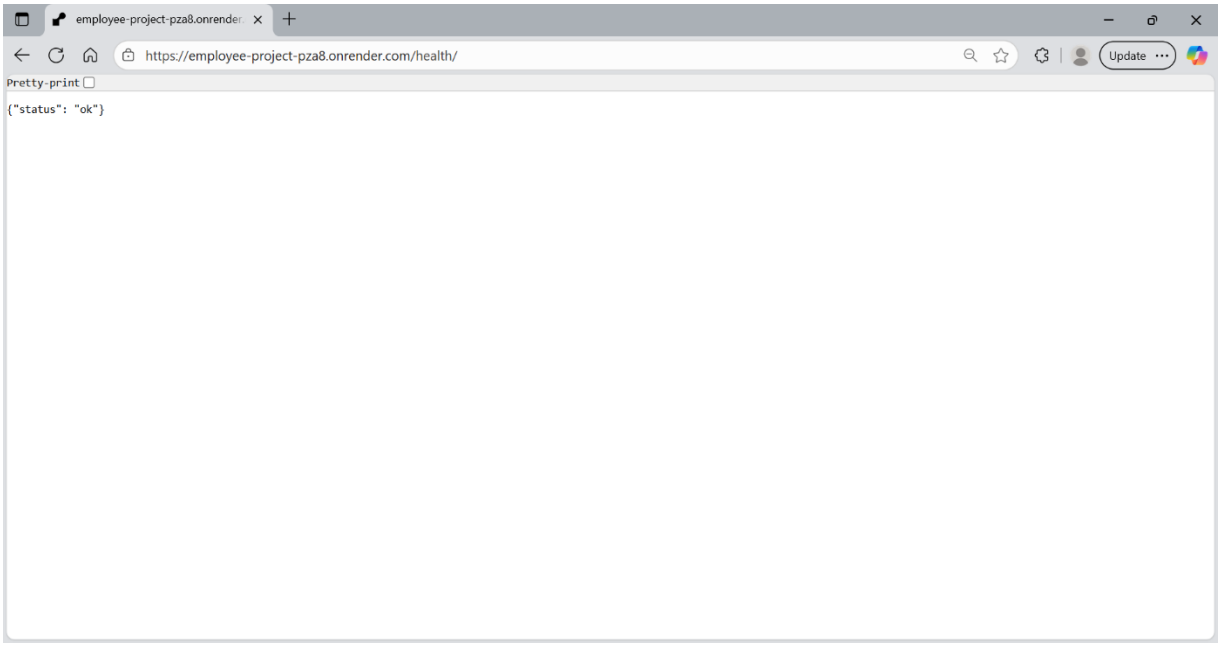


Figure 4: Health Check Endpoint

The /health/ endpoint confirms that the application, database, and server configurations are functioning correctly. This is useful for uptime monitoring and deployment verification.





📁 2. Seeding Data

Figure 5: Seeding the Database

Using the custom management command python manage.py seed_data, the system populates the database with 50+ fake employee records and attendance data using the Faker library.

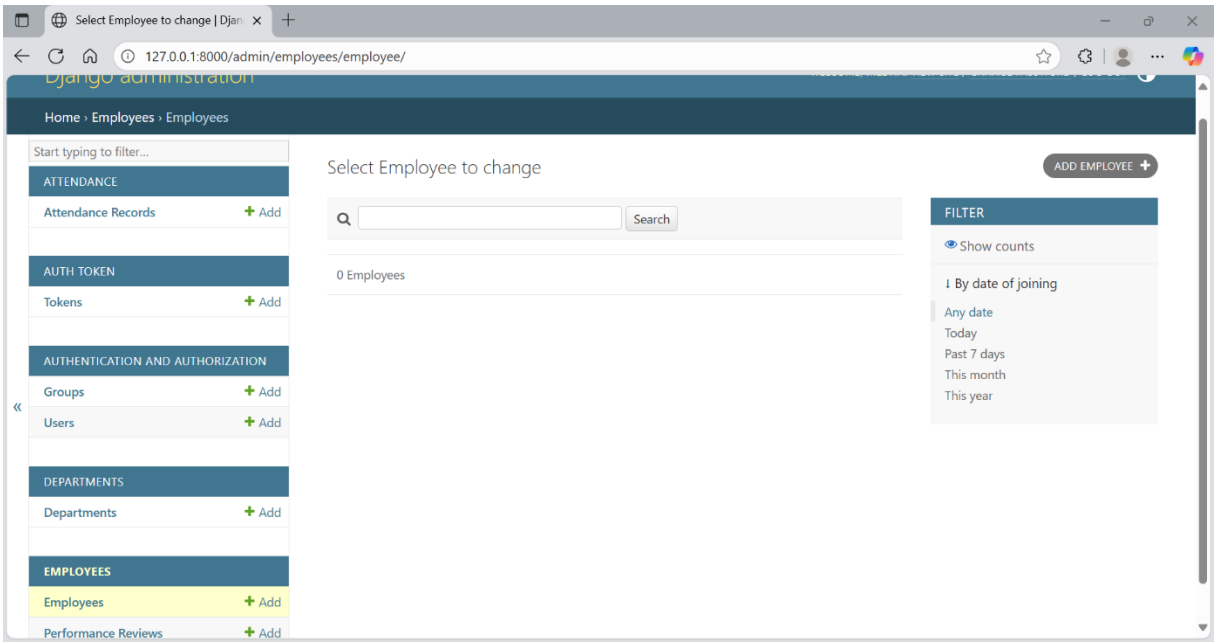


Fig: Before seeding data

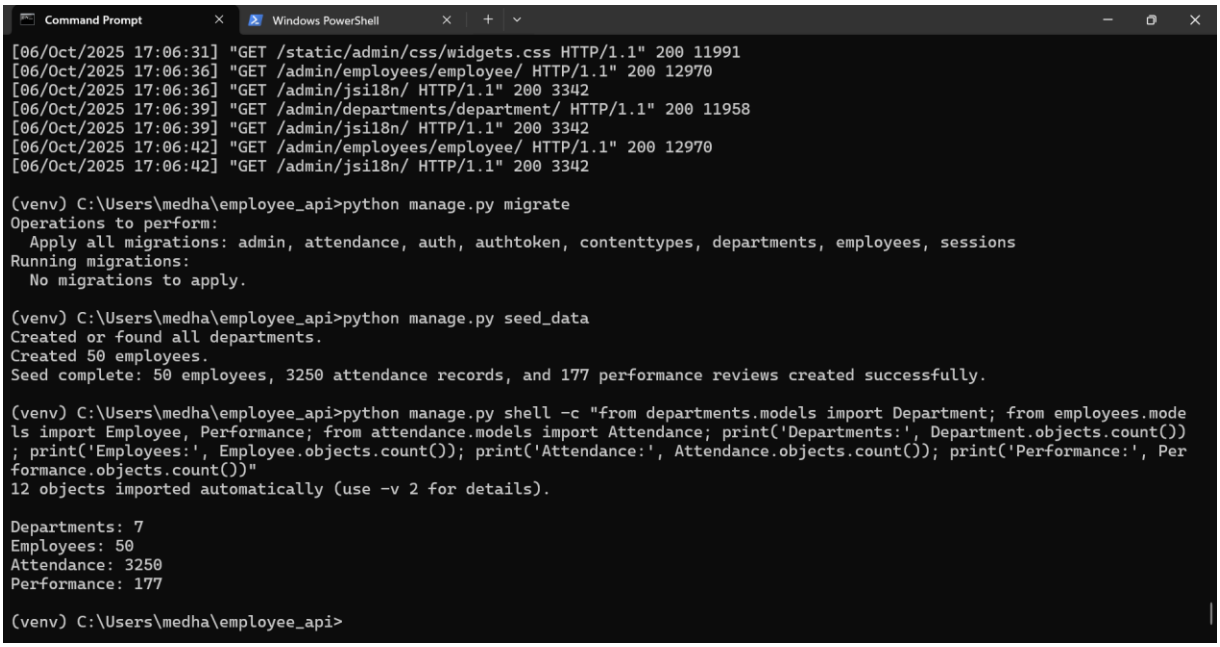


Fig: seeding data

Figure 6: Access Token Generation

A valid JWT access token is generated via the /api/auth/token/ endpoint, allowing secure access to the API.

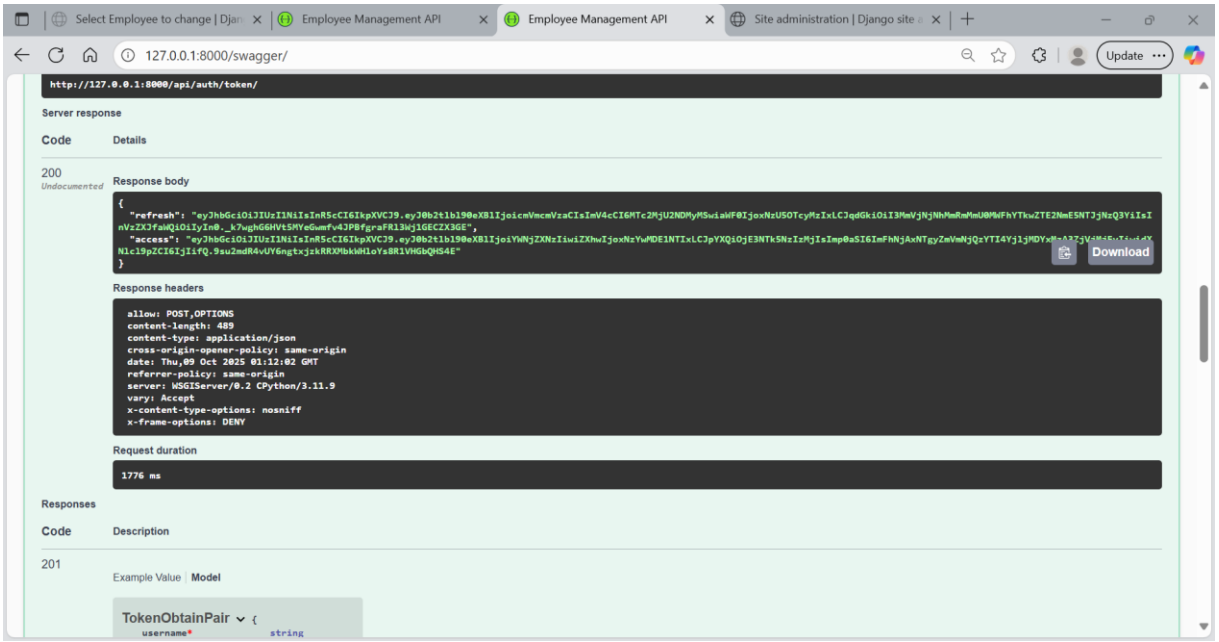
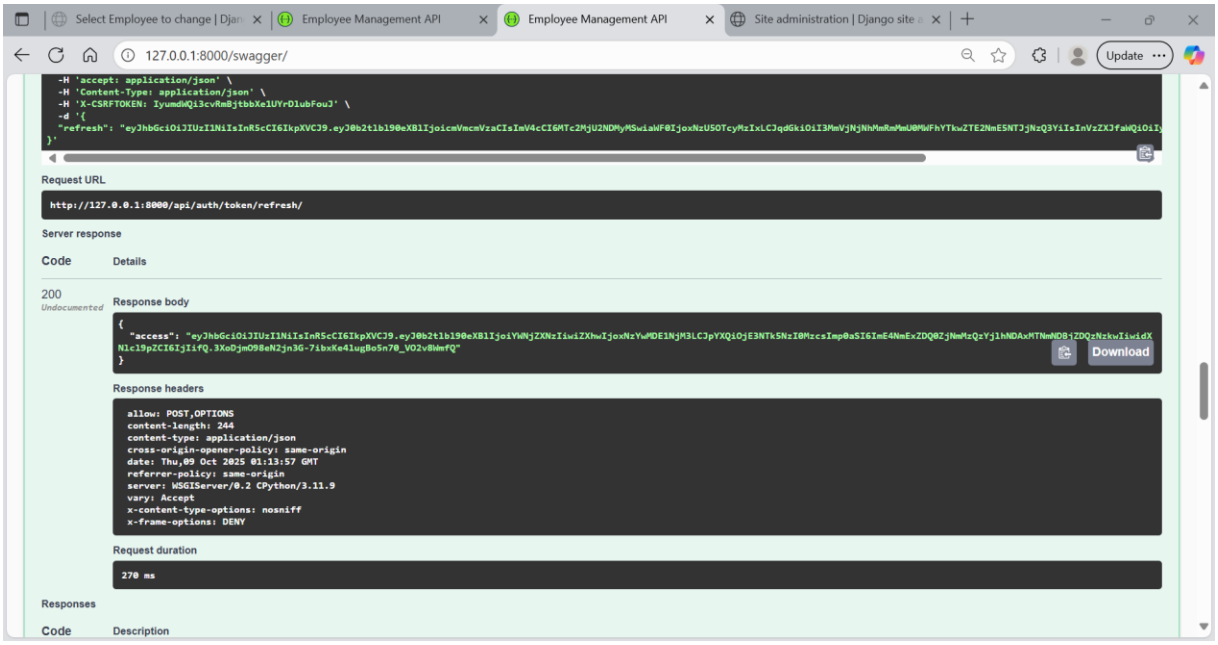


Figure 7: Refresh Token Retrieval

A refresh token is issued, enabling the user to obtain a new access token without re-authentication.



📁 3. Employee Module

Figure 8: Adding an Employee Record

New employees can be created via POST requests to the /api/v1/employees/ endpoint, storing key details like name, email, and department.

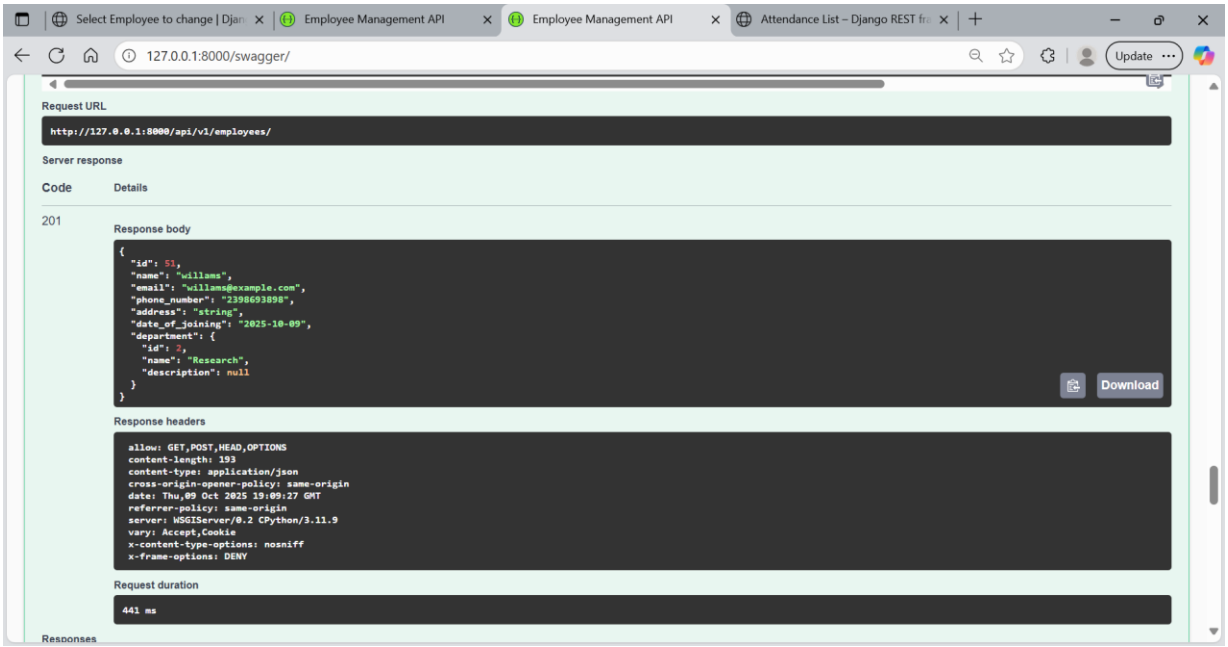


Figure 9: Employee List View

A list of all employees with pagination, filtering, and sorting capabilities is displayed, showing how the API handles large datasets efficiently.

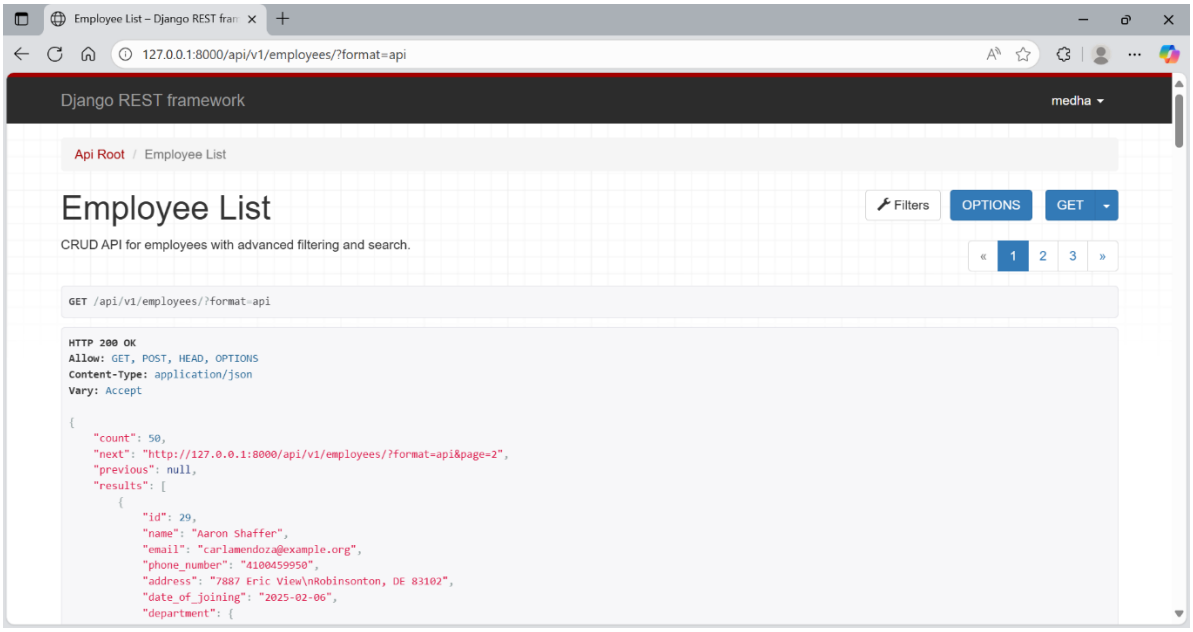
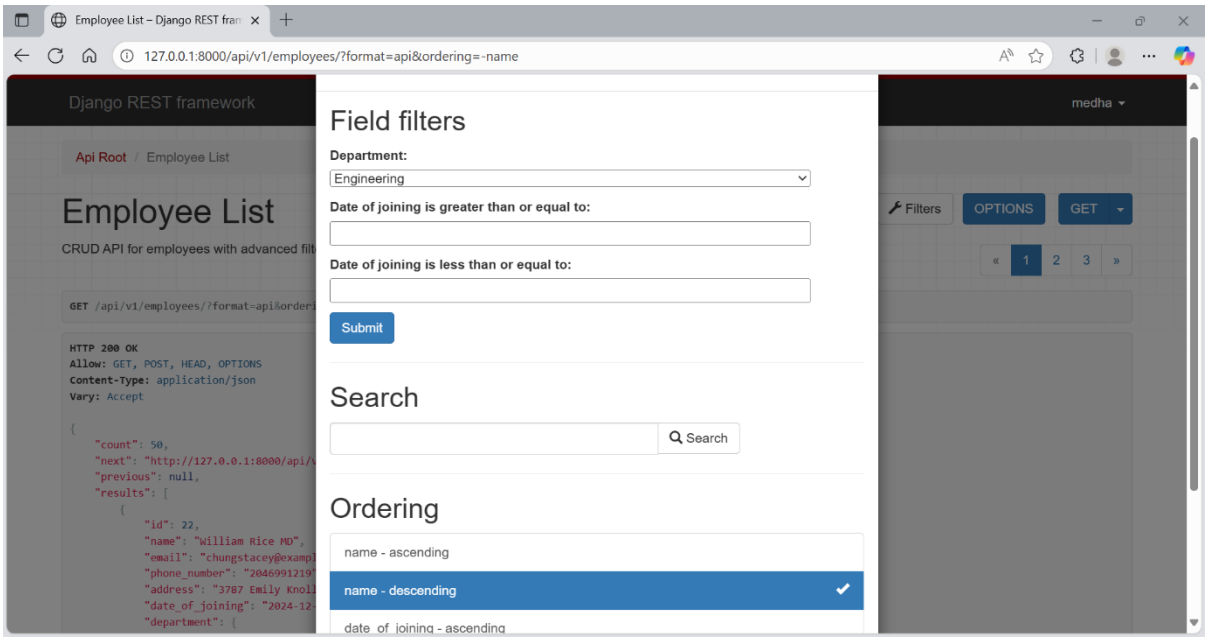


Figure 10: Filtering Employees by Department

The list API supports filtering employees based on department, improving data retrieval precision.



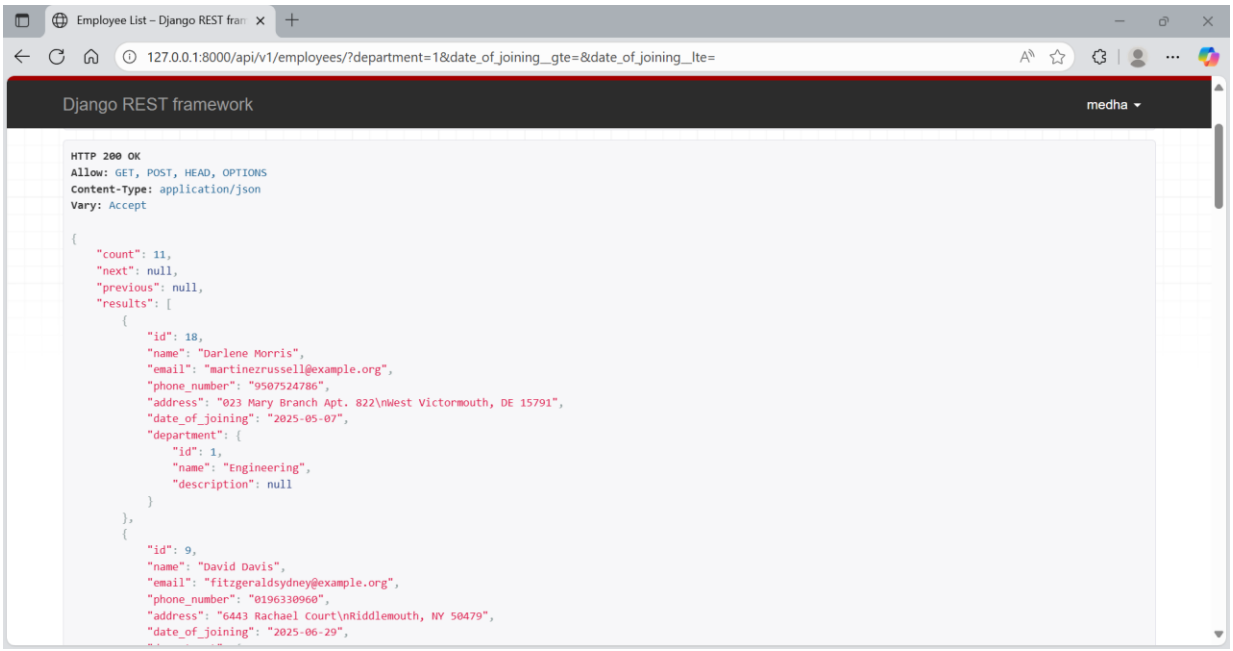


Figure 11: Updating Employee Department

Employee details, including their associated department, can be updated using PATCH requests.

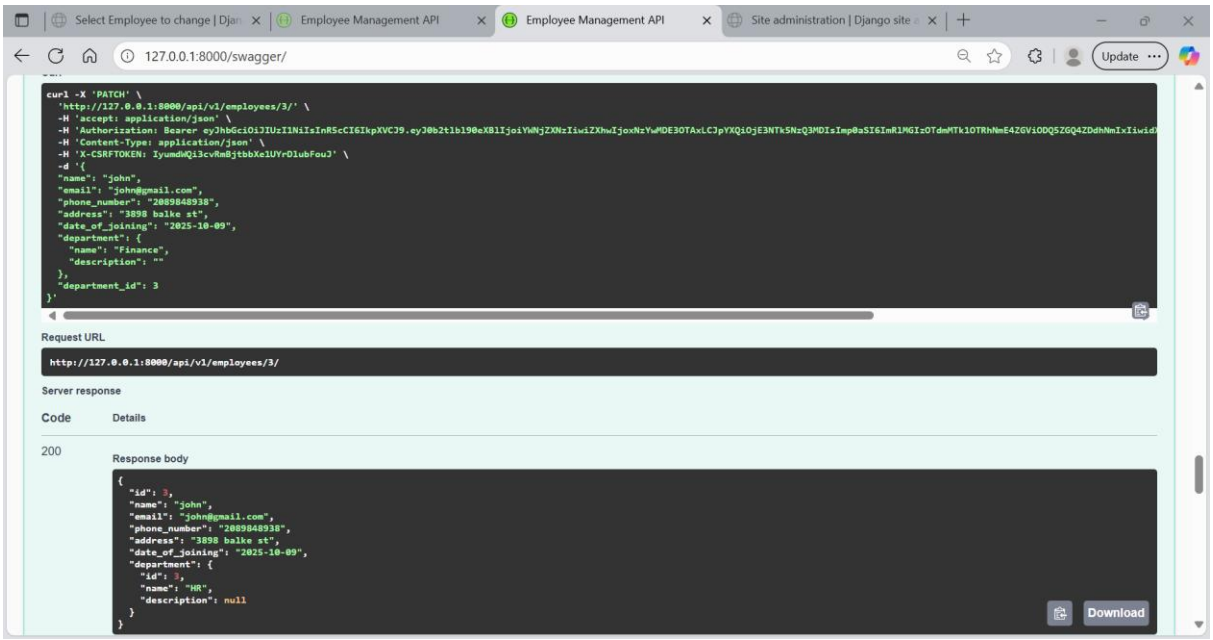
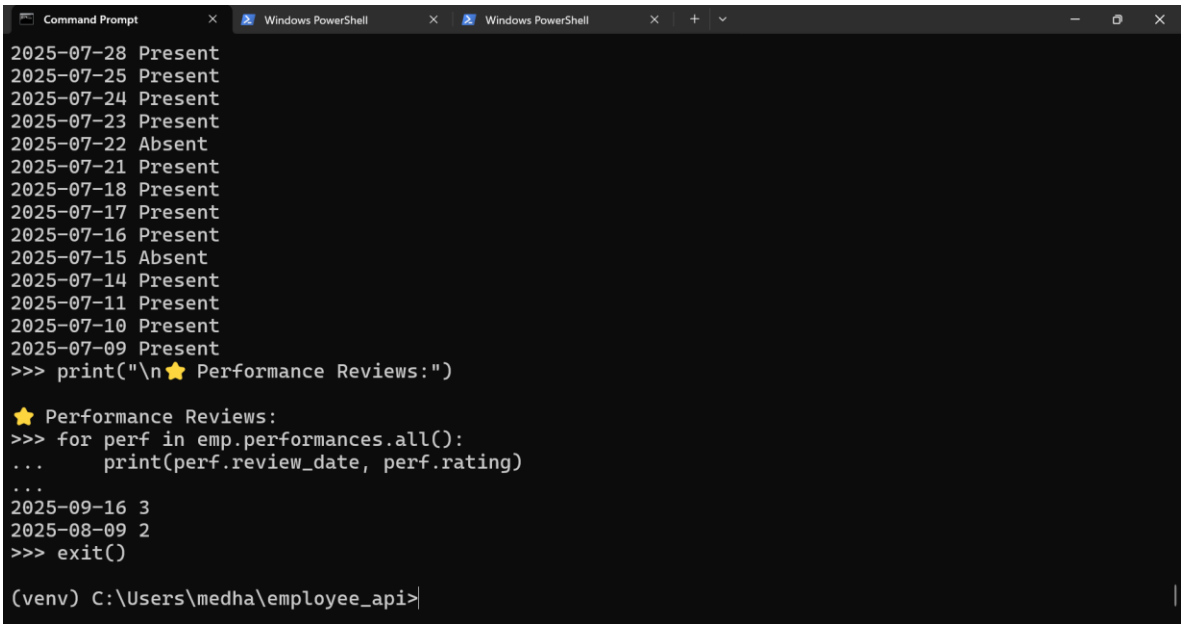
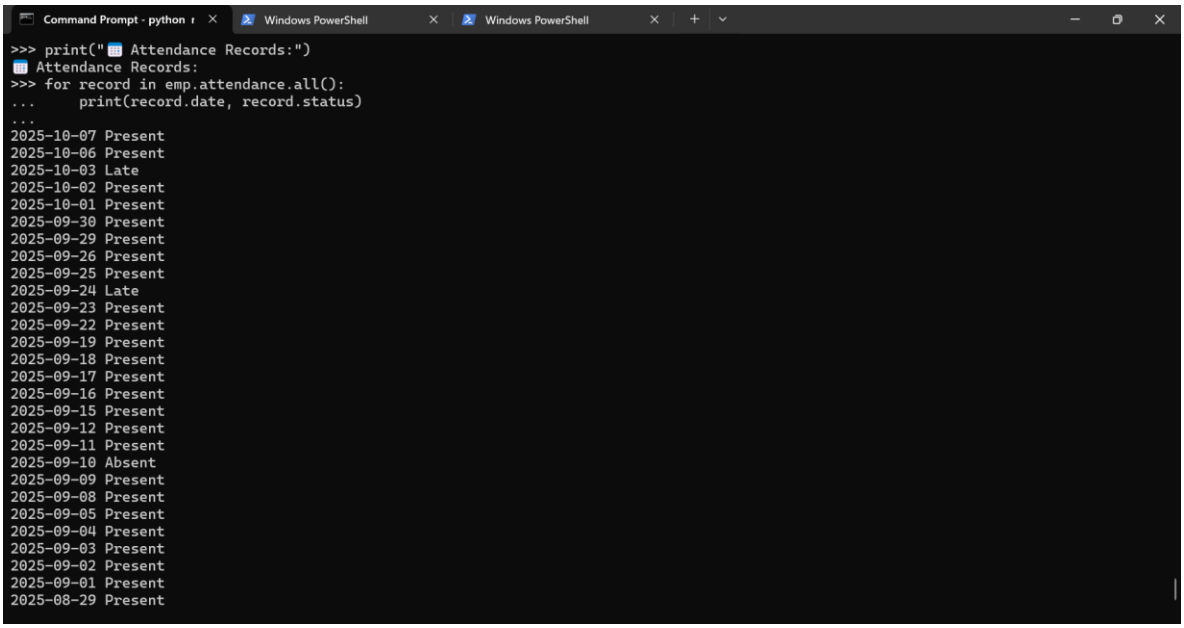
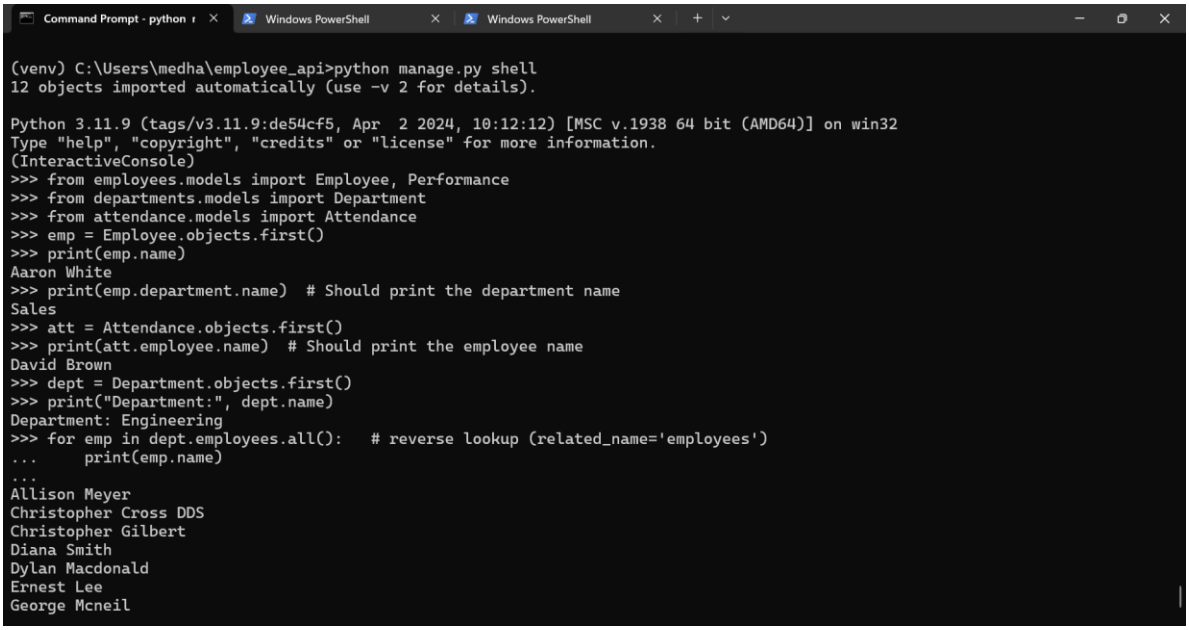


Figure 12: Testing Model Relationships

The API demonstrates proper ForeignKey and reverse relationships — e.g., listing employees by department or viewing attendance for a specific employee — confirming relational integrity.







📁 4. Department Module

Figure 13: Adding a Department

Departments are added through the /api/v1/departments/ endpoint, allowing proper employee categorization.

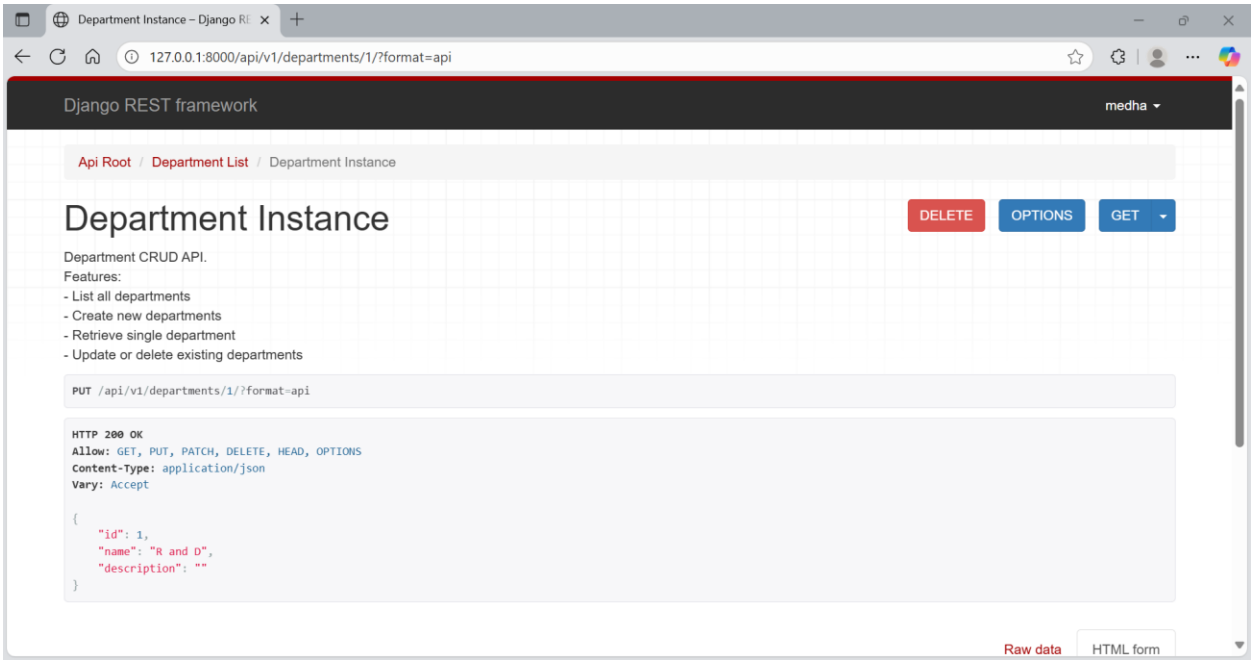


Figure 14: Department List View

All departments are listed with their corresponding details, enabling quick reference and updates.

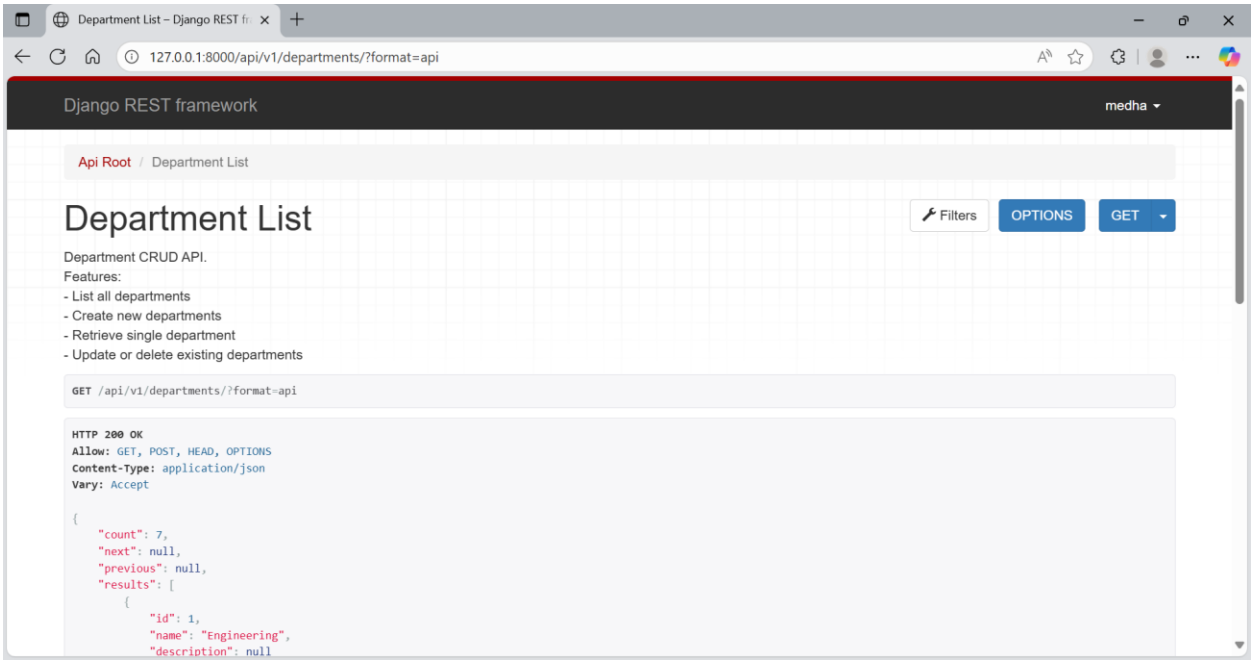
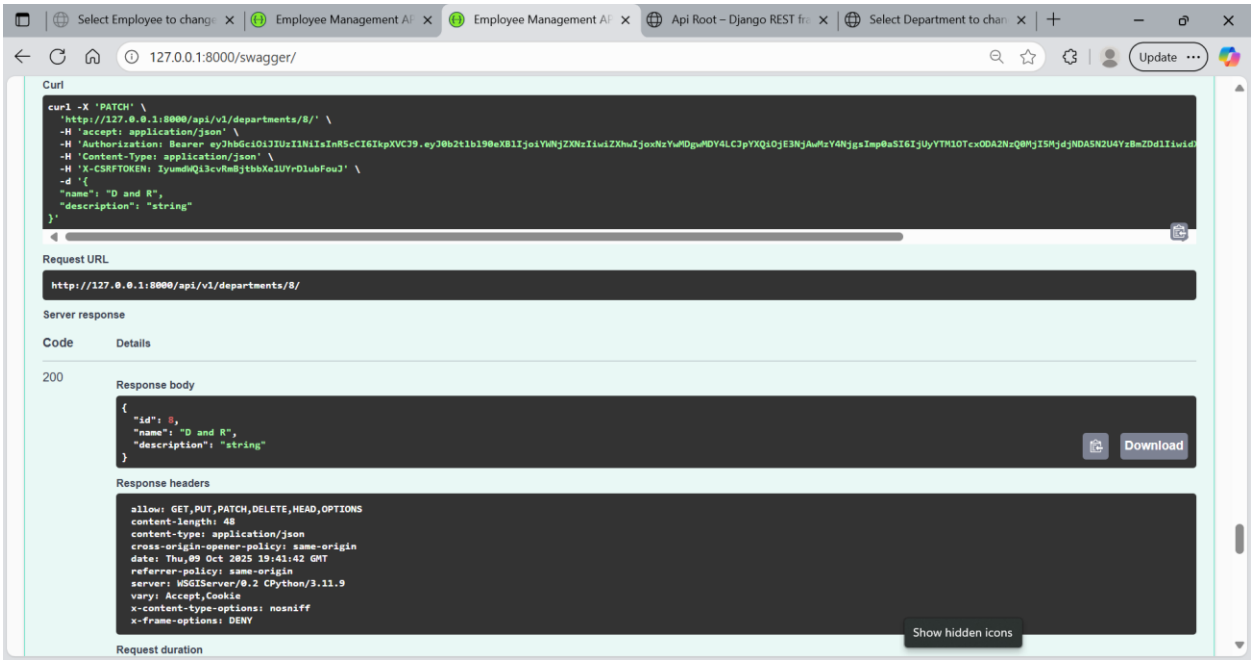
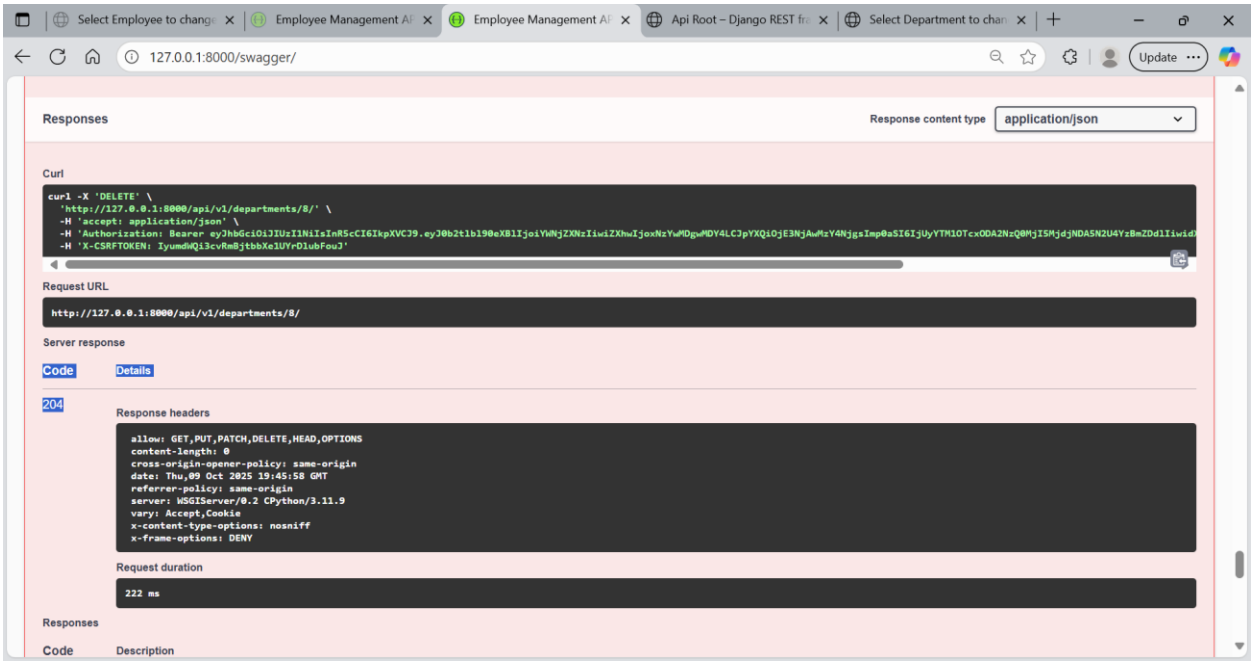


Figure 15: Updating Department Information

Department names or other fields can be modified as needed through the API.





📁 5. Attendance Module

Figure 16: Adding Attendance Records

Attendance data can be recorded with date and status (Present, Absent, Late) linked to specific employees.

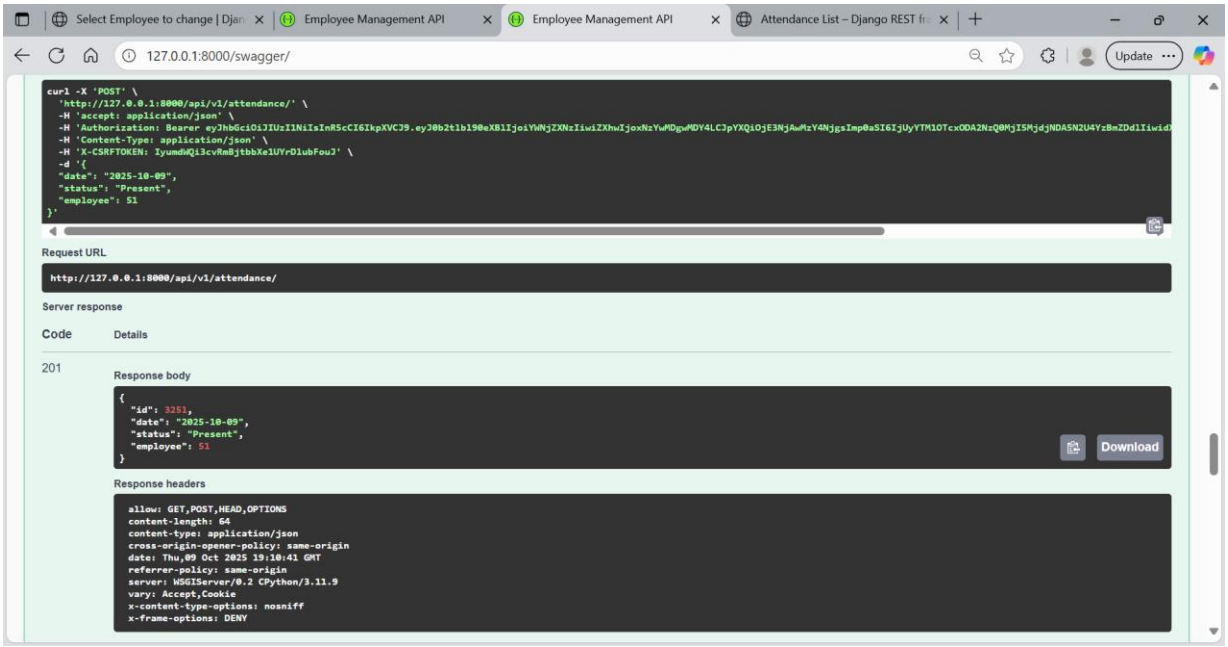
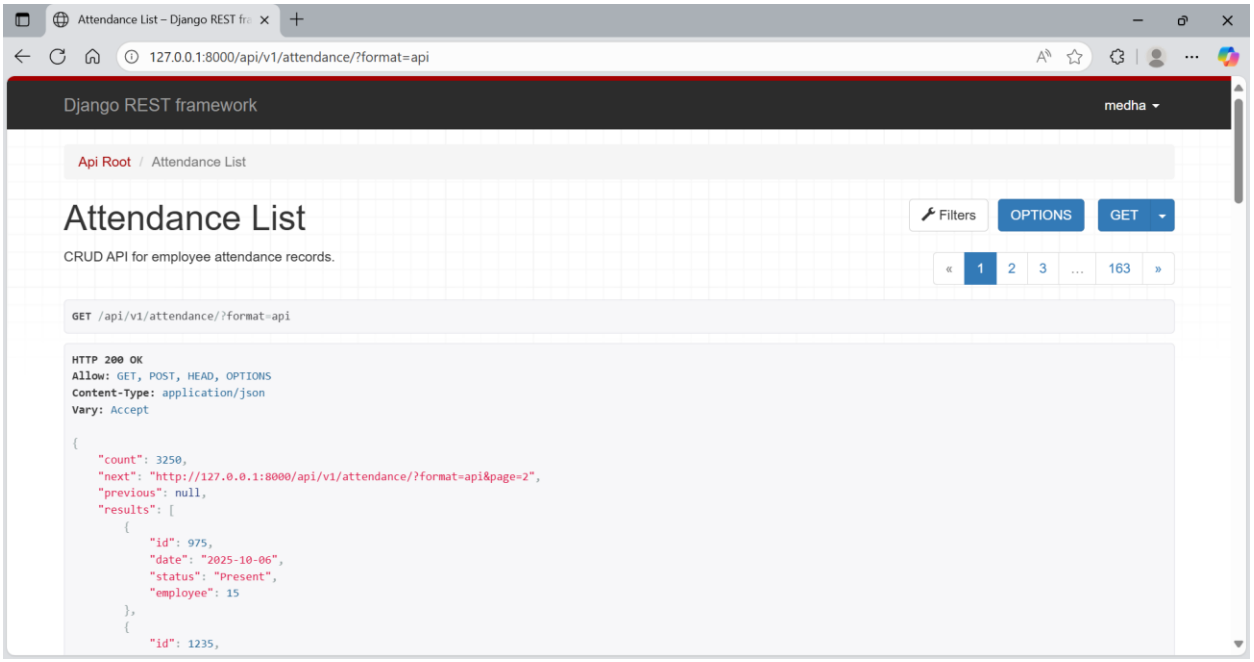
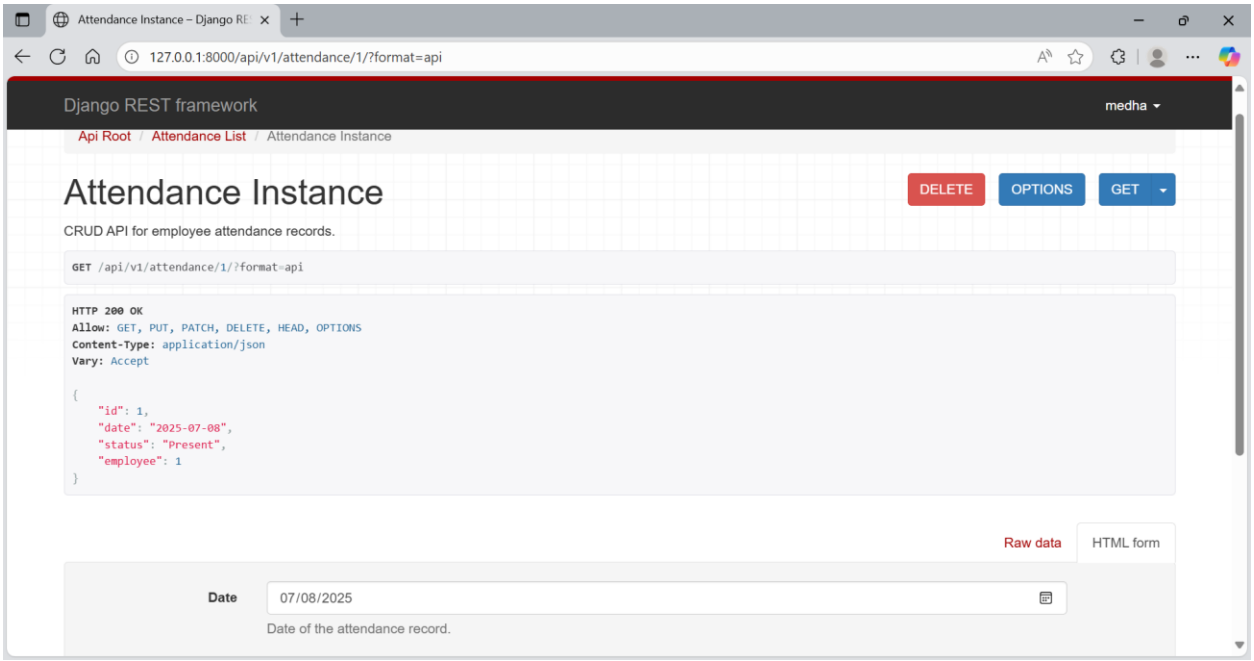


Figure 17: Viewing Attendance Records

A list of attendance entries is displayed, showing daily logs for each employee.





