

# Python Backend Developer Roadmap (End-to-End)

## Phase 1: Advanced Core Python

1. Decorators - How to write and use them with examples like `@app.route`, `@login_required`.
2. Generators & Iterators - Use `'yield'`, `'next()'`, `'iter()'` for memory-efficient processing.
3. Context Managers - Using `'with'` and custom `__enter__`, `__exit__`.
4. OOP in Python - Classes, Inheritance, `@classmethod`, `@staticmethod`, MRO.
5. Functional Programming - `lambda`, `map`, `filter`, `reduce`, `zip`, `enumerate`.
6. Exception Handling - `try-except-finally`, custom exceptions, logging best practices.
7. Type Hints & PEP 8 - Python typing system, `mypy`, formatters like `black`.
8. Modules & Imports - `__main__`, relative vs absolute imports, organizing packages.

## Phase 2: API Development

- RESTful API Design (CRUD, pagination, filtering)
- Flask and FastAPI Internals - Blueprints, Routers, Dependency Injection.
- Django REST Framework - Serializers, ViewSets, Permissions, Auth.
- JWT & OAuth2 Authentication.
- Swagger/OpenAPI documentation.
- Error handling, Middleware, Request validation.
- Background tasks with Celery + Redis.

## Phase 3: Databases & ORMs

- SQL Basics - Joins, indexes, performance tuning.
- MySQL/PostgreSQL with SQLAlchemy or Django ORM.
- MongoDB with PyMongo.
- Migrations with Alembic or Django ORM.
- Redis - session store and caching layer.

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## Phase 4: DevOps & Deployment

- Git & GitHub workflows.
- Docker - building, running, linking containers.
- Docker Compose - multi-container setups.
- CI/CD - GitHub Actions, Jenkins basics.
- Web Servers - Gunicorn + NGINX reverse proxy.
- Unit Testing - pytest, unittest, Postman for API testing.
- Linux for backend - file permissions, logs, SSH.

## Phase 5: Cloud (AWS Focus)

- EC2, S3, IAM Roles & Policies.
- RDS for MySQL/PostgreSQL.
- Lambda - Serverless Python functions.
- CloudWatch logs & alarms.
- SNS, SQS, SES - integrations.
- Secrets Manager & environment config.

## Phase 6: Real Projects & Interview Prep

Sample Projects:

- Resume Parser API
- E-Commerce API with JWT & Django DRF
- IoT Device Monitor using AWS IoT Core
- Realtime Chat System with Redis & WebSockets

Interview Topics:

- Python Internals, OOP, decorators

## **Python Backend Developer Roadmap (End-to-End)**

- API security, testing, rate limiting
- SQL vs NoSQL use cases
- System design basics: load balancing, caching, scaling

### **Certifications & Final Tips**

- Earn one or more: AWS Cloud Practitioner, Python Certification (Coursera, Google, etc)
- Host projects on GitHub with README and API docs.
- Maintain clean, PEP-8 compliant code with proper logging and tests.
- Build 2-3 deployable projects and get peer code reviews.