

# Assignment-15

## Lab 15 – Backend API Development: Creating RESTful Services with AI

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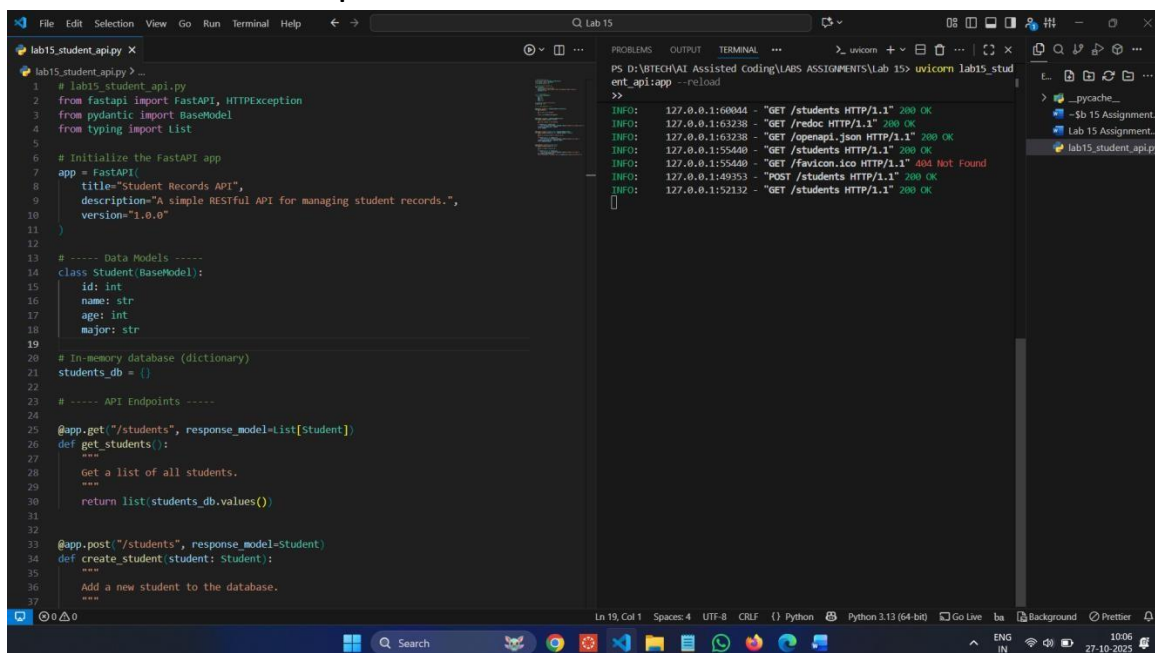
BATCH:

### Task 1 – Student Records API Task:

Use AI to build a RESTful API for managing student records.

#### Instructions:

- Endpoints required:
  - o GET /students → List all students
  - o POST /students → Add a new student
  - o PUT /students/{id} → Update student details
  - o DELETE /students/{id} → Delete a student record
- Use an in-memory data structure (list or dictionary) to store records.
- Ensure API responses are in JSON format. **Code :**



The screenshot displays a VS Code editor with a Python file named `lab15_student_api.py`. The code defines a FastAPI application with the following components:

- Imports:** `FastAPI`, `HTTPException` from `fastapi`; `BaseModel` from `pydantic`; `List` from `typing`.
- App Initialization:** `app = FastAPI(title="Student Records API", description="A simple RESTful API for managing student records.", version="1.0.0")`
- Data Model:** `class Student(BaseModel):` with fields `id: int`, `name: str`, `age: int`, and `major: str`.
- In-memory Database:** `students_db = {}`
- API Endpoints:**
  - `@app.get("/students", response_model=list[Student])` with a `def get_students():` function that returns `list(students_db.values())`.
  - `@app.post("/students", response_model=Student)` with a `def create_student(student: Student):` function that adds a new student to the database.

The terminal window on the right shows the command `uvicorn lab15_student_api:app --reload` and the following log output:

```
INFO: 127.0.0.1:60044 - "GET /students HTTP/1.1" 200 OK
INFO: 127.0.0.1:63238 - "GET /redoc HTTP/1.1" 200 OK
INFO: 127.0.0.1:63238 - "GET /openapi.json HTTP/1.1" 200 OK
INFO: 127.0.0.1:55440 - "GET /students HTTP/1.1" 200 OK
INFO: 127.0.0.1:55440 - "GET /favicon.ico HTTP/1.1" 404 Not Found
INFO: 127.0.0.1:49353 - "POST /students HTTP/1.1" 200 OK
INFO: 127.0.0.1:52132 - "GET /students HTTP/1.1" 200 OK
```

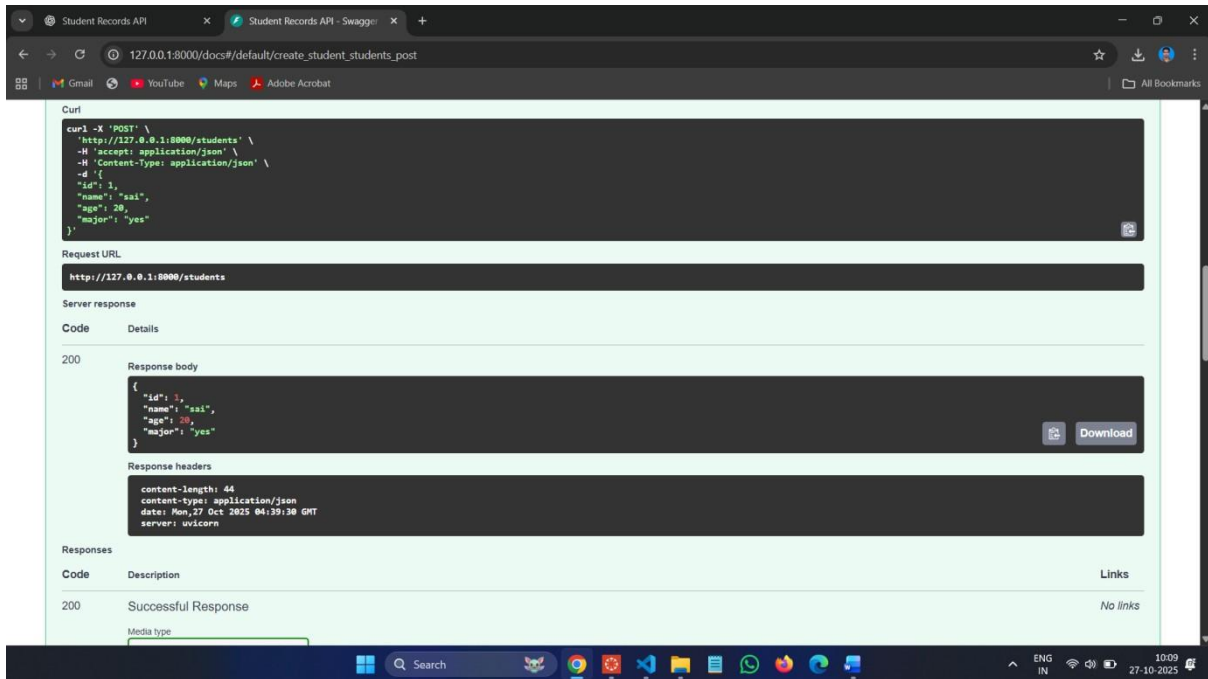
Swagger UI: <http://127.0.0.1:8000/docs>

