

Project Design Phase-II
Technology Stack (Architecture & Stack)

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

Technical Architecture:

Our solution uses a simple web-based architecture:

- The doctor enters patient test results into a web form.
- The web app sends the data to the backend server.
- The backend loads the machine learning model, processes the data, and returns a prediction.
- The prediction is shown to the doctor on the web page.

Deployment:

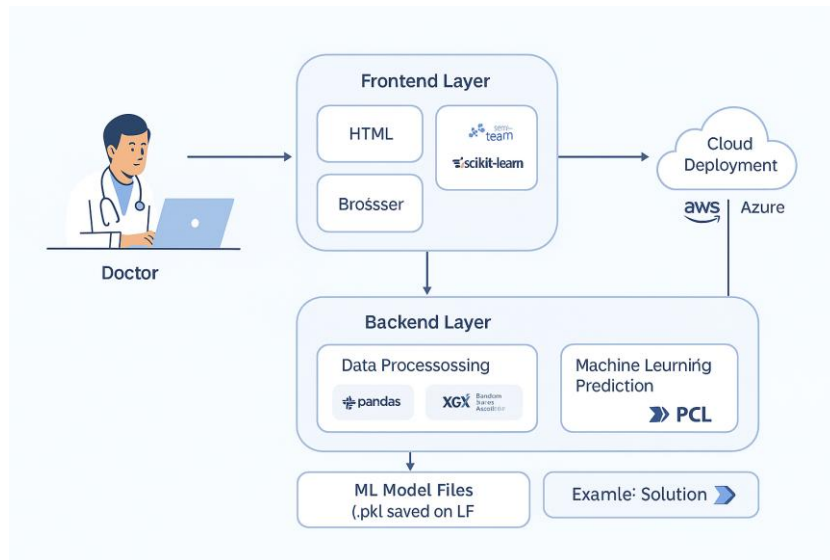
The application can be run locally or hosted on a cloud server for broader access.

Optional future components:

- Database to store predictions or logs.
- External APIs for patient record integration.

Example: Order processing during pandemics for offline mode

Reference: <https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/>



Processes:

- Frontend form for doctors
- Backend (Flask) for predictions
- ML model does cirrhosis prediction

Local or Cloud:

- Can run locally or on cloud servers

External APIs:

- None used now
- Might connect to hospital systems later

Data Storage:

- CSV data files
- ML model files (.pkl)

ML Model Connection:

- Backend loads saved model and makes predictions

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Web page where doctors enter data and see results	HTML, CSS, Bootstrap, JavaScript
2.	Application Logic-1	Handles web routing, user input, and predictions	Python, Flask

3.	Application Logic-2	Data preprocessing (encoding, normalization)	Python (pandas, sklearn)
4.	Application Logic-3	Machine learning prediction logic	Python (scikit-learn, xgboost)
5.	Database	Not applicable (no persistent data storage in MVP)	N/A
6.	Cloud Database	Not applicable (could add cloud DB in future versions)	N/A
7.	File Storage	Storage of trained model files	Local filesystem (.pkl files)
8.	External API-1	Not used in current MVP	N/A
9.	External API-2	Not used in current MVP	N/A
10.	Machine Learning Model	Predicts liver cirrhosis risk based on patient data	Random Forest, XGBoost, joblib

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Frameworks used for development	Flask, scikit-learn, pandas, seaborn
2.	Security Implementations	Data privacy, secure handling of user inputs	HTTPS, input validation, no permanent data storage
3.	Scalable Architecture	Can be deployed on cloud, easy to scale horizontally if traffic increases	Flask app deployable on AWS, Azure, GCP
4.	Availability	High availability possible with cloud deployment and load balancers	AWS Elastic Load Balancing, Azure Load Balancer
5.	Performance	Fast response times due to lightweight model; prediction < 2 seconds	Local joblib model loading, Flask optimizations