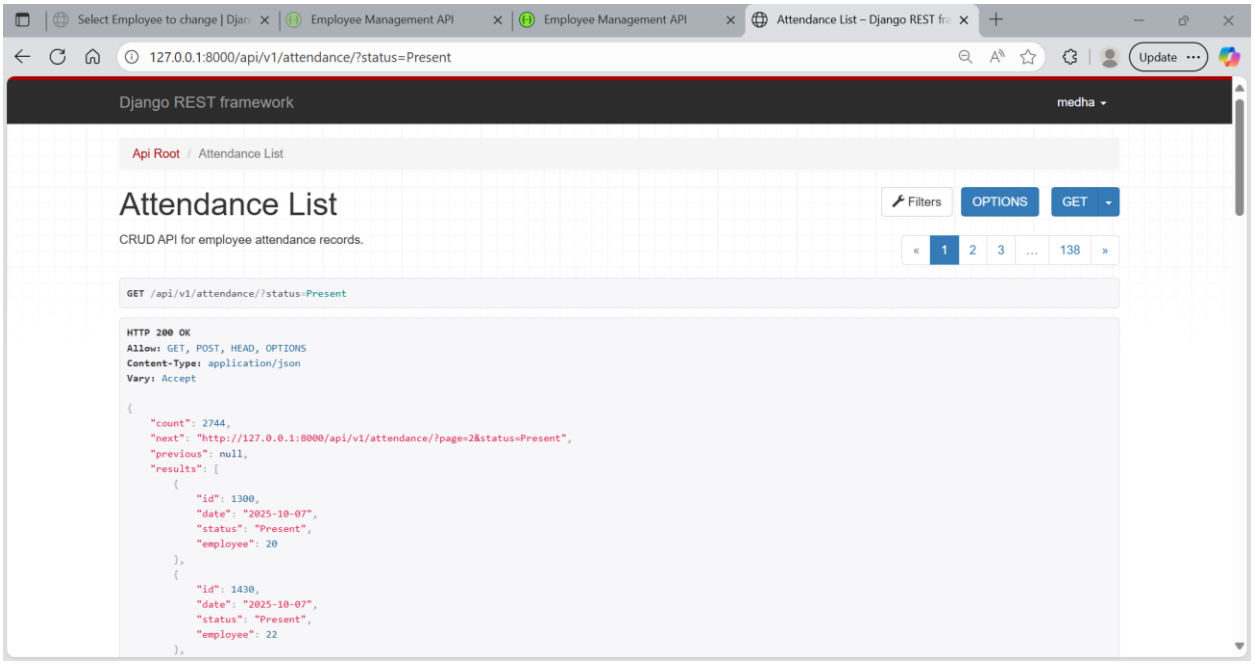
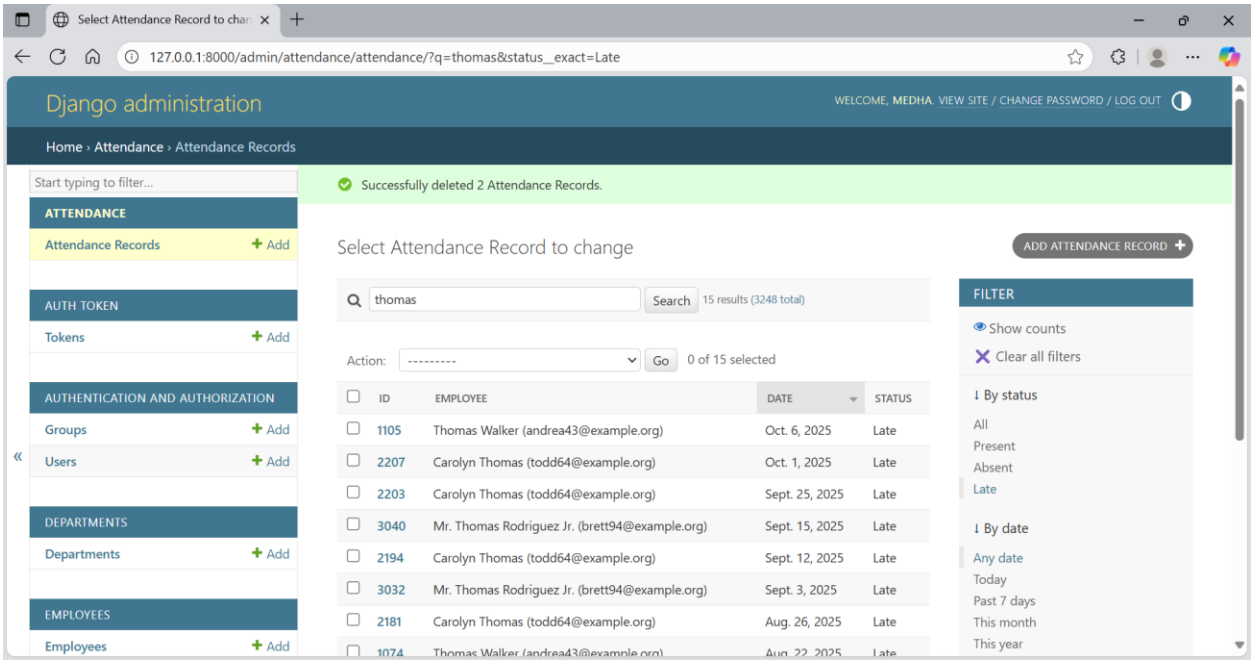


Figure 18: Updating Attendance Status

Attendance details can be modified after initial creation if corrections are required.



📁 6. Performance Module

Figure 19: Adding Performance Reviews

Employee performance ratings and reviews are submitted via the performance API endpoint.

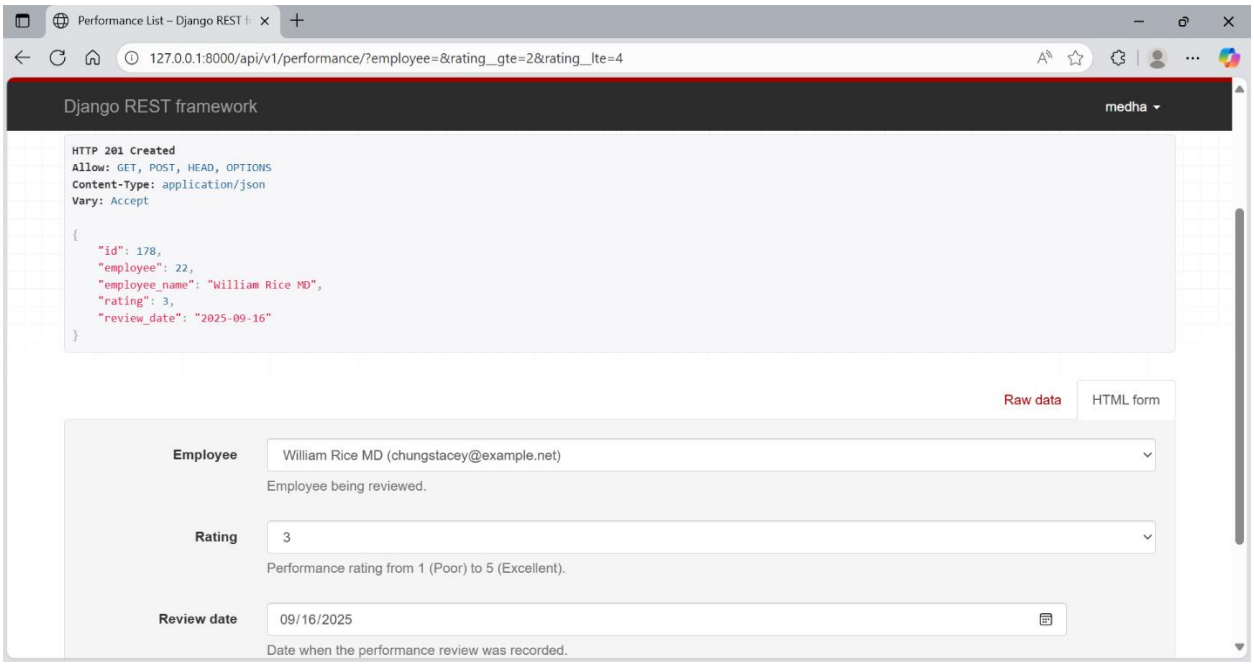
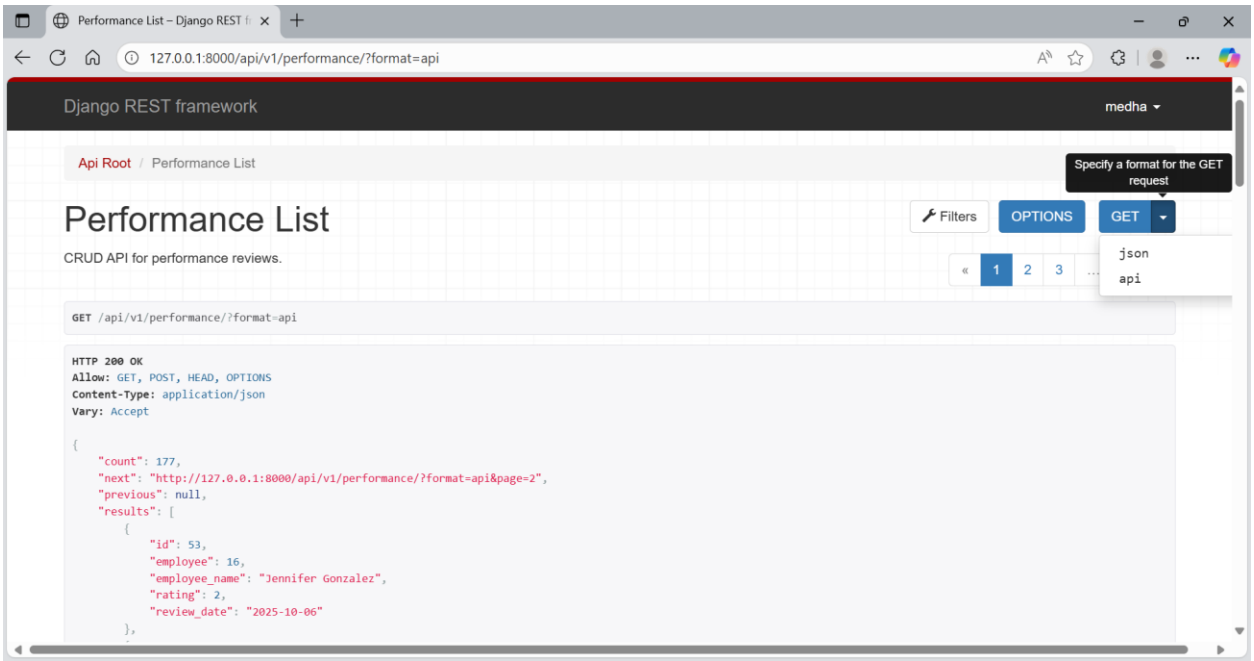
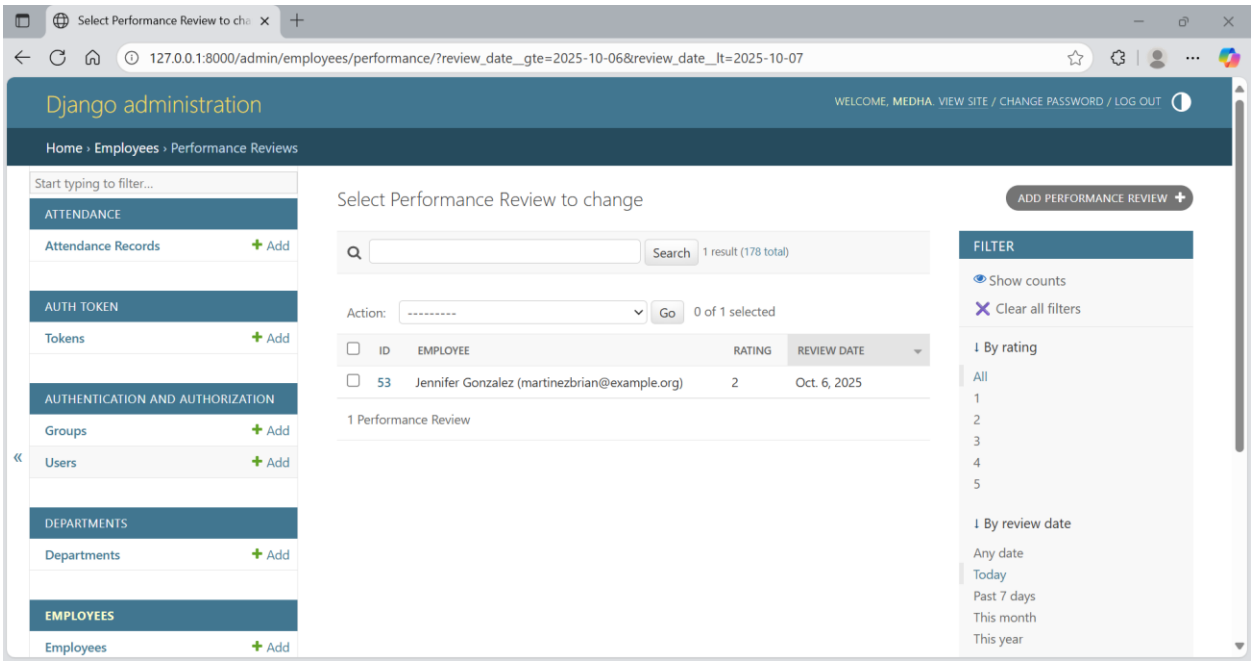


Figure 20: Updating Performance Data

Existing performance records can be updated to reflect changes in evaluation results.




Select Performance Review to cha
127.0.0.1:8000/admin/employees/performance/?review_date__gte=2025-10-06&review_date__lt=2025-10-07
Django administration
WELCOME, MEDHA. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Employees › Performance Reviews
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Select Performance Review to change
ADD PERFORMANCE REVIEW +
Search
1 result (178 total)
Action: --------- Go 0 of 1 selected
ID EMPLOYEE RATING REVIEW DATE
53 Jennifer Gonzalez (martinezbrian@example.org) 2 Oct. 6, 2025
1 Performance Review
FILTER
Show counts
Clear all filters
By rating
All
1
2
3
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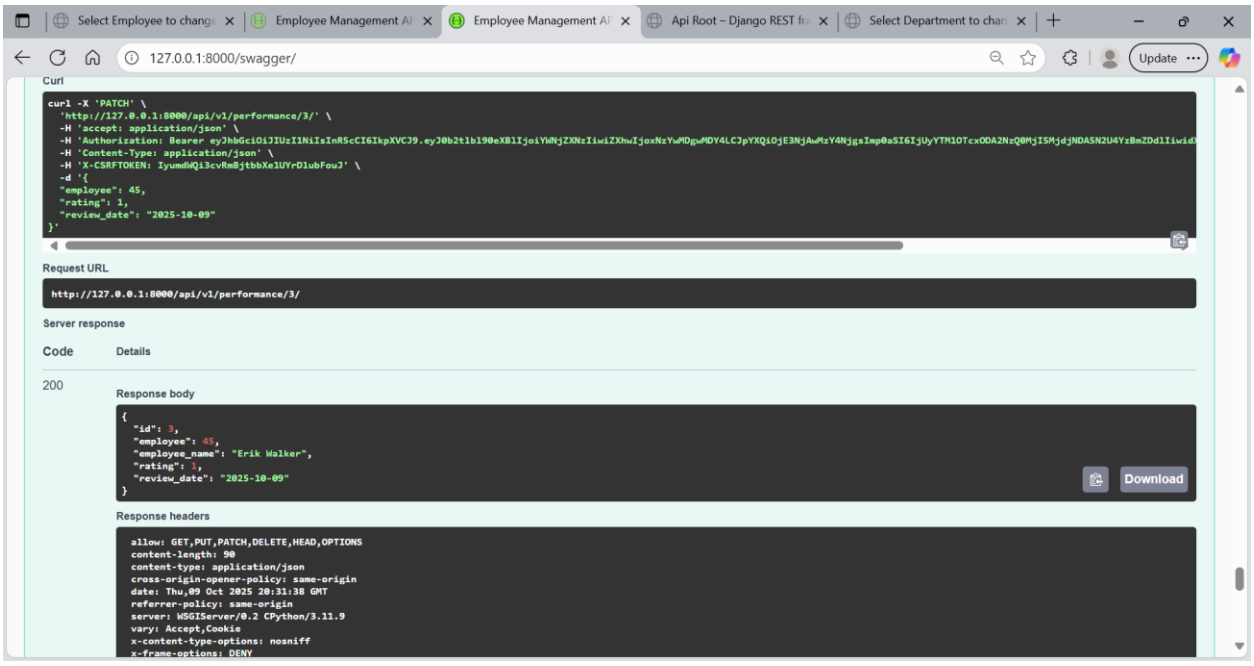
By review date
Any date
Today
Past 7 days
This month
This year


Select Employee to change
Employee Management AP
Employee Management AP
Api Root – Django REST fra
Select Department to chan
127.0.0.1:8000/swagger/
Update
Curl
curl -X 'PATCH' \
'http://127.0.0.1:8000/api/v1/performance/3/' \
-H 'accept: application/json' \
-H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ0b2tlbl90eXBlIjoiYWNjZXNzIiwiZXhwIjoxNzYwMDgwMDY4LCJpYXQiOjE3NjAwMzY4NjgsImp0aSI6IjUyYTM1OTcxODA2NzQ0MjI5MjdjNDA5N2U4YzBmZDdlIiwid
-H 'Content-Type: application/json' \
-H 'X-CSRFTOKEN: IyumdWQi3cvRmBjtbbXe1UYrDlubFouJ' \
-d '{
"employee": 45,
"rating": 1,
"review_date": "2025-10-09"
}'
Request URL
http://127.0.0.1:8000/api/v1/performance/3/
Server response
Code Details
200
Response body
{
"id": 3,
"employee": 45,
"employee_name": "Erik Walker",
"rating": 1,
"review_date": "2025-10-09"
}
Download
Response headers
allow: GET,PUT,PATCH,DELETE,HEAD,OPTIONS
content-length: 90
content-type: application/json
cross-origin-opener-policy: same-origin
date: Thu,09 Oct 2025 20:31:38 GMT
referrer-policy: same-origin
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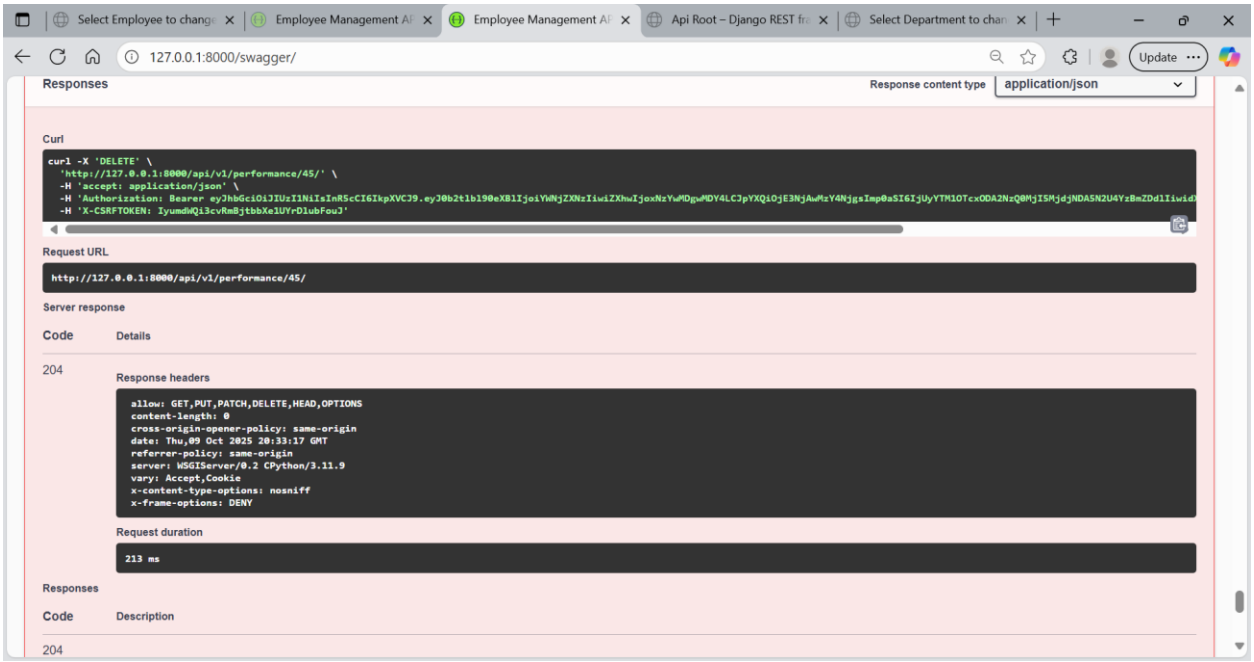
x-content-type-options: nosniff
x-frame-options: DENY



📁 7. Deployment on Render

Figure 21: Deployed Admin Panel

The application's admin panel is deployed successfully on Render, enabling remote access to manage data.

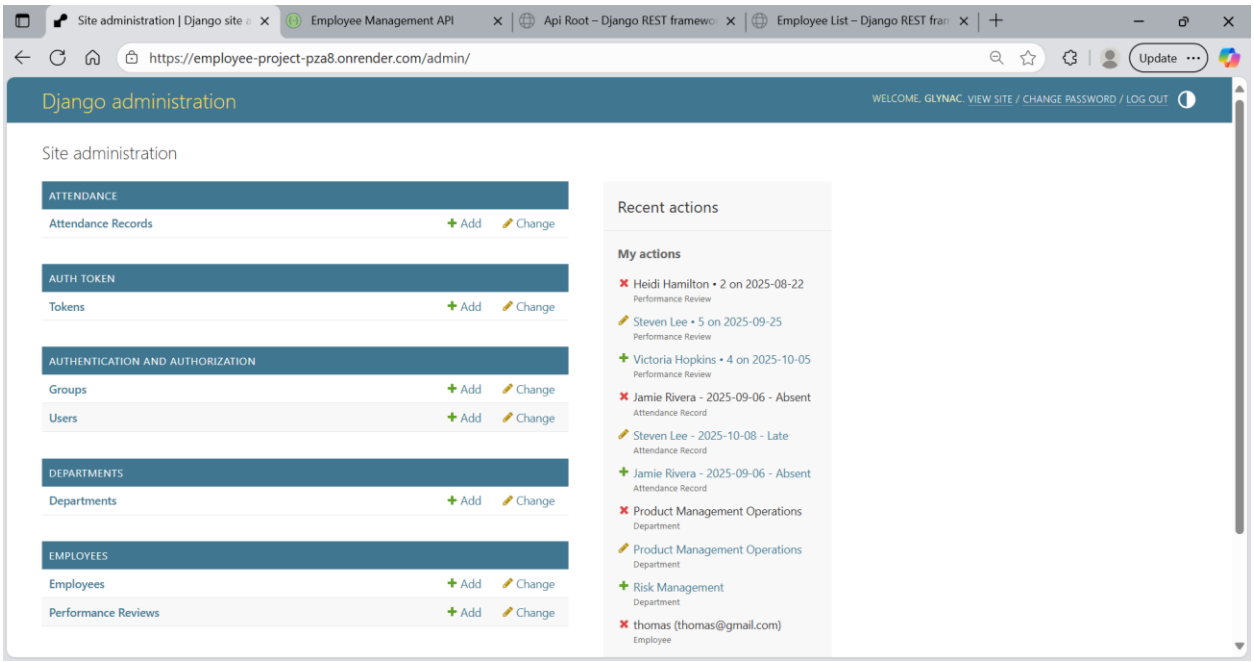
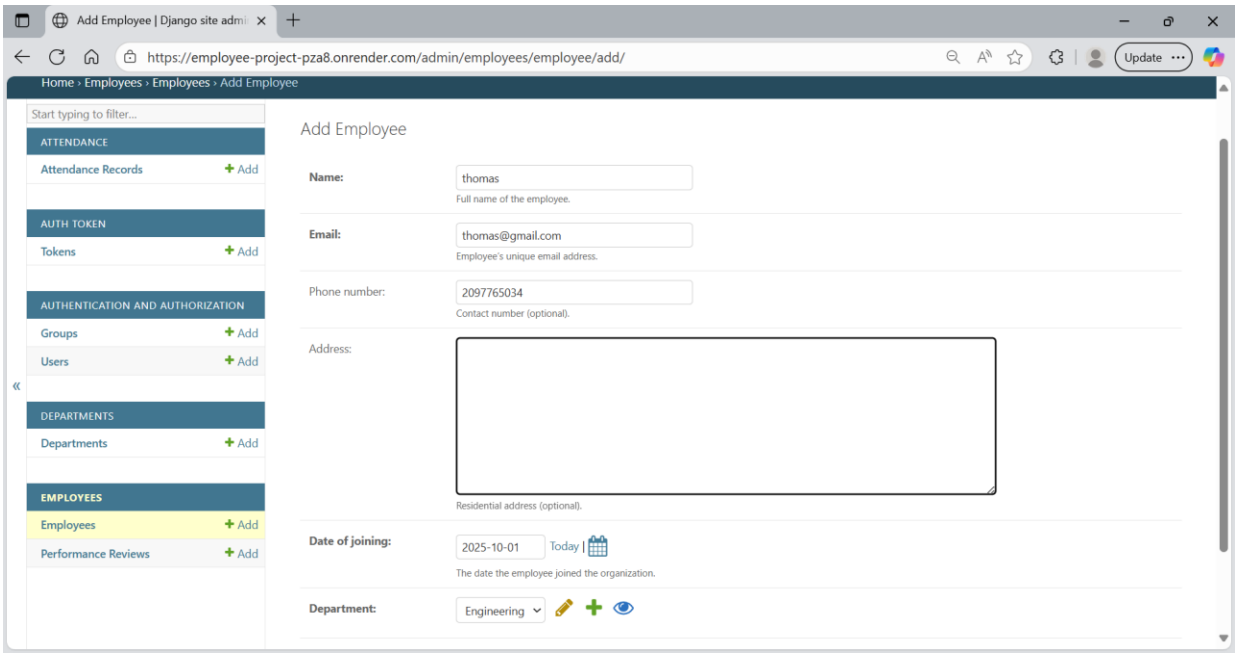
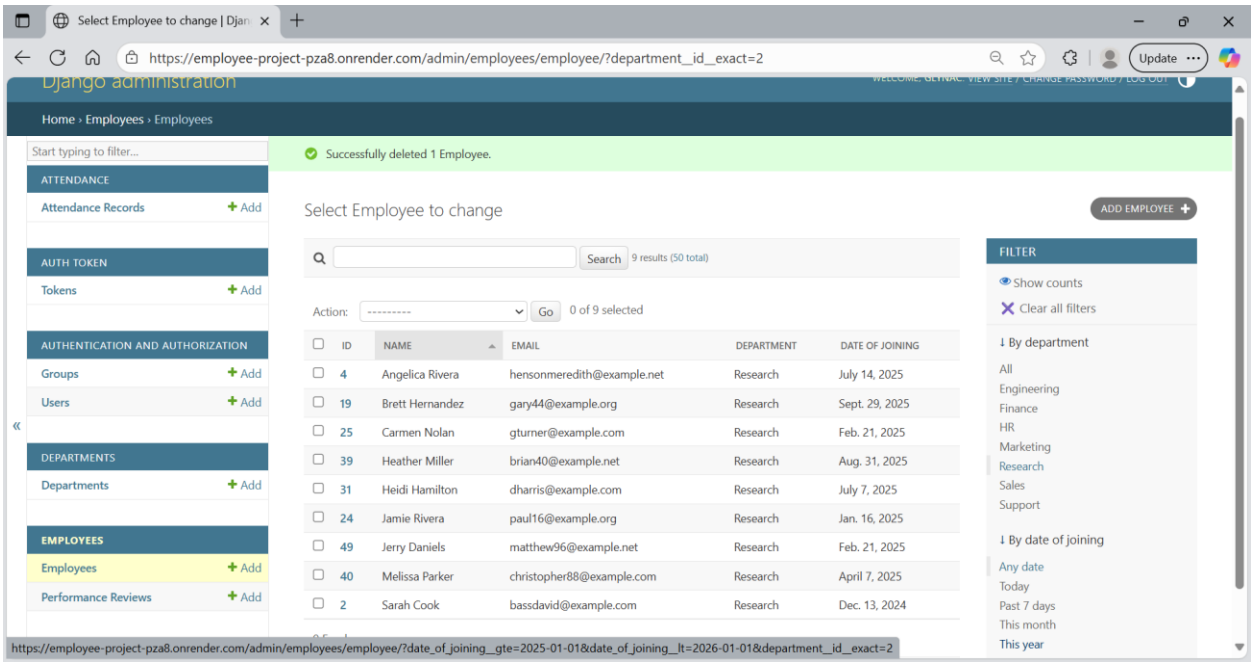
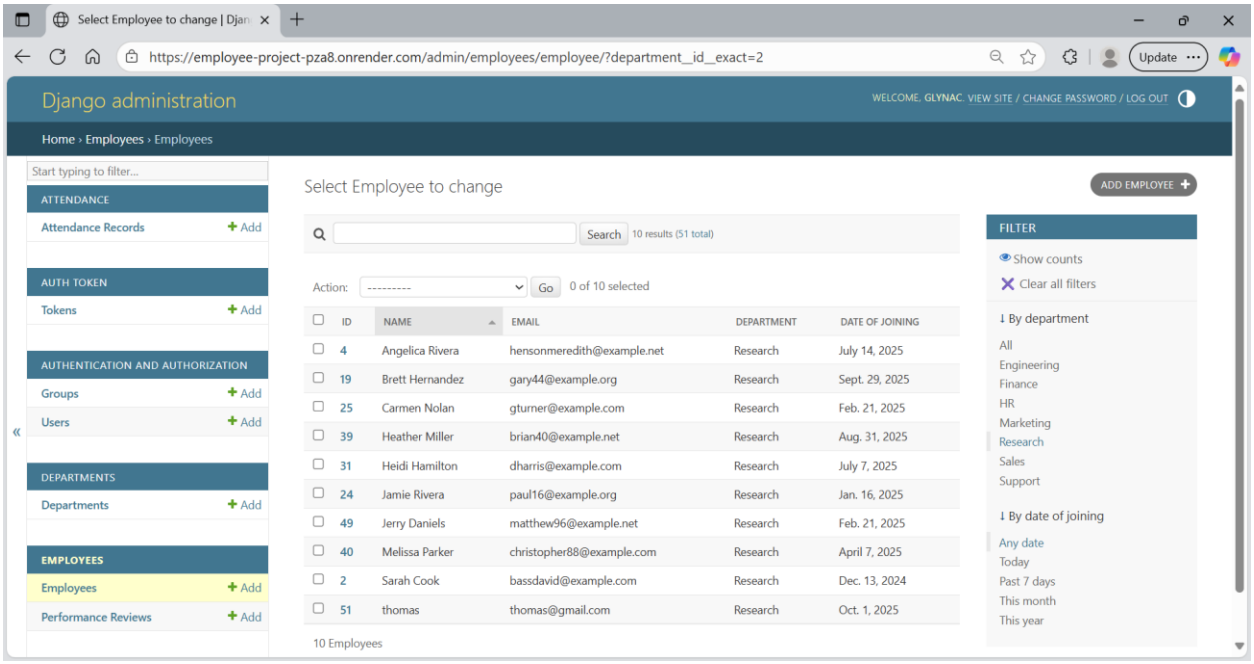


Figure 22: Deployed Employee List API

The live employee API is accessible and functional on the production deployment.






Select Employee to change | Djan
https://employee-project-pza8.onrender.com/admin/employees/employee/?department__id__exact=2
Update
Django administration
WELCOME, GLYNAC. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Employees › Employees
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
Select Employee to change
ADD EMPLOYEE +
Search
10 results (51 total)
Action: --------- Go 0 of 10 selected
ID NAME EMAIL DEPARTMENT DATE OF JOINING
4 Angelica Rivera hensonmeredith@example.net Research July 14, 2025
19 Brett Hernandez gary44@example.org Research Sept. 29, 2025
25 Carmen Nolan gturner@example.com Research Feb. 21, 2025
39 Heather Miller brian40@example.net Research Aug. 31, 2025
31 Heidi Hamilton dharris@example.com Research July 7, 2025
24 Jamie Rivera paul16@example.org Research Jan. 16, 2025
49 Jerry Daniels matthew96@example.net Research Feb. 21, 2025
40 Melissa Parker christopher88@example.com Research April 7, 2025
2 Sarah Cook bassdavid@example.com Research Dec. 13, 2024
51 thomas thomas@gmail.com Research Oct. 1, 2025
10 Employees
FILTER
Show counts
Clear all filters
By department
All
Engineering
Finance
HR
Marketing
Research
Sales
Support
By date of joining
Any date
Today
Past 7 days
This month
This year

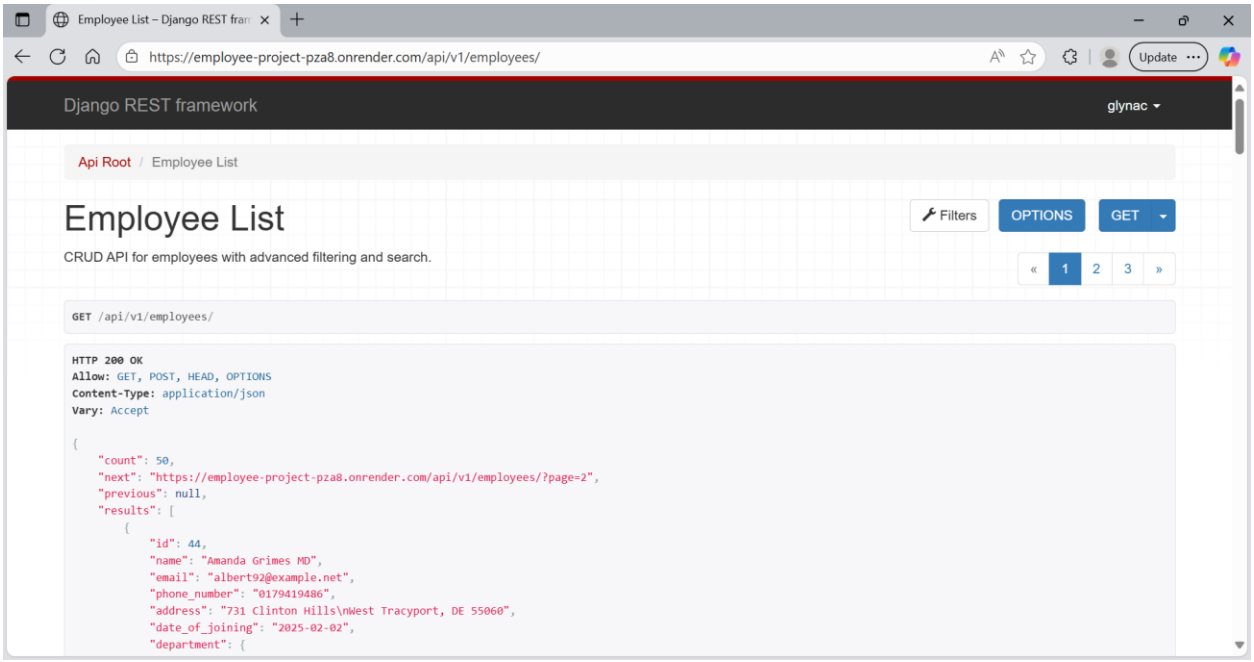
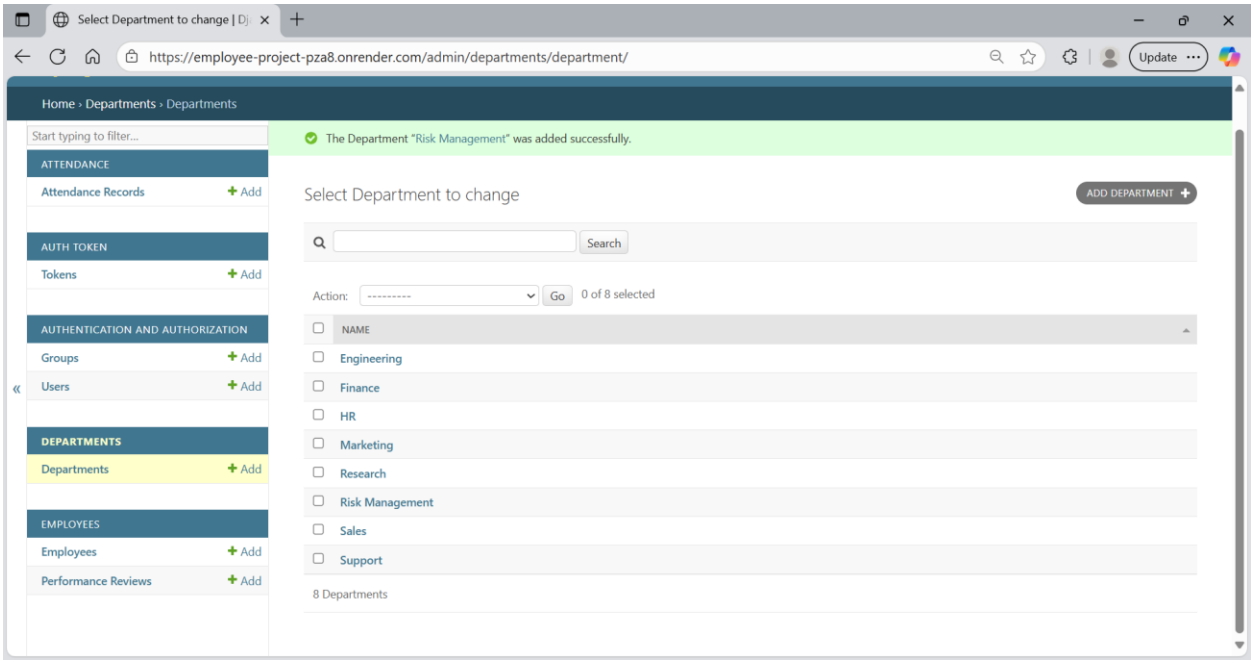
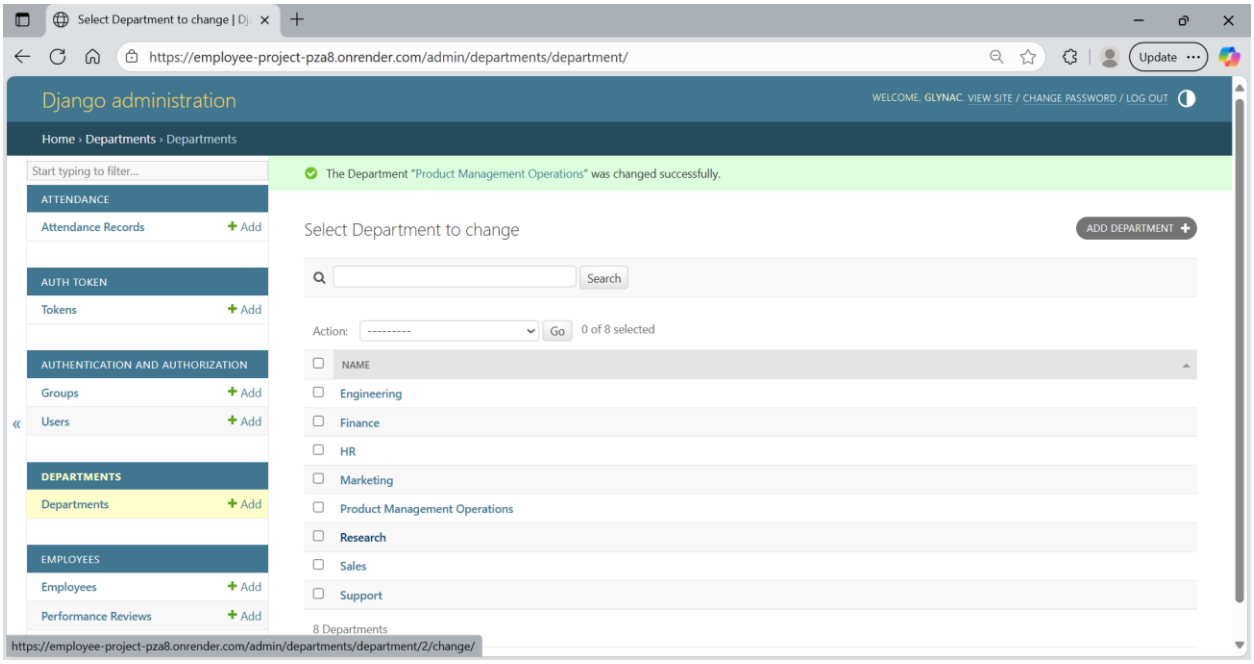
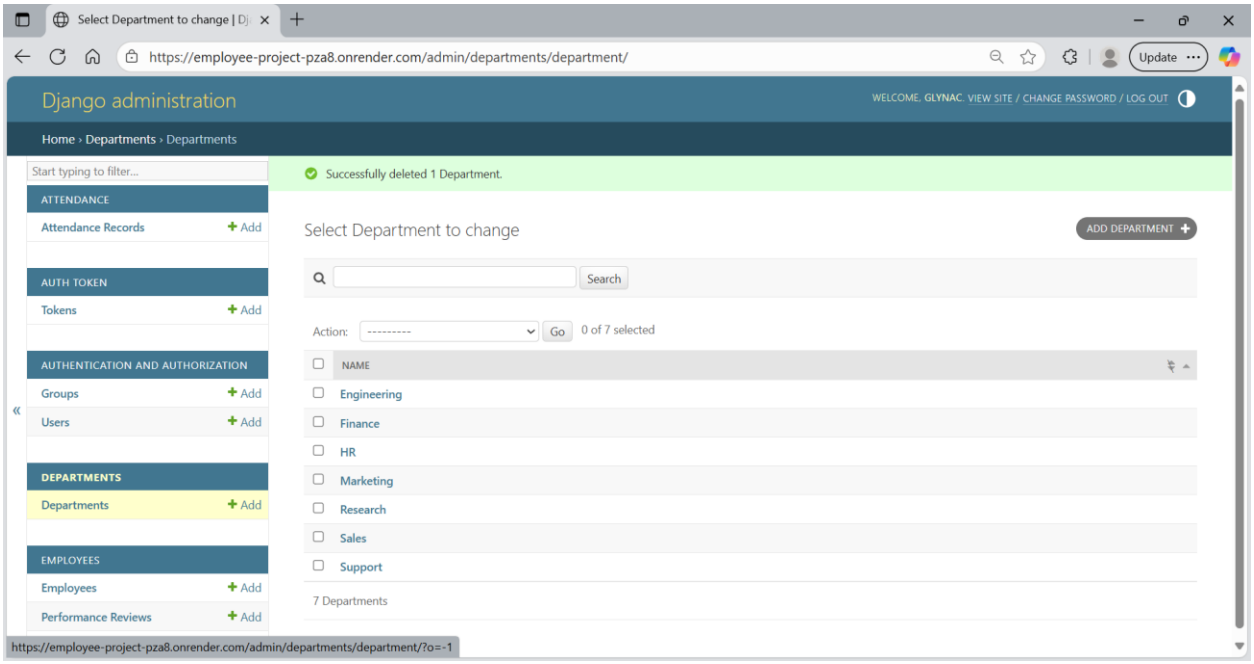

Employee List – Django REST fran
https://employee-project-pza8.onrender.com/api/v1/employees/
Update
Django REST framework
glynac
Api Root / Employee List
Employee List
CRUD API for employees with advanced filtering and search.
Filters
OPTIONS
GET
« 1 2 3 »
GET /api/v1/employees/
HTTP 200 OK
Allow: GET, POST, HEAD, OPTIONS
Content-Type: application/json
Vary: Accept
{
"count": 50,
"next": "https://employee-project-pza8.onrender.com/api/v1/employees/?page=2",
"previous": null,
"results": [
{
"id": 44,
"name": "Amanda Grimes MD",
"email": "albert92@example.net",
"phone_number": "0179419486",
"address": "731 Clinton Hills\nWest Tracyport, DE 55060",
"date_of_joining": "2025-02-02",
"department": {

Figure 23: Deployed Department List API

Department data can be managed directly on the deployed version of the application.






Select Department to change | Dj
https://employee-project-pza8.onrender.com/admin/departments/department/
Update
Django administration
WELCOME, GLYNAC. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Departments › Departments
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
Successfully deleted 1 Department.
Select Department to change
ADD DEPARTMENT +
Search
Action: --------- Go 0 of 7 selected
NAME
Engineering
Finance
HR
Marketing
Research
Sales
Support
7 Departments
https://employee-project-pza8.onrender.com/admin/departments/department/?o=-1