## Commands :

pip install fastapiuvicorn

uvicorn lab15\_student\_api:app --reload **Output:**

## POST :



## GET :

Student Records API - Swagger

127.0.0.1:8000/docs#/default/get\_students\_students\_get

Curl

```
curl -X 'GET' \
  'http://127.0.0.1:8000/students' \
  -H 'accept: application/json'
```

Request URL

http://127.0.0.1:8000/students

Server response

Code	Details
200	<p>Response body</p> <pre>{   "id": 1,   "name": "sai",   "age": 20,   "major": "cse" }, {   "id": 1,   "name": "sai",   "age": 20,   "major": "yes" }</pre> <p>Response headers</p> <pre>content-length: 91 content-type: application/json date: Mon, 27 Oct 2025 04:48:34 GMT server: uvicorn</pre>

Responses

Code	Description	Links
200	Successful Response	No links

## PUT :

Student Records API - Swagger

127.0.0.1:8000/docs#/default/update\_student\_students\_student\_id\_put

Curl

```
curl -X 'PUT' \
  'http://127.0.0.1:8000/students/2' \
  -H 'accept: application/json' \
  -H 'Content-Type: application/json' \
  -d '{
    "id": 0,
    "name": "ram",
    "age": 0,
    "major": "string"
  }'
```

Request URL

http://127.0.0.1:8000/students/2

Server response

Code	Details
200	<p>Response body</p> <pre>{   "id": 0,   "name": "ram",   "age": 0,   "major": "string" }</pre> <p>Response headers</p> <pre>content-length: 46 content-type: application/json date: Mon, 27 Oct 2025 04:41:18 GMT server: uvicorn</pre>

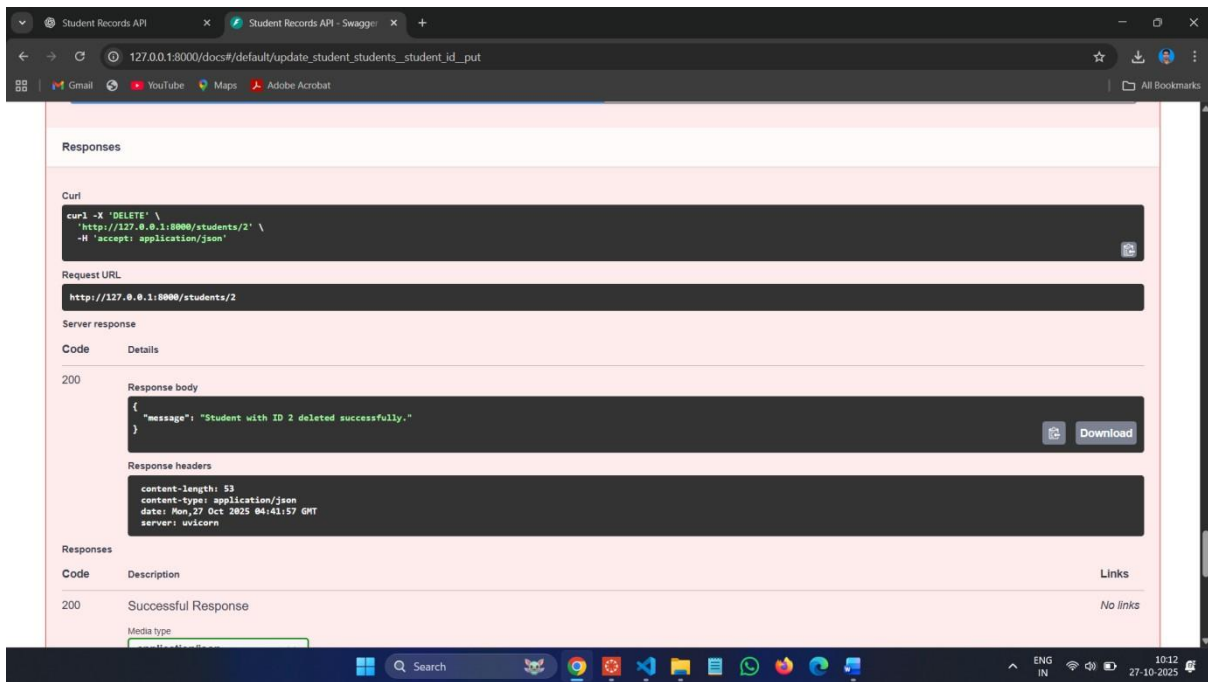
Responses

Code	Description	Links
200	Successful Response	No links

Media type

application/json

## DELETE :



## Task 2 – Library Book Management API Task:

Develop a RESTful API to handle library books.

### Instructions:

- Endpoints required:
  - o GET /books → Retrieve all books
  - o POST /books → Add a new book
  - o GET /books/{id} → Get details of a specific book
  - o PATCH /books/{id} → Update partial book details (e.g., availability)
  - o DELETE /books/{id} → Remove a book
- Implement error handling for invalid requests.

