Project Design Phase
Solution Architecture

Date	28 June 2025
Team ID	**LTVIP2025TMID41166**
Project Name	Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques
Maximum Marks	4 Marks

Solution Architecture:

Our project aims to bridge the gap between traditional medical diagnosis and modern technology by building a machine learning model to predict liver cirrhosis from patient blood test data.

The solution includes the following components:

- **Data Collection & Storage**
    - Collect patient data (CSV format) from Kaggle and store it securely for analysis.
- **Data Preprocessing & Analysis**
    - Clean the data, handle missing values, encode categorical variables, detect outliers, and normalize values.
- **Machine Learning Model**
    - Train several classification models (e.g. Logistic Regression, Random Forest, XGBoost) and select the best-performing one using evaluation metrics like accuracy and F1-score.
- **Model Persistence**
    - Save the trained model and normalizer using joblib for future use.
- **Web Application (Flask)**
    - Develop a Flask web app with an HTML frontend where doctors can input patient values and receive a prediction instantly.
- **User Interface**
    - Simple, user-friendly web pages for entering patient data and displaying results.
- **Security & Privacy**
    - Keep patient data confidential and secure during processing and storage.
- **Deployment & Scalability**
    - Host the app locally or on cloud servers so it can be accessed in hospitals or clinics.

Benefits of This Architecture

- Provides doctors a quick, non-invasive way to check liver cirrhosis risk.

- Saves time and costs associated with invasive procedures.
- Can be easily scaled to more hospitals or extended to other diseases.
- Makes advanced diagnostics available even in smaller clinics.

Example - Solution Architecture Diagram: