PROJECT PROPOSAL

Project Title

Online Course Portal

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1. Introduction

With the rapid advancement of web and mobile technologies, the demand for efficient, secure, and scalable backend systems has increased significantly. Backend applications are responsible for managing data, handling authentication, ensuring security, and enabling smooth communication between clients and servers.

Traditional backend systems often suffer from performance bottlenecks and lack scalability. Modern frameworks such as **FastAPI** and databases like **MongoDB** provide high performance, flexibility, and ease of development. This project proposes the development of a backend system named **OCP**, designed using FastAPI and MongoDB to address these challenges.

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2. Problem Statement

Many existing backend systems:

- Have slow response times
- Are difficult to scale
- Lack proper data validation and security
- Require complex configurations

There is a need for a lightweight, fast, and scalable backend system that can efficiently manage users, data, and file handling while remaining easy to integrate with frontend applications.

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3. Proposed Solution

The proposed solution is to develop **OCP**, a RESTful backend system using **FastAPI** and **MongoDB**. FastAPI will be used to create high-performance APIs with built-in validation, while MongoDB will provide flexible and scalable NoSQL data storage. The system will support authentication, data management, and file upload functionality.

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4. Objectives of the Project

The main objectives of this project are:

- To design and implement a RESTful backend using FastAPI
- To integrate MongoDB for efficient data storage
- To implement secure authentication mechanisms
- To provide file upload and management features
- To ensure scalability, performance, and maintainability

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5. Scope of the Project

The scope of the project includes:

- Backend API development
- Database integration and management
- Authentication handling
- File upload functionality

The project does not include frontend development but will be fully compatible with web and mobile frontends.

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6. Tools and Technologies

Programming Language

- Python 3.x

Framework

- FastAPI

Database

- MongoDB

Libraries

- Pydantic
- PyMongo
- Uvicorn
- BSON

Development Tools

- Visual Studio Code
- Postman

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7. Methodology

The project will follow a **modular and incremental development approach**:

1. Requirement analysis
2. System design
3. Database design
4. API development
5. Testing and validation
6. Documentation

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8. System Architecture

The system will follow a **client–server architecture**:

- Client sends HTTP requests
- FastAPI processes requests
- MongoDB performs database operations
- Responses are returned in JSON format

This architecture ensures scalability and separation of concerns.

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9. Expected Outcomes

- A fully functional backend system
- Secure and validated APIs
- Efficient database operations
- File upload and management support
- Ready for frontend or mobile app integration

10. Significance of the Project

This project will:

- Demonstrate modern backend development practices
- Provide practical experience with FastAPI and MongoDB
- Serve as a foundation for real-world applications
- Enhance understanding of RESTful API design

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11. Project Schedule (Tentative)

Phase	Description	Duration
Phase 1	Requirement Analysis	1 Week
Phase 2	System & Database Design	1 Week
Phase 3	Backend Development	3 Weeks
Phase 4	Testing	1 Week
Phase 5	Documentation	1 Week

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12. Limitations

- No frontend interface
- Basic authentication
- Limited role management

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13. Future Enhancements

- JWT-based authentication
- Role-based access control
- Frontend integration
- Cloud deployment
- Logging and monitoring

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14. Conclusion

This project proposal outlines the development of **OCP**, a scalable backend system using FastAPI and MongoDB. The proposed system aims to deliver high performance, security, and scalability while following modern backend development standards. The project is suitable for academic submission and has strong potential for real-world application.