**Code :**

The image shows a VS Code editor with two files open: `lab15_library_api.py` and `lab15_student_api.py`. The `lab15_library_api.py` file contains the following code:

```
1 # lab15_library_api.py
2 from fastapi import FastAPI, HTTPException
3 from pydantic import BaseModel
4 from typing import Optional, Dict
5
6
7 app = FastAPI(
8     title="Library Book Management API",
9     description="RESTful API to manage library books with CRUD and partial update",
10     version="1.0.0"
11 )
12
13 # ----- Data Models -----
14 class Book(BaseModel):
15     id: int
16     title: str
17     author: str
18     year: int
19     available: bool = True
20
21 class BookUpdate(BaseModel):
22     title: Optional[str] = None
23     author: Optional[str] = None
24     year: Optional[int] = None
25     available: Optional[bool] = None
26
27 # In-memory "database"
28 books_db: Dict[int, Book] = {}
29
30 # ----- Endpoints -----
31
32 @app.get("/books")
33 def get_books():
34     """
35     Retrieve all books in the library.
36     """
37     return list(books_db.values())
```

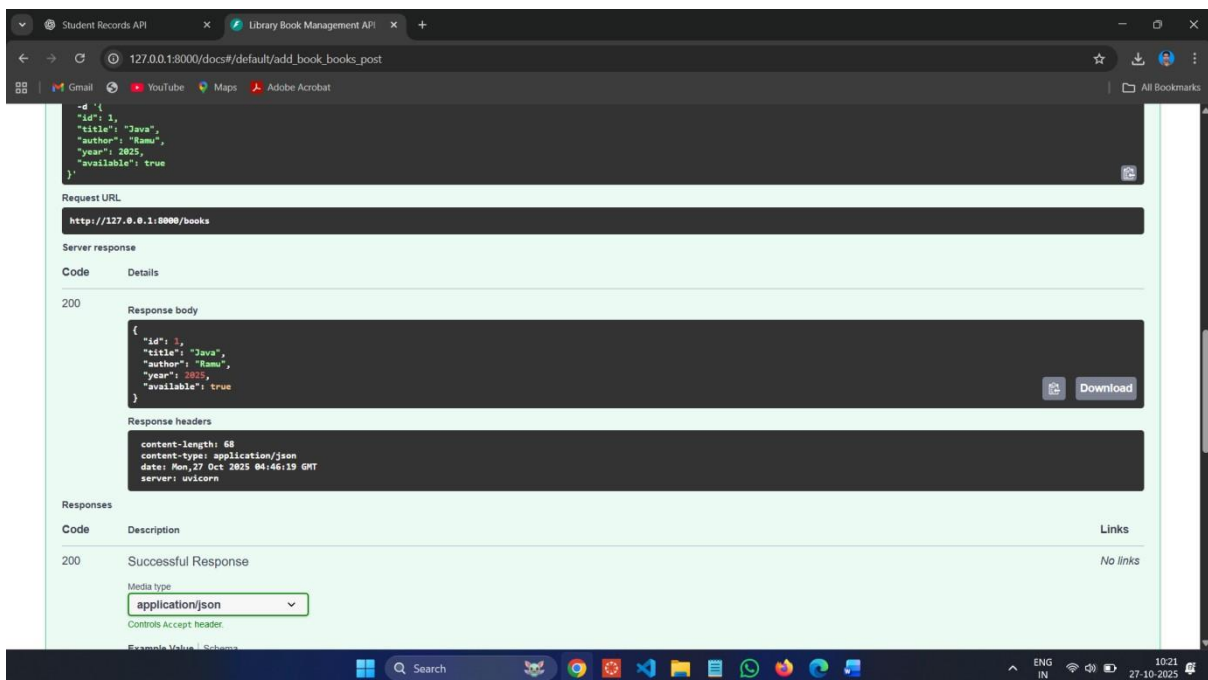
The terminal output shows the command `uvicorn lab15_library_api:app --reload` being executed. The output indicates that the application is running on `http://127.0.0.1:8000` and that the Swagger UI is available at `http://127.0.0.1:8000/docs`. The terminal also shows the application startup logs, including the server process starting and the application startup complete.

## Commands :

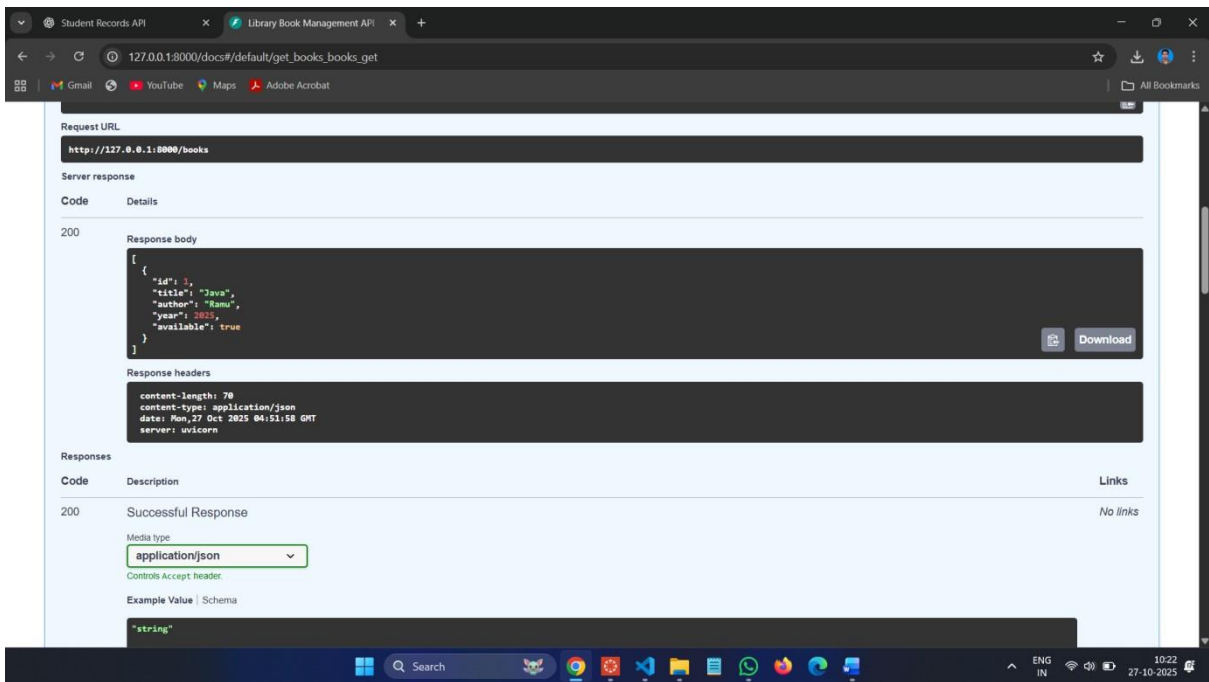
`uvicorn lab15_library_api:app --reload`