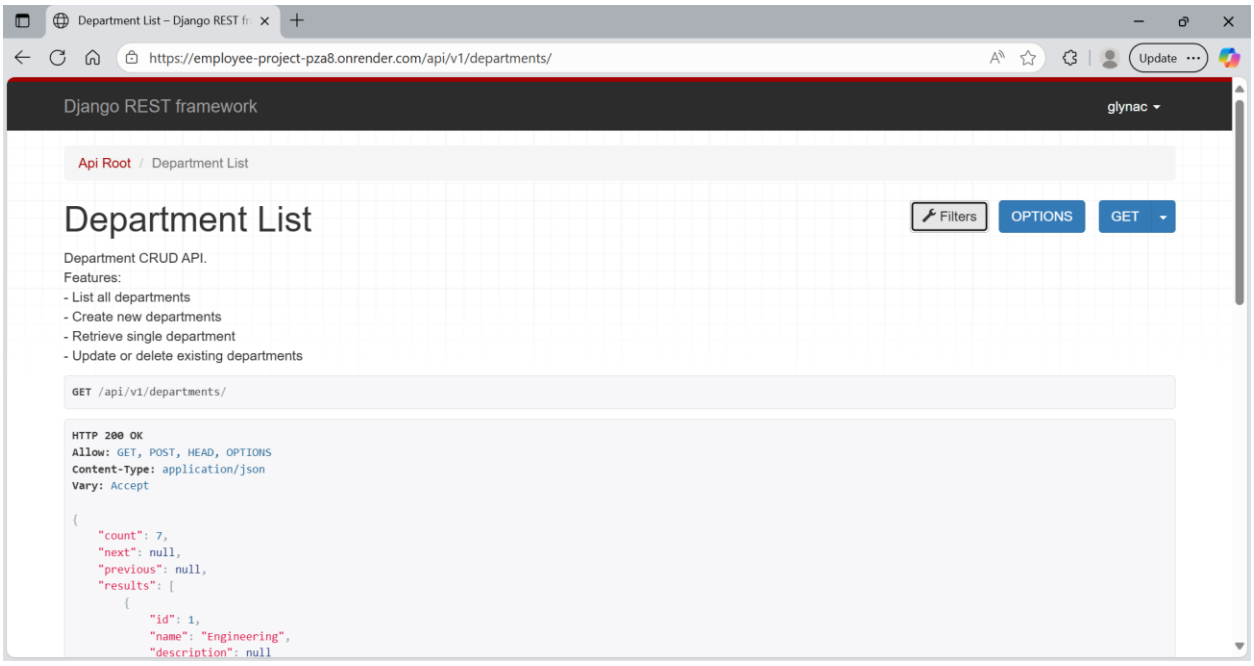
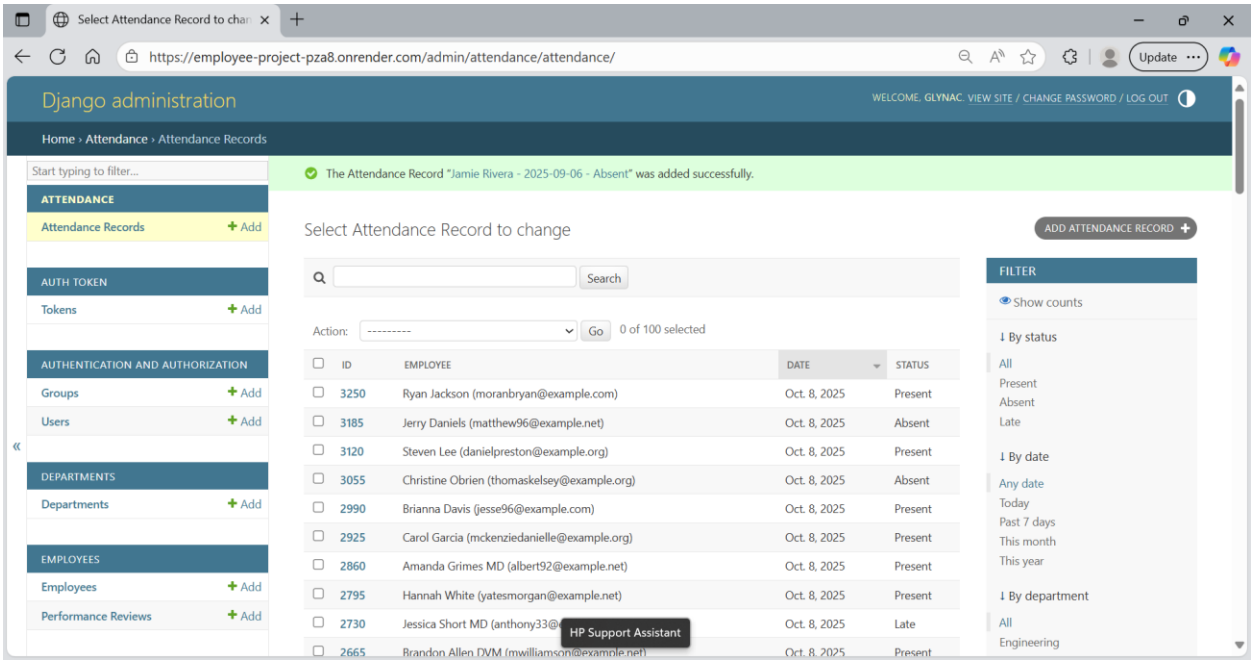
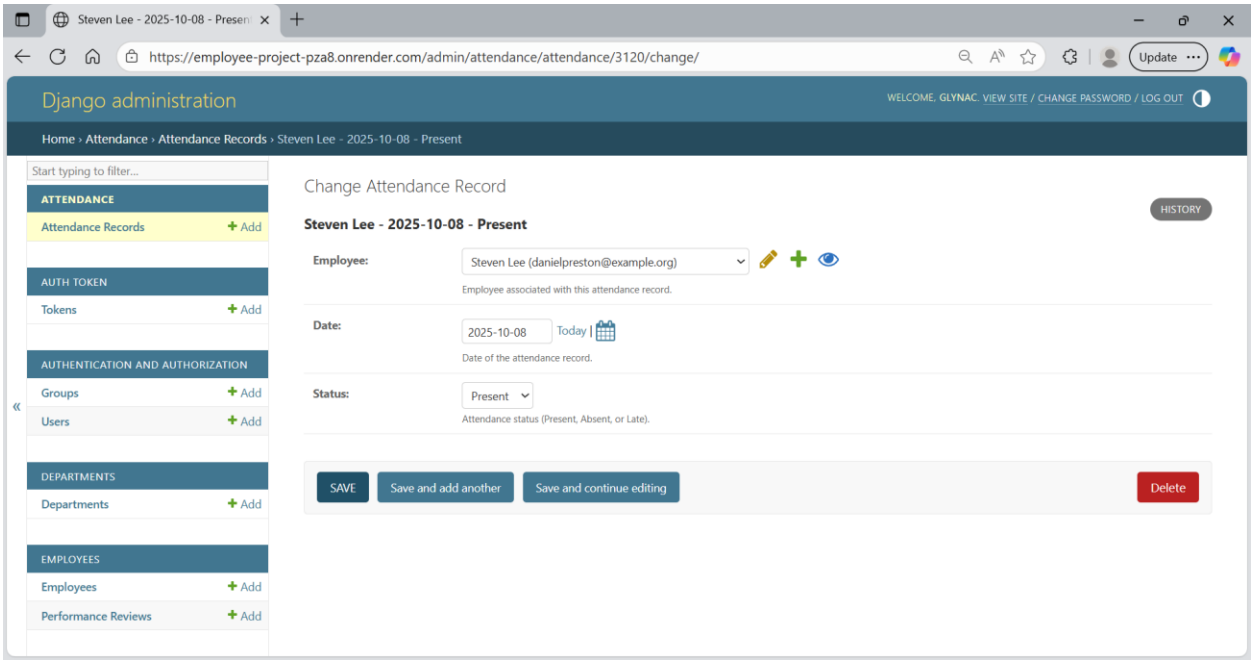
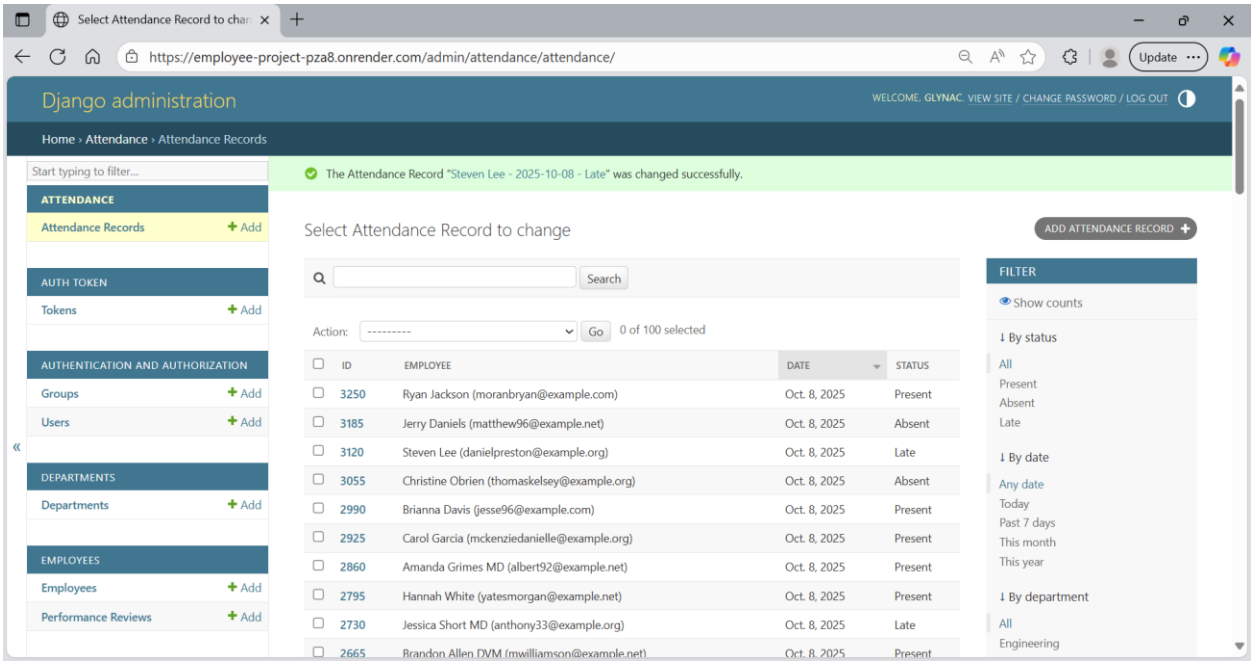

Department List – Django REST fr
https://employee-project-pza8.onrender.com/api/v1/departments/
Update
Django REST framework
glynac
Api Root / Department List
Department List
Filters
OPTIONS
GET
Department CRUD API.
Features:
- List all departments
- Create new departments
- Retrieve single department
- Update or delete existing departments
GET /api/v1/departments/
HTTP 200 OK
Allow: GET, POST, HEAD, OPTIONS
Content-Type: application/json
Vary: Accept
{
"count": 7,
"next": null,
"previous": null,
"results": [
{
"id": 1,
"name": "Engineering",
"description": null

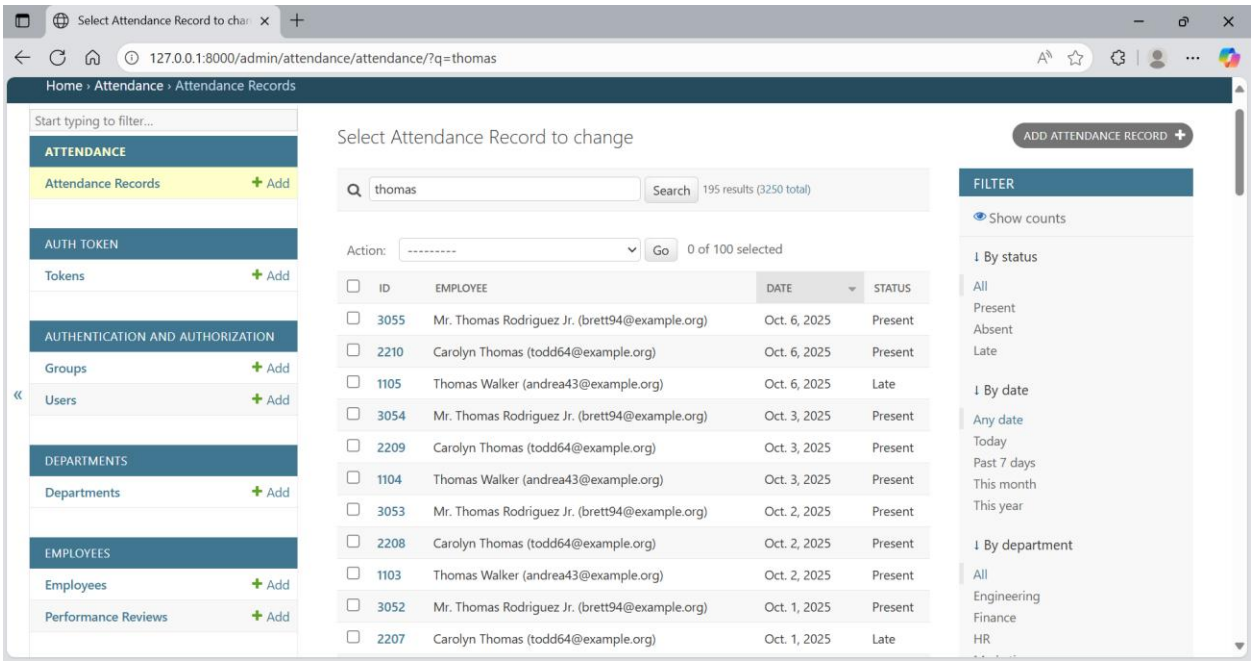
Figure 24: Deployed Attendance API

Attendance records can be created and retrieved on the production server.






Select Attendance Record to cha
https://employee-project-pza8.onrender.com/admin/attendance/attendance/
Update
Django administration
WELCOME, GLYNAC. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Attendance › Attendance Records
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
The Attendance Record "Steven Lee - 2025-10-08 - Late" was changed successfully.
Select Attendance Record to change
ADD ATTENDANCE RECORD +
Search
Action: --------- Go 0 of 100 selected
ID EMPLOYEE DATE STATUS
3250 Ryan Jackson (moranbryan@example.com) Oct. 8, 2025 Present
3185 Jerry Daniels (matthew96@example.net) Oct. 8, 2025 Absent
3120 Steven Lee (danielpreston@example.org) Oct. 8, 2025 Late
3055 Christine Obrien (thomaskelsey@example.org) Oct. 8, 2025 Absent
2990 Brianna Davis (jesse96@example.com) Oct. 8, 2025 Present
2925 Carol Garcia (mckenziedanielle@example.org) Oct. 8, 2025 Present
2860 Amanda Grimes MD (albert92@example.net) Oct. 8, 2025 Present
2795 Hannah White (yatesmorgan@example.net) Oct. 8, 2025 Present
2730 Jessica Short MD (anthony33@example.org) Oct. 8, 2025 Late
2665 Brandon Allen DVM (mwilliamson@example.net) Oct. 8, 2025 Present
FILTER
Show counts
By status
All
Present
Absent
Late
By date
Any date
Today
Past 7 days
This month
This year
By department
All
Engineering


Select Attendance Record to cha
127.0.0.1:8000/admin/attendance/attendance/?q=thomas
Home › Attendance › Attendance Records
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
Select Attendance Record to change
ADD ATTENDANCE RECORD +
thomas
Search
195 results (3250 total)
Action: --------- Go 0 of 100 selected
ID EMPLOYEE DATE STATUS
3055 Mr. Thomas Rodriguez Jr. (brett94@example.org) Oct. 6, 2025 Present
2210 Carolyn Thomas (todd64@example.org) Oct. 6, 2025 Present
1105 Thomas Walker (andrea43@example.org) Oct. 6, 2025 Late
3054 Mr. Thomas Rodriguez Jr. (brett94@example.org) Oct. 3, 2025 Present
2209 Carolyn Thomas (todd64@example.org) Oct. 3, 2025 Present
1104 Thomas Walker (andrea43@example.org) Oct. 3, 2025 Present
3053 Mr. Thomas Rodriguez Jr. (brett94@example.org) Oct. 2, 2025 Present
2208 Carolyn Thomas (todd64@example.org) Oct. 2, 2025 Present
1103 Thomas Walker (andrea43@example.org) Oct. 2, 2025 Present
3052 Mr. Thomas Rodriguez Jr. (brett94@example.org) Oct. 1, 2025 Present
2207 Carolyn Thomas (todd64@example.org) Oct. 1, 2025 Late
FILTER
Show counts
By status
All
Present
Absent
Late
By date
Any date
Today
Past 7 days
This month
This year
By department
All
Engineering
Finance
HR

