

# Backend Developer Advanced Roadmap

## 1. FastAPI

- Install FastAPI and run a basic app with uvicorn.
- Define path operations: `@app.get()`, `@app.post()`.
- Handle query/path parameters, request bodies using Pydantic.
- Handle responses with status codes and models.
- Use dependency injection (Depends), create custom dependencies.
- Implement authentication using OAuth2 and JWT.
- Middleware for logging, error handling.
- Background tasks and WebSockets.
- Testing with TestClient and pytest.

## 2. Docker

- Understand containers vs virtual machines.
- Basic Docker CLI: build, run, exec, ps.
- Write a Dockerfile for FastAPI.
- Use Docker Compose to define app, db, redis.
- Volumes, networks, image tagging and optimization.
- Health checks and production-ready containers.

## 3. Redis

- Use Redis for caching, session store, rate limiting.
- Work with Redis data types: strings, hashes, lists.

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- Use Pub/Sub for real-time features.
- Use Redis as Celery broker and result backend.
- Understand persistence: RDB, AOF, expiration policies.

### **4. Celery**

- Install and configure Celery with FastAPI.
- Understand task queues, brokers, and backends.
- Define tasks, handle retries, timeouts.
- Use Redis or RabbitMQ as broker.
- Monitor tasks with Flower.

### **5. RabbitMQ**

- Understand producer-consumer model, message queues.
- Setup exchanges, queues, routing keys.
- Use management UI for monitoring.
- Use RabbitMQ as a Celery broker.

### **6. Nginx**

- Setup Nginx as reverse proxy for FastAPI.
- Serve static files, configure load balancing.
- Use Let's Encrypt for SSL.
- Caching and compression.

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### 7. NoSQL (MongoDB)

- Learn NoSQL types: document, key-value, graph.
- Perform CRUD operations with MongoDB.
- Use query filters, projections, aggregation.
- Indexing and performance optimization.
- Integrate with FastAPI using Motor or Beanie.

### 8. Microservices

- Understand monolith vs microservices architecture.
- Communicate between services using REST or message brokers.
- Use JWT for authentication across services.
- Deploy using Docker Compose or Kubernetes.
- Follow API Gateway, service discovery patterns.

### Suggested Learning Timeline

Week 1: FastAPI basics

Week 2: FastAPI + DB, auth

Week 3: Docker CLI, Compose

Week 4: Redis usage

Week 5: Celery with Redis

Week 6: RabbitMQ setup

Week 7: Nginx reverse proxy

## **Backend Developer Advanced Roadmap**

Week 8: MongoDB and NoSQL

Week 9-10: Microservices project using all tools