Swagger UI: <http://127.0.0.1:8000/docs>

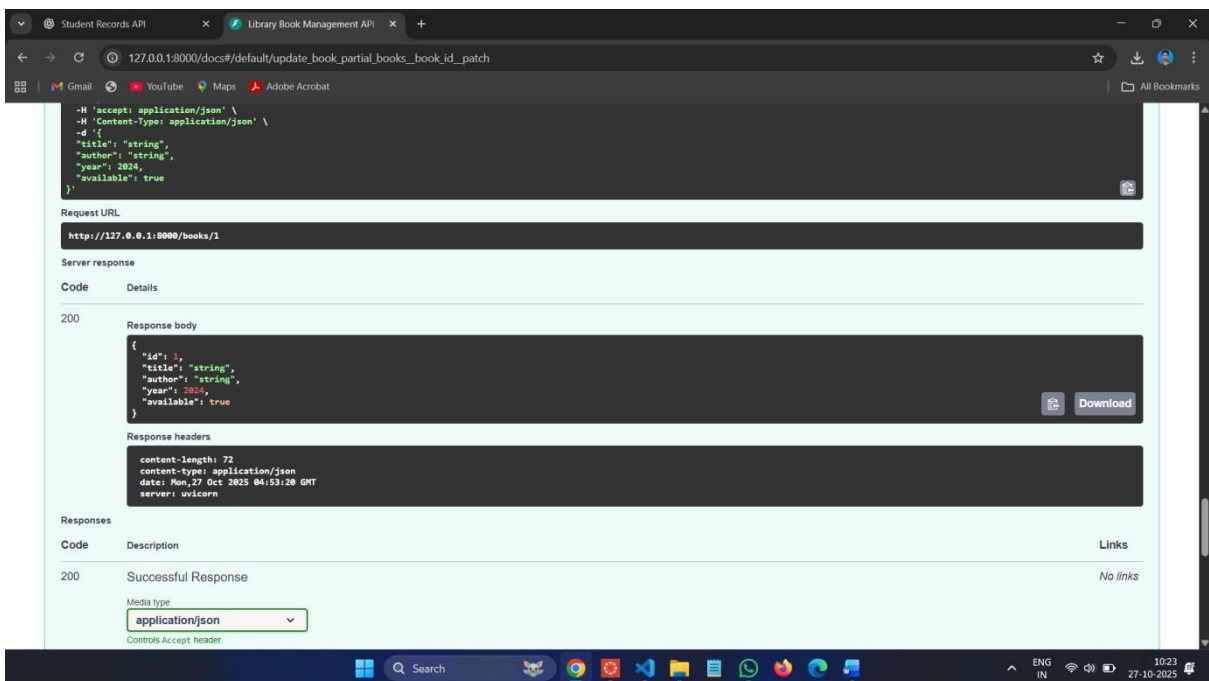
## POST :



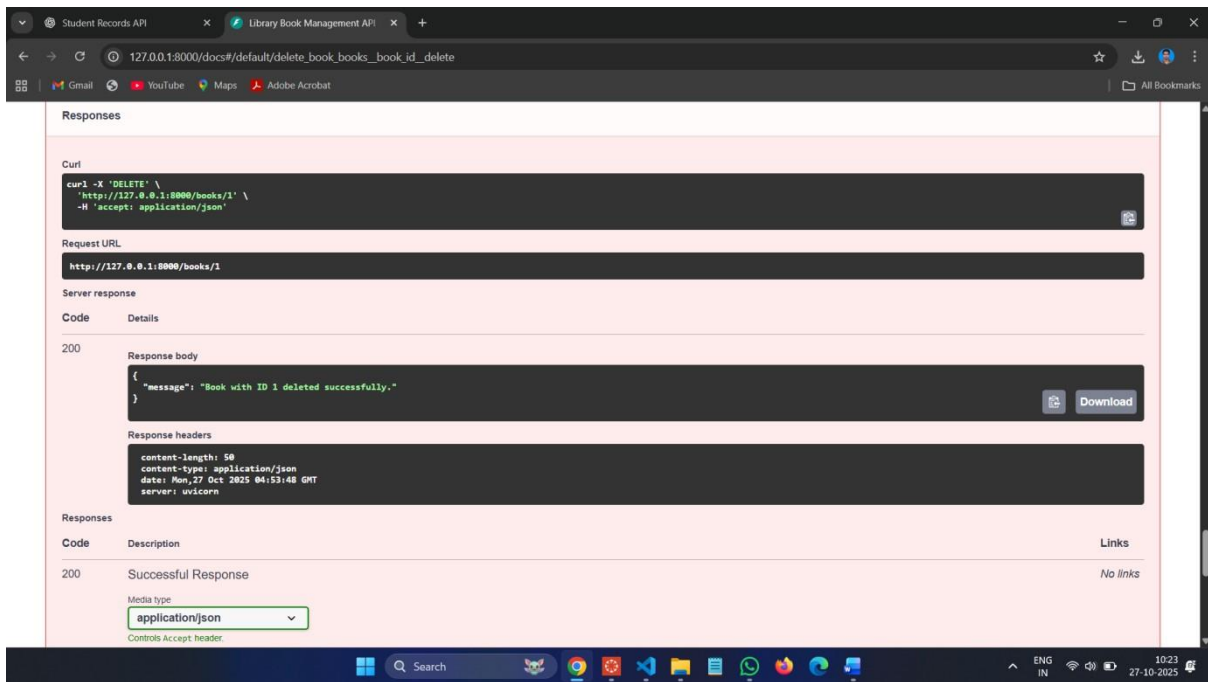
## GET :



**PUT :**



**DELETE :**



### Task 3 – Employee Payroll API Task:

Create an API for managing employees and their salaries.

