🏆 Phase 6 — Capstone Project: Online Learning Platform (Backend System)

Duration: 2 Months (±8 Weeks)

🎯 **Goal**

Design and build a **full-scale backend system** that demonstrates:

- Clean architecture
- Security
- Scalability
- DevOps readiness
- Real-world business logic

This project is your **portfolio centerpiece**.

📔 Roadmap Phase 6 — Weekly Breakdown

📌 Week 1: System Design & Planning 🧠

1. Define system requirements:

   - Users

   - Roles

   - Core features

2. Identify roles:

   - Admin

   - Instructor

   - Student

3. Choose tech stack:

   - Backend (Spring Boot / FastAPI)

   - Database (PostgreSQL)

   - Cache (Redis)

4. Design high-level architecture.

5. Draw ERD and system diagrams.

📌 Week 2: Database & Core Setup 🗄️

1. Design database schema:

   - User

   - Course

   - Lesson

   - Enrollment

   - Payment

2. Setup backend project structure.

3. Configure database migrations.

4. Setup authentication foundation.

5. Initialize Git repository.

📌 Week 3: Authentication & Authorization 🔐

1. Implement JWT authentication.

2. Role-based access control:

   - Admin

   - Instructor

   - Student

3. Secure sensitive endpoints.

4. Handle permissions cleanly.

5. Test authentication flows.

📌 Week 4: Course & Enrollment Management 📚

1. Course CRUD (admin/instructor).

2. Lesson CRUD.

3. Enrollment logic.

4. Course access control.

5. Validate business rules.

📌 Week 5: Payments & Video Storage 💳

1. Implement payment simulation:

   - Fake gateway

   - Order status

2. Handle enrollments after payment.

3. Integrate file storage:

   - S3 / MinIO

4. Secure video access.

5. Store video metadata.

📌 Week 6: Performance & Async Processing ⚡

1. Cache popular courses using Redis.

2. Implement async jobs:

   - Email notification

   - Enrollment confirmation

3. Retry logic for failed jobs.

4. Pagination & search.

5. Optimize slow queries.

📌 Week 7: DevOps, Deployment & Monitoring 🐳

1. Dockerize backend services.

2. Setup CI/CD pipeline.

3. Deploy to cloud.

4. Enable logging & monitoring.

5. Verify production readiness.

📌 Week 8: Final Polish & Presentation 🎯

1. Full system testing.

2. Security review.

3. Refactor code for clarity.

4. Write full documentation:

   - README

   - API docs

5. Prepare project presentation.

🛠️ Capstone Features Checklist

Core Features

- Multi-role authentication

- Course & lesson management

- Enrollment & payment simulation

- Secure video hosting

- Caching & async jobs

- Pagination & search

- Clean API design

🧠 Phase 6 Summary ✨

- Build a **real backend product**

- Combine backend + security + DevOps

- Demonstrate system thinking

- Produce a strong portfolio project

✅ Phase 6 Exit Criteria (Very Important)

You are **Capstone-complete** if you can:

- Explain your architecture decisions

- Deploy your system publicly

- Handle real-world edge cases

- Secure and scale your backend

- Defend your design choices confidently

🔥 After Phase 6, You Are:

- **Job-ready Backend Engineer**

- Comfortable with:

  - Real backend systems

  - Production environments

  - Technical interviews

- Ready to apply for backend roles 🚀

If you want next:

- 📐 **System design interview drills**

- 🧠 **Backend interview Q&A**

- 📄 **Portfolio & CV structure**

- ✅ **One-page roadmap summary**

Just say the next step.