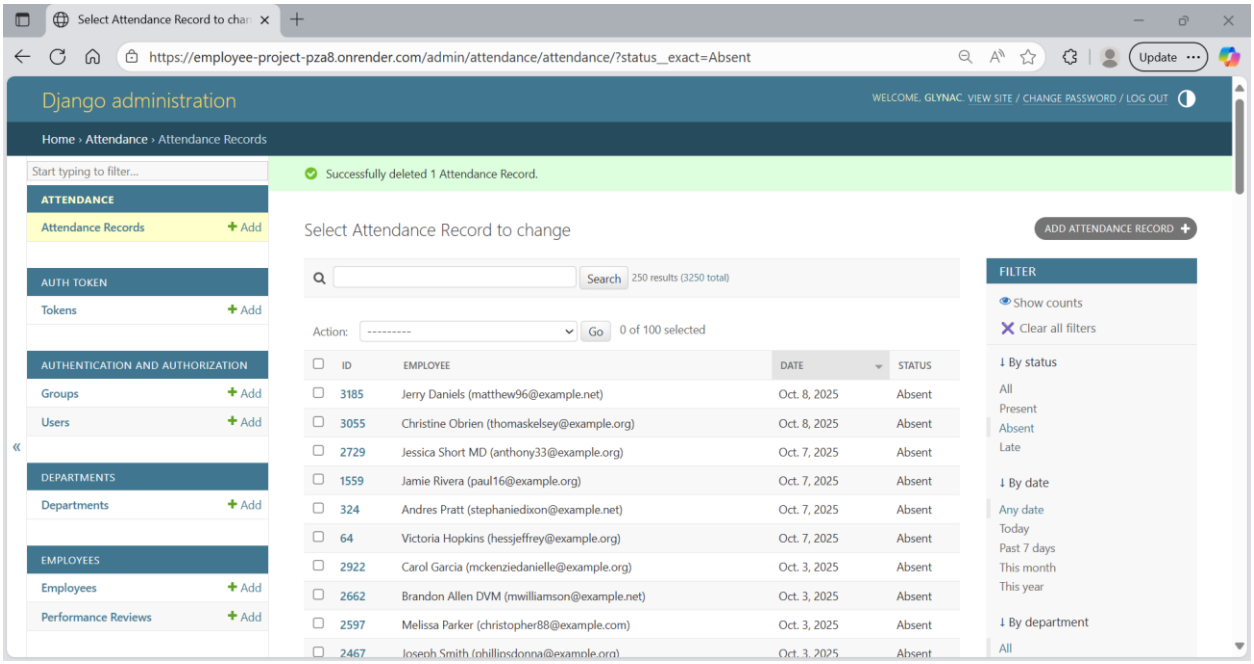
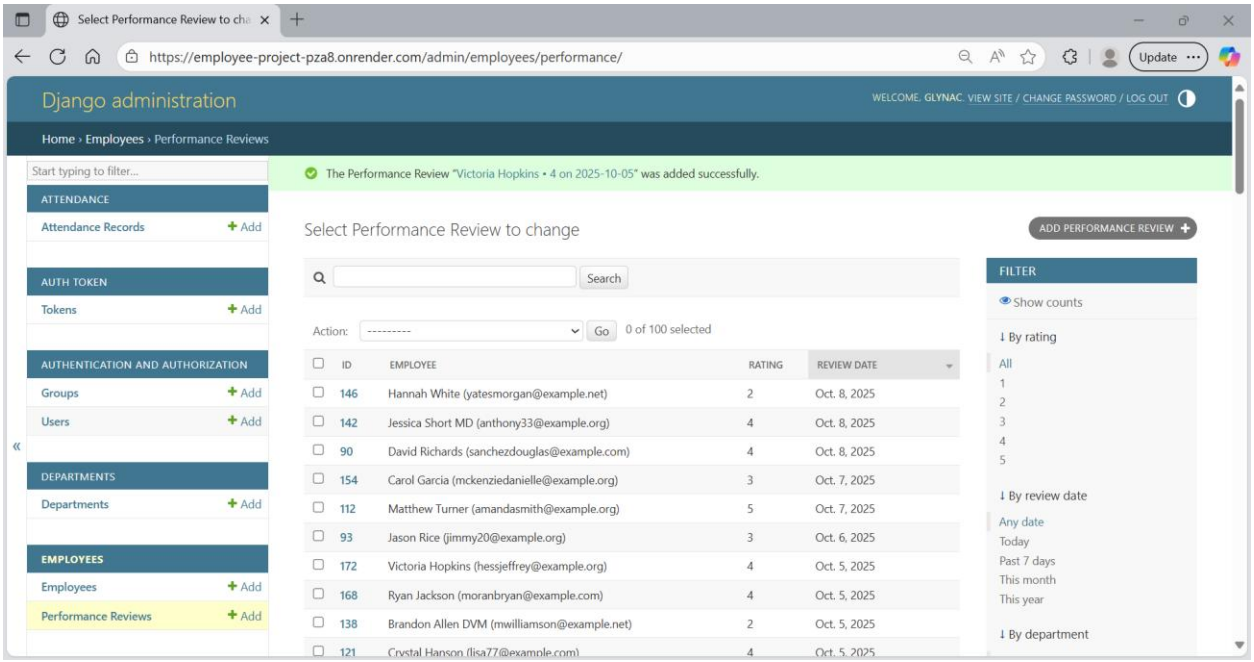
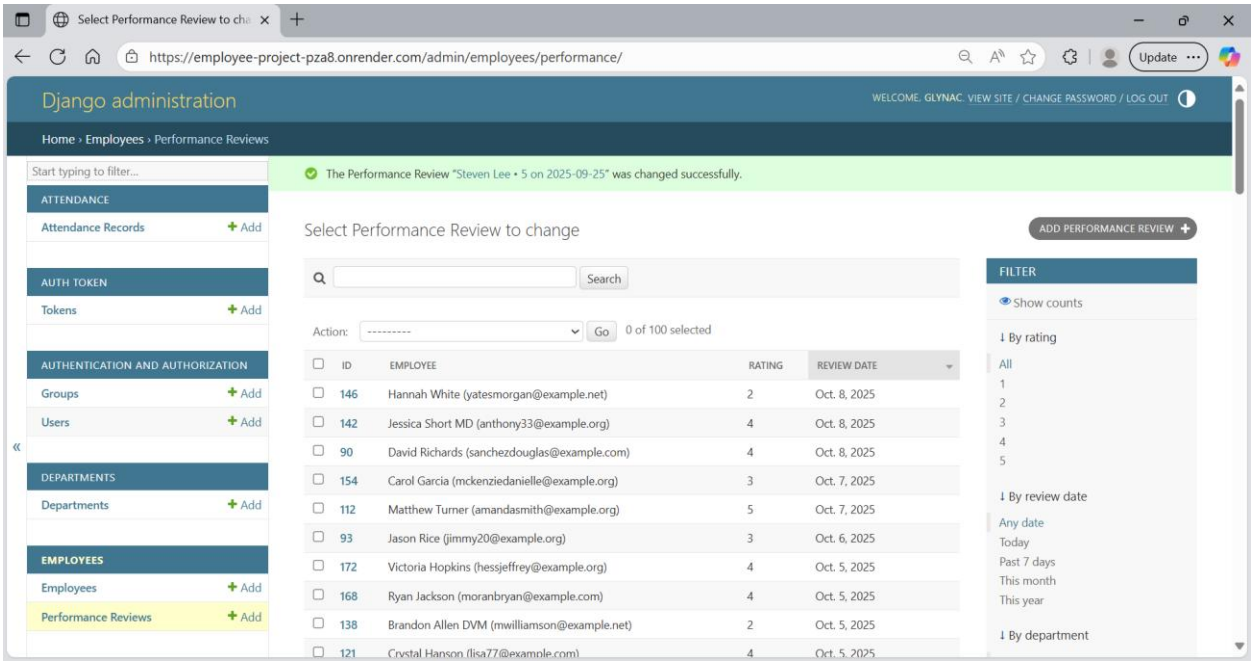
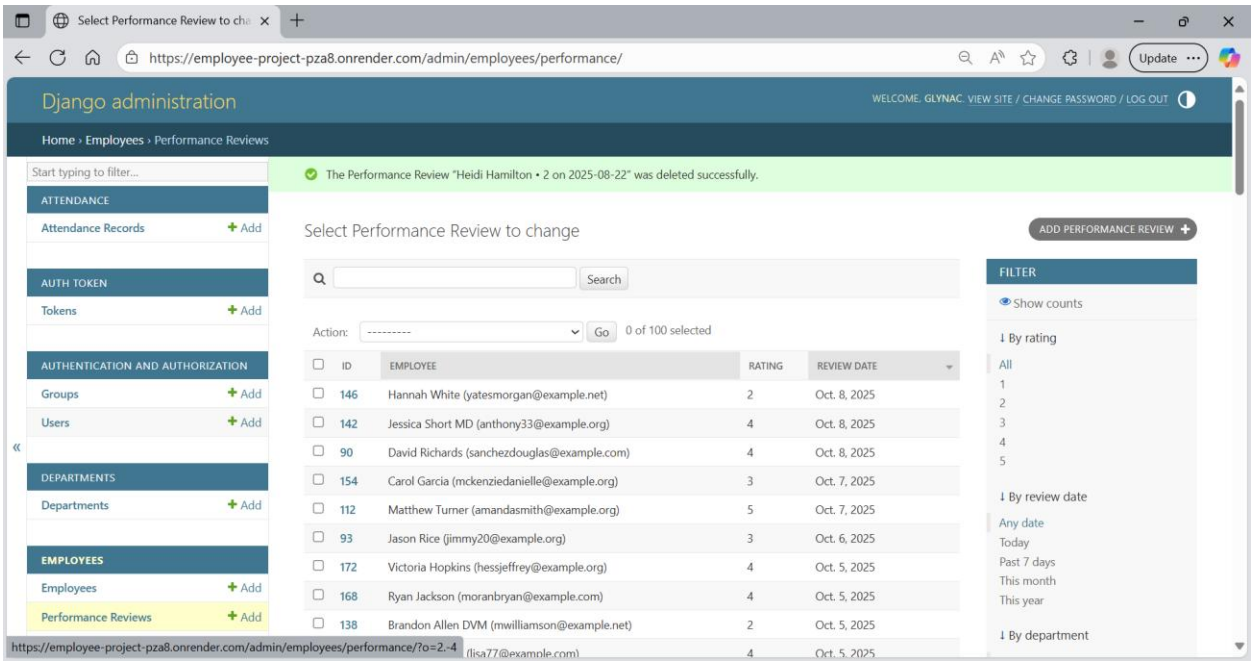


Figure 25: Deployed Performance API

Performance records can be created and retrieved on the production server.




Select Performance Review to cha
https://employee-project-pza8.onrender.com/admin/employees/performance/
Update
Django administration
WELCOME, GLYNAC. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Employees › Performance Reviews
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
The Performance Review "Steven Lee • 5 on 2025-09-25" was changed successfully.
Select Performance Review to change
ADD PERFORMANCE REVIEW
Search
Action: --------- Go 0 of 100 selected
ID EMPLOYEE RATING REVIEW DATE
146 Hannah White (yatesmorgan@example.net) 2 Oct. 8, 2025
142 Jessica Short MD (anthony33@example.org) 4 Oct. 8, 2025
90 David Richards (sanchezdouglas@example.com) 4 Oct. 8, 2025
154 Carol Garcia (mckenziedanielle@example.org) 3 Oct. 7, 2025
112 Matthew Turner (amandasmith@example.org) 5 Oct. 7, 2025
93 Jason Rice (jimmy20@example.org) 3 Oct. 6, 2025
172 Victoria Hopkins (hessjeffrey@example.org) 4 Oct. 5, 2025
168 Ryan Jackson (moranbryan@example.com) 4 Oct. 5, 2025
138 Brandon Allen DVM (mwilliamson@example.net) 2 Oct. 5, 2025
121 Crystal Hanson (lisa77@example.com) 4 Oct. 5, 2025
FILTER
Show counts
By rating
All
1
2
3
4
5
By review date
Any date
Today
Past 7 days
This month
This year
By department


Select Performance Review to cha
https://employee-project-pza8.onrender.com/admin/employees/performance/
Update
Django administration
WELCOME, GLYNAC. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Employees › Performance Reviews
Start typing to filter...
ATTENDANCE
Attendance Records + Add
AUTH TOKEN
Tokens + Add
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
DEPARTMENTS
Departments + Add
EMPLOYEES
Employees + Add
Performance Reviews + Add
The Performance Review "Heidi Hamilton • 2 on 2025-08-22" was deleted successfully.
Select Performance Review to change
ADD PERFORMANCE REVIEW
Search
Action: --------- Go 0 of 100 selected
ID EMPLOYEE RATING REVIEW DATE
146 Hannah White (yatesmorgan@example.net) 2 Oct. 8, 2025
142 Jessica Short MD (anthony33@example.org) 4 Oct. 8, 2025
90 David Richards (sanchezdouglas@example.com) 4 Oct. 8, 2025
154 Carol Garcia (mckenziedanielle@example.org) 3 Oct. 7, 2025
112 Matthew Turner (amandasmith@example.org) 5 Oct. 7, 2025
93 Jason Rice (jimmy20@example.org) 3 Oct. 6, 2025
172 Victoria Hopkins (hessjeffrey@example.org) 4 Oct. 5, 2025
168 Ryan Jackson (moranbryan@example.com) 4 Oct. 5, 2025
138 Brandon Allen DVM (mwilliamson@example.net) 2 Oct. 5, 2025
https://employee-project-pza8.onrender.com/admin/employees/performance/?o=2.-4
FILTER
Show counts
By rating
All
1
2
3
4
5
By review date
Any date
Today
Past 7 days
This month
This year
By department

📁 8. Charts & Analytics

Figure 26: Local Analytics Dashboard

Charts generated using Chart.js display employee distribution across departments and monthly attendance trends.

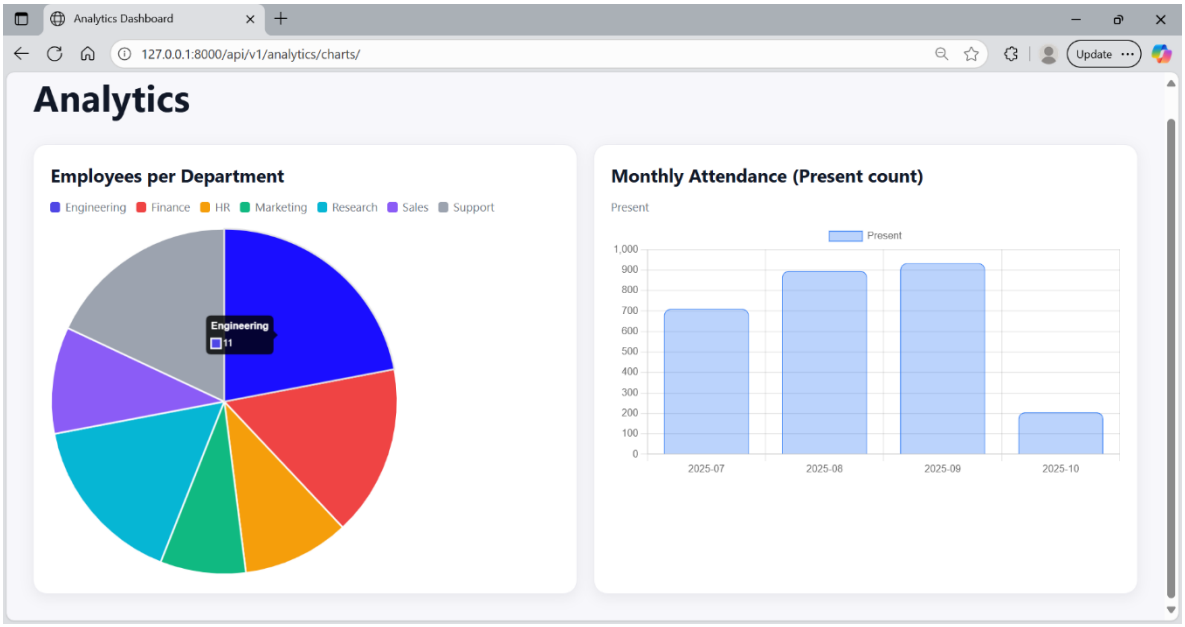
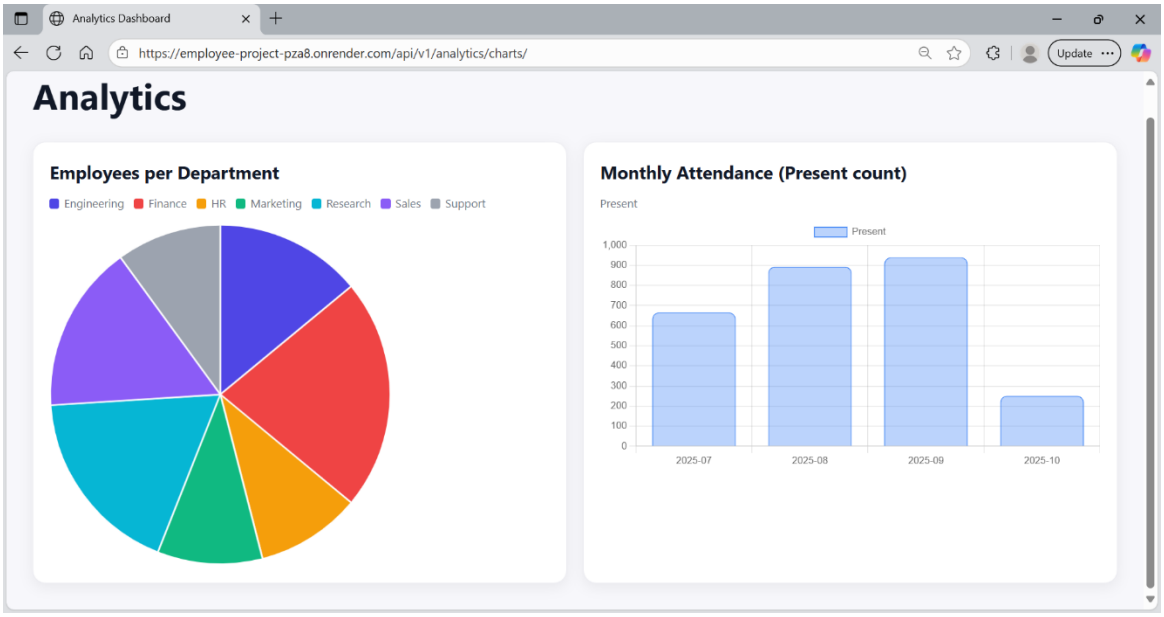


Figure 27: Deployed Charts View

The same analytics dashboard is accessible in the deployed environment, providing real-time insights into workforce metrics.



11. Conclusion

The Employee Management System (Django + DRF) has been thoroughly enhanced and now meets all requirements outlined for final resubmission. The project implements a clean and modular Django structure with dedicated apps for Employees, Departments, Attendance, and Performance, ensuring scalability and maintainability. Core models are properly designed with ForeignKey relationships and validated through reverse queries, while database migrations execute successfully without errors.

The system delivers fully functional RESTful APIs that support complete CRUD operations, along with pagination, filtering, and sorting capabilities. Secure access is ensured through JWT-based authentication, and interactive Swagger documentation is available at the /swagger/ route. The inclusion of a custom seed data command enables automatic database population with realistic test data, significantly improving development and testing workflows.

Beyond the core objectives, the project incorporates several advanced features that showcase modern backend engineering practices. These include Docker configuration for containerized deployment, Chart.js-based analytics for data visualization, and seamless Render deployment integrated with a PostgreSQL database. Additional components such as health check endpoints, relationship integrity testing, and analytics dashboards further strengthen the system's reliability and production readiness.

Overall, the Employee Management System demonstrates professional-grade backend development practices, combining robust data management, secure authentication, comprehensive documentation, and deployment readiness.