#### Instructions:

- Endpoints required:
  - o GET /employees → List all employees
  - o POST /employees → Add a new employee with salary details
  - o PUT /employees/{id}/salary → Update salary of an employee
  - o DELETE /employees/{id} → Remove employee from system
- Use AI to:
  - o Suggest data model structure.
  - o Add comments/docstrings for all endpoints. **Code :**

The image shows a VS Code editor with a Python FastAPI application. The code defines an `Employee` model and a `listEmployees` endpoint. The terminal shows the application running on `http://127.0.0.1:8000` and responding to `GET /docs` and `GET /openapi.json` requests.

```
lab15_employee_api.py > delete_employee
1 # lab15_employee_api.py
2 from fastapi import FastAPI, HTTPException
3 from pydantic import BaseModel, Field
4 from typing import Dict
5
6 app = FastAPI(
7     title="Employee Payroll API",
8     description="RESTful API to manage employees and their salaries.",
9     version="1.0.0"
10 )
11
12 # ----- AI-Suggested Data Model -----
13 class Employee(BaseModel):
14     """
15     Represents an employee record with basic details and salary information.
16     """
17     id: int = Field(..., description="Unique employee ID")
18     name: str = Field(..., description="Full name of the employee")
19     department: str = Field(..., description="Department where the employee works")
20     position: str = Field(..., description="Job title or role")
21     salary: float = Field(..., description="Monthly salary of the employee")
22
23 class SalaryUpdate(BaseModel):
24     """
25     Represents the salary update structure for an existing employee.
26     """
27     salary: float = Field(..., description="Updated salary value")
28
29 # In-memory "database"
30 employees_db: Dict[int, Employee] = {}
31
32 # ----- API Endpoints -----
33
34 @app.get("/employees")
35 def list_employees():
36     """
37     Retrieve a list of all employees in the system.
38     """
```

Terminal Output:

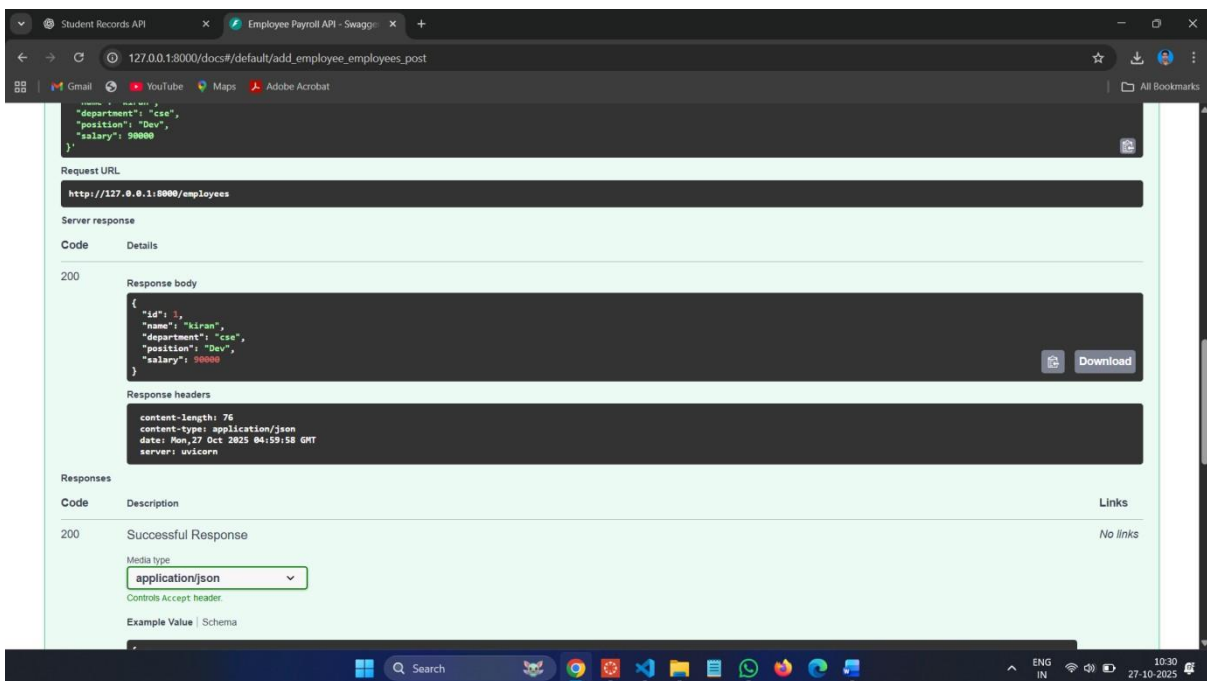
```
PS D:\VBTECH\AI Assisted Coding\LABS ASSIGNMENTS\Lab 15> uvicorn lab15_employee_api:app --reload
INFO: Will watch for changes in these directories: ['D:\VBTECH\AI Assisted Coding\LABS ASSIGNMENTS\Lab 15']
INFO: Uvicorn running on http://127.0.0.1:8000 (Press CTRL+C to quit)
INFO: Started reload process [12212] using Stateload
INFO: Started server process [11004]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: 127.0.0.1:51656 - "GET /docs HTTP/1.1" 200 OK
INFO: 127.0.0.1:51656 - "GET /openapi.json HTTP/1.1" 200 OK
```

Commands :

