**MLOps Mid Project Assignment**

A data scientist has completed the development of a customer churn prediction model for the company. As an MLOps engineer, you are tasked with deploying this model into production with comprehensive infrastructure support.

Project Scope and Requirements:

Your deployment must include the following core components:

* data preparation capabilities that interface with the company database
* model execution functionality with result persistence
* comprehensive monitoring systems
* automated alerting mechanisms for operational issues.

The data scientist has provided three essential deliverables to support your work. First, a Jupyter notebook containing complete data preparation workflows and preprocessing code. Second, a serialized RandomForestClassifier model saved as a pickle file. Third, comprehensive project documentation that details the data sources, model specifications, and implementation requirements

Primary Deliverables:

You must complete two distinct but integrated components for this deployment.

Batch processing: develop a batch processing pipeline that executes daily at 12:00 PM. This pipeline must retrieve data from the database, process it through the model, and persist results back to the database. The system must be capable of processing all available database inputs, specifically database\_input.csv, database\_input1.csv, and database\_input2.csv exmples files.

REST API: create a REST API that provides real-time model predictions for the marketing server. The API must accept the following parameters and return prediction results: TotalCharges, Month-to-month, One year, Two year, PhoneService, and tenure.

Architecture and Approval Process:

Before beginning development, you must design and document a complete solution architecture. This architecture **must be reviewed and approved** by your lecturer prior to implementation.

Implementation Standards

* Your solution must demonstrate robust error handling for edge cases, including scenarios with missing data, columns containing only null values, and other data quality issues.
* Implement monitoring across all system components with relevant alerting mechanisms that notify stakeholders of operational issues.
* All code must be maintained in a Git repository with appropriate version control practices. Your lecturer must have access to review your implementation through the Git repository

\*\* Consider the architectural relationship between your batch processing and API components carefully. Evaluate whether these should be implemented as separate projects with shared common code, or as a single monolithic application that handles both batch and real-time processing requirements.

Additional Considerations

As a bonus objective, implement your complete solution using Docker containerization to demonstrate modern deployment practices.