uvicorn lab15\_employee\_api:app --reload

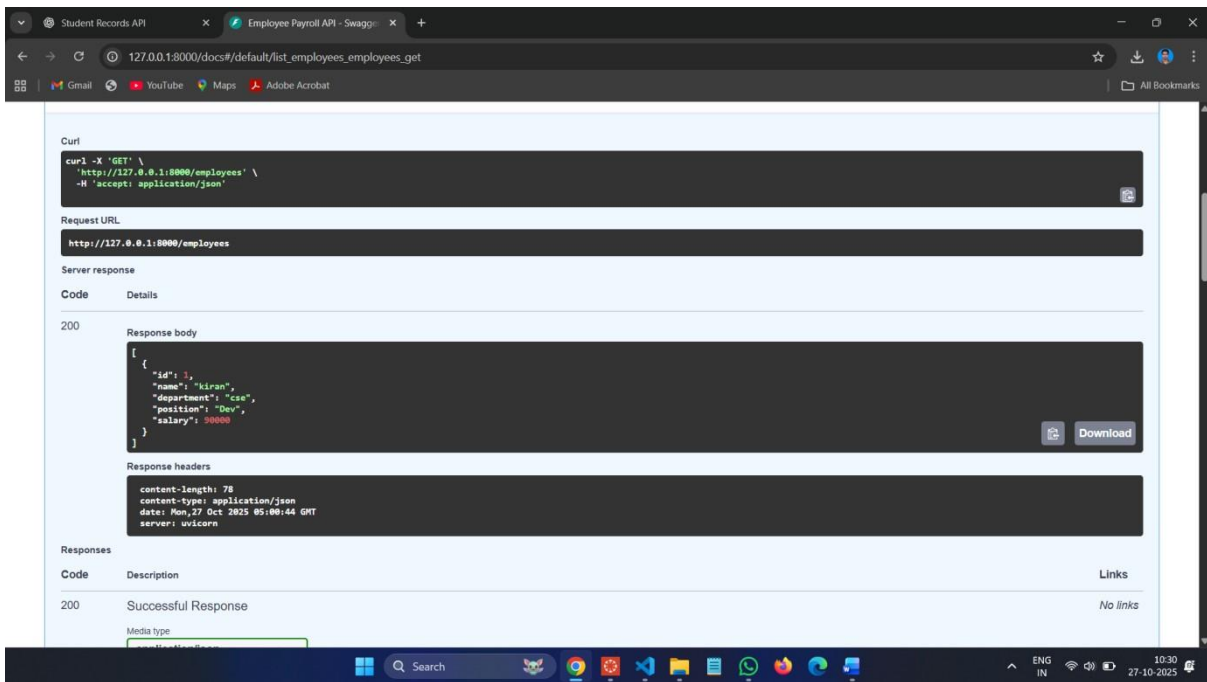
Swagger UI: <http://127.0.0.1:8000/docs> POST

:

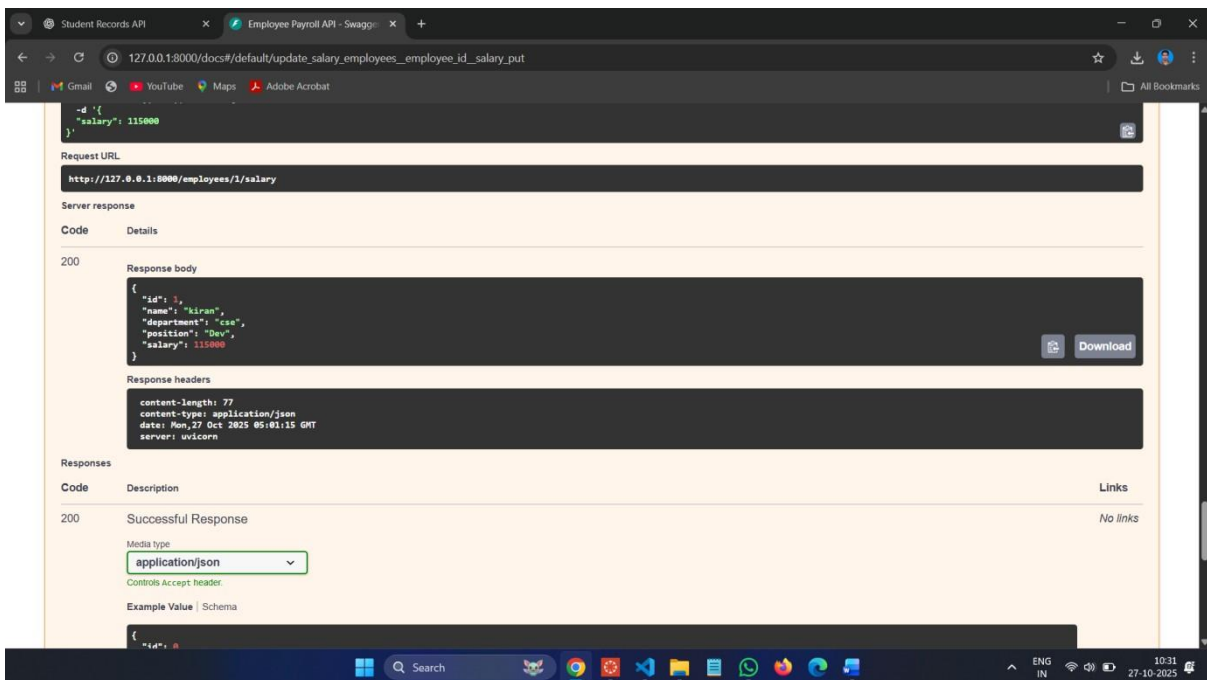


GET :

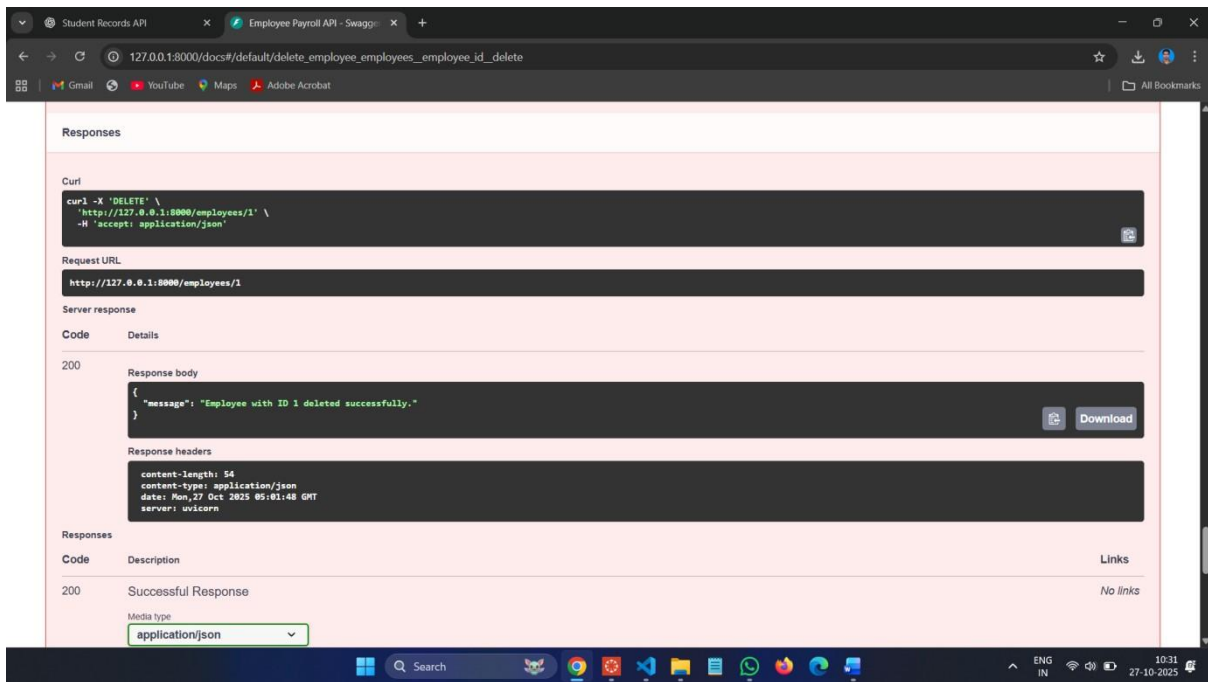




PUT :



DELETE :



## Task 4 – Real-Time Application: Online Food Ordering API Scenario:

Design a simple API for an online food ordering system.

### Requirements:

#### • Endpoints required:

- o GET /menu → List available dishes
- o POST /order → Place a new order
- o GET /order/{id} → Track order status
- o PUT /order/{id} → Update an existing order (e.g., change items)
- o DELETE /order/{id} → Cancel an order

#### • AI should generate:

- o REST API code
- o Suggested improvements (like authentication, pagination)

#### Code :

The image shows a VS Code editor with a Python FastAPI application named `lab15_food_api.py`. The code defines a RESTful API for an online food ordering system. It includes data models for `Dish` and `Order`, and an in-memory database. The terminal output shows the application running on `http://127.0.0.1:8000` and responding to GET and POST requests.

```
1 # lab15_food_api.py
2 from fastapi import FastAPI, HTTPException
3 from pydantic import BaseModel, Field
4 from typing import List, Dict, Optional
5
6 app = FastAPI(
7     title="Online Food Ordering API",
8     description="A RESTful API that simulates a basic online food ordering system",
9     version="1.0.0"
10 )
11
12 # ----- Data Models -----
13 class Dish(BaseModel):
14     """Represents a menu item (dish) available for order."""
15     id: int
16     name: str
17     price: float
18
19 class Order(BaseModel):
20     """Represents a customer's food order."""
21     id: int
22     items: List[int] = Field(..., description="List of dish IDs included in the order")
23     status: str = Field(default="Pending", description="Current status of the order")
24     total: float = 0.0
25
26 class OrderUpdate(BaseModel):
27     """Represents updates that can be applied to an existing order."""
28     items: Optional[List[int]] = None
29     status: Optional[str] = None
30
31 # ----- In-memory databases -----
32 menu_db: Dict[int, Dish] = {
33     1: Dish(id=1, name="Margherita Pizza", price=8.99),
34     2: Dish(id=2, name="Cheeseburger", price=7.49),
35     3: Dish(id=3, name="Pasta Alfredo", price=9.25),
36     4: Dish(id=4, name="Caesar Salad", price=5.75),
37 }
```

Terminal output:

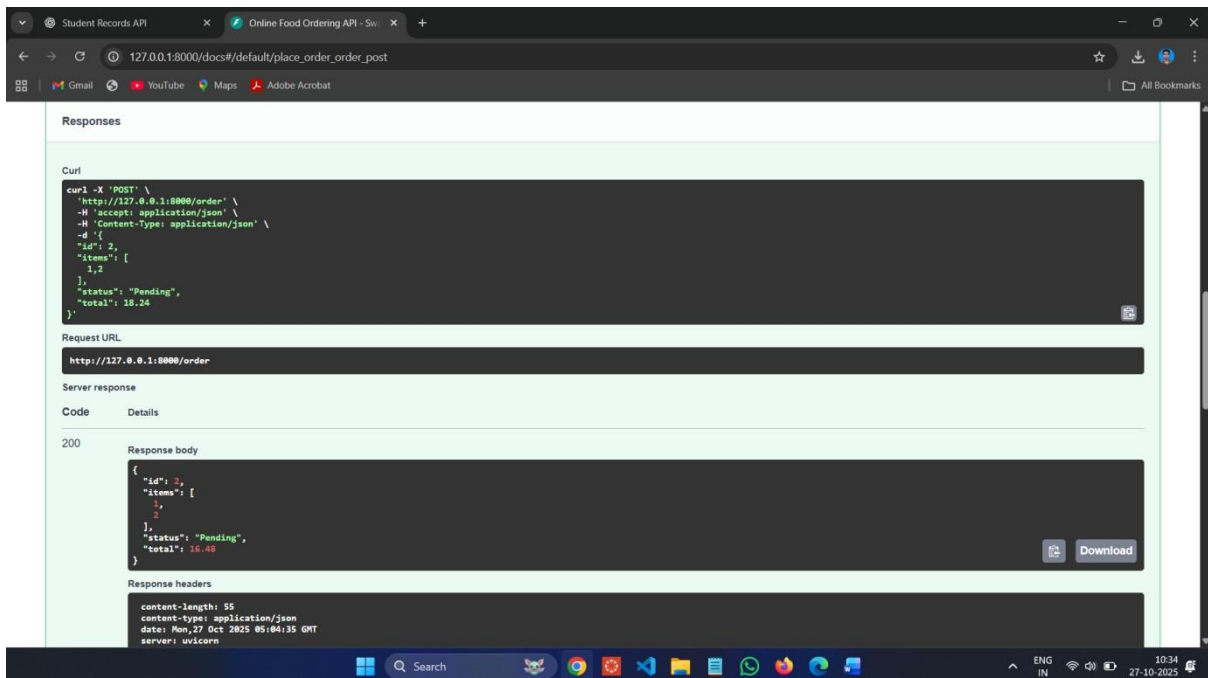
```
PS D:\VBTECH\AI Assisted Coding\LABS ASSIGNMENTS\Lab 15> uvicorn lab15_food_api:app --reload
INFO: Will watch for changes in these directories: ['D:\VBTECH\AI Assisted Coding\LABS ASSIGNMENTS\Lab 15']
INFO: Uvicorn running on http://127.0.0.1:8000 (Press CTRL+C to quit)
INFO: Started reload process [3408] using Stateload
INFO: Started server process [1996]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: 127.0.0.1:53575 - "GET /docs HTTP/1.1" 200 OK
INFO: 127.0.0.1:53575 - "GET /openapi.json HTTP/1.1" 200 OK
INFO: 127.0.0.1:63392 - "POST /order HTTP/1.1" 200 OK
```

Commands :

`uvicorn lab15_food_api:app --reload`

Swagger UI: <http://127.0.0.1:8000/docs>

POST :



GET :

Student Records API Online Food Ordering API - Sw

127.0.0.1:8000/docs/default/update\_order\_order\_id\_put

Responses

Curl

```
curl -X 'GET' \
  'http://127.0.0.1:8000/order/5' \
  -H 'accept: application/json'
```

Request URL

http://127.0.0.1:8000/order/5

Server response

Code	Details
200	<p>Response body</p> <pre>{   "id": 5,   "items": [     1   ],   "status": "Pending",   "total": 8.99 }</pre> <p>Response headers</p> <pre>content-length: 52 content-type: application/json date: Mon, 27 Oct 2025 05:12:31 GMT server: uvicorn</pre>

Responses

Code	Description	Links
200	Successful Response	No links

PUT :

Student Records API Online Food Ordering API - Sw

127.0.0.1:8000/docs/default/update\_order\_order\_id\_put

Responses

Curl

```
curl -X 'PUT' \
  'http://127.0.0.1:8000/order/5' \
  -H 'accept: application/json' \
  -H 'Content-Type: application/json' \
  -d '{
    "items": [
      1
    ],
    "status": "Completed"
  }'
```

Request URL

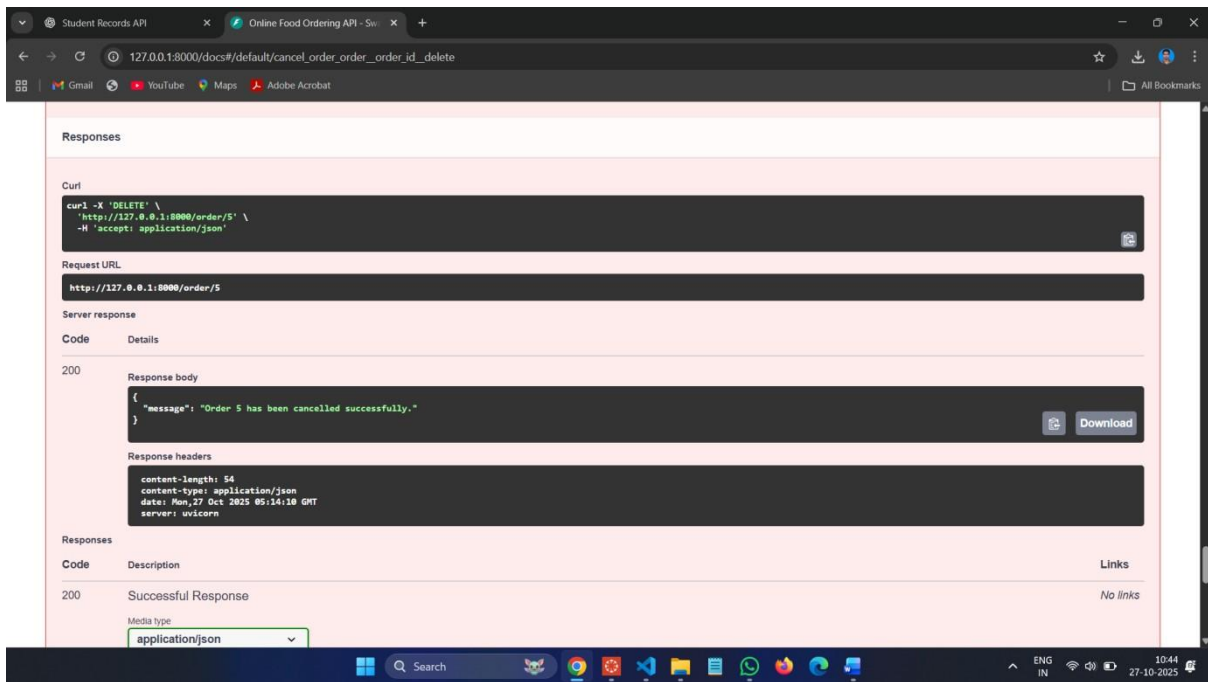
http://127.0.0.1:8000/order/5

Server response

Code	Details
200	<p>Response body</p> <pre>{   "id": 5,   "items": [     1   ],   "status": "Completed",   "total": 8.99 }</pre> <p>Response headers</p> <pre>content-length: 54 content-type: application/json date: Mon, 27 Oct 2025 05:13:46 GMT server: uvicorn</pre>

Responses

DELETE :



## Observations:

### 1. RESTful Design Principles:

Each task followed REST standards — using appropriate HTTP methods (GET, POST, PUT, PATCH, DELETE) and clear URL structures for resources like /students, /books, /employees, and /order.

### 2. AI-Assisted Code Generation:

AI tools were effectively used to generate data models, endpoint structures, and documentation automatically, saving development time and ensuring consistency.

### 3. CRUD Operations:

All four APIs successfully implemented CRUD functionality:

o Create: POST requests o Read: GET requests o Update:  
PUT/PATCH requests o Delete: DELETE requests

#### **4. Error Handling:**

Each API handled invalid requests gracefully using HTTPException with proper status codes and messages.

#### **5. Auto Documentation:**

FastAPI automatically provided API documentation through /docs (Swagger UI) and /redoc (ReDoc), fulfilling the lab's documentation objective.

#### **6. Partial Updates & Real-Time Design:**

- o Task 2 introduced partial updates (PATCH) for library books.
- o Task 4 simulated a real-world food ordering system with realistic order tracking and AI improvement suggestions.

#### **7. AI-Driven Improvements:**

Suggested features such as authentication, pagination, realtime updates (via WebSockets), and database integration demonstrate how AI can enhance backend architecture planning.