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

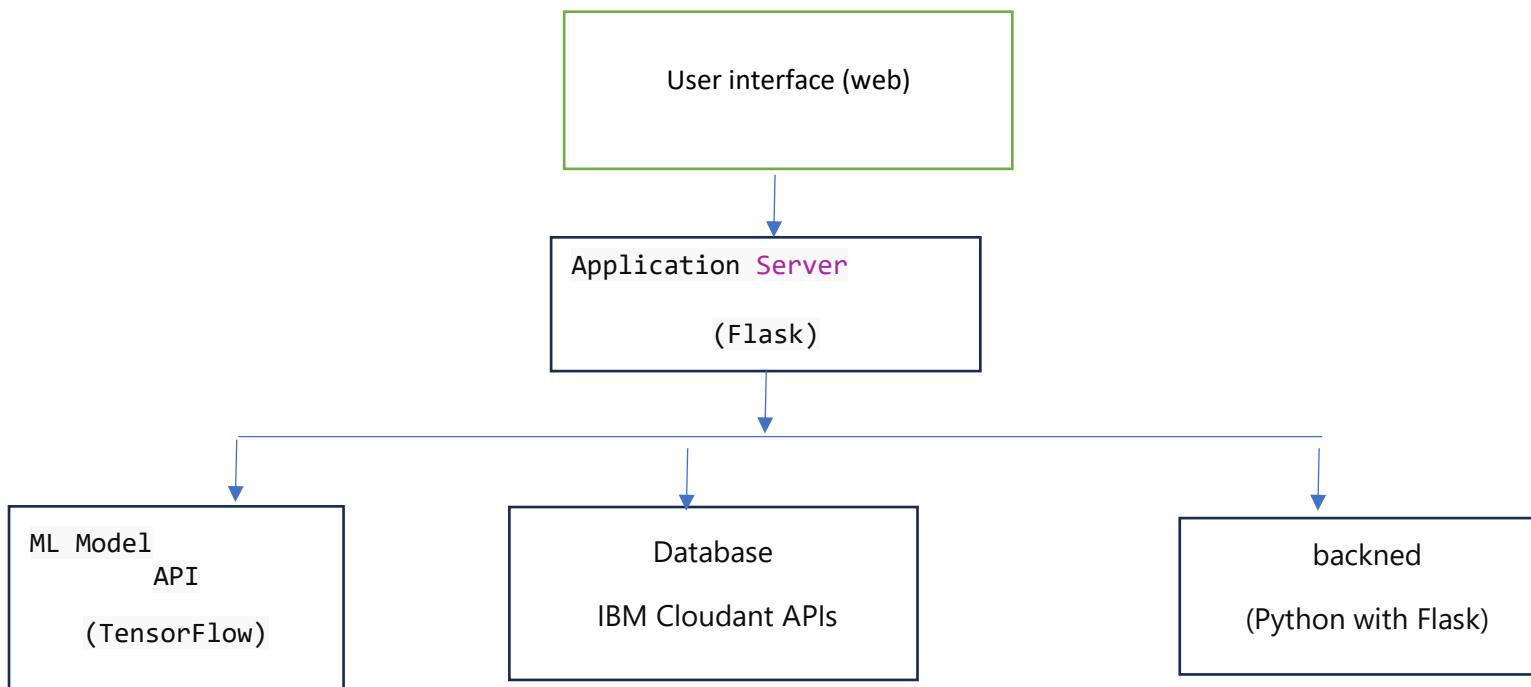| Date	31 January 3035
Team ID	LTVIP2026TMIDS82253
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	4 Marks

Technical Architecture:

```
                    ┌─────────────────────────┐
                    │                         │
                    │    User interface (web) │
                    │                         │
                    └───────────┬─────────────┘
                                │
                    ┌───────────▼─────────────┐
                    │  Application Server      │
                    │                         │
                    │      (Flask)            │
                    └───────────┬─────────────┘
         ┌──────────────────────┼──────────────────────┐
         │                      │                      │
┌────────▼────────┐   ┌─────────▼────────┐   ┌─────────▼────────┐
│ ML Model        │   │  Database        │   │  backned         │
│         API     │   │                  │   │                  │
│                 │   │ IBM Cloudant APIs│   │ (Python with Flask)│
│   (TensorFlow)  │   │                  │   │                  │
└─────────────────┘   └──────────────────┘   └──────────────────┘
```

Table-1 : Components & Technologies:

S.No	Component	Description	Technology Used
1	User Interface	Web interface for image upload and result display	HTML, CSS, JavaScript
2	Application Logic	Backend handling requests, user authentication, and predictions	Python, Flask
3	Image Preprocessing Module	Image resizing, normalization, and augmentation	OpenCV, Pillow
4	Deep Learning Model	Classification of fresh vs rotten produce using transfer learning	Xception (TensorFlow/Keras)
5	Model Training Module	Training and testing of deep learning model	TensorFlow, Keras
6	Database	Stores user details and prediction results	Cloudant DB
7	Cloud Platform	Hosting application and database services	IBM Cloud
8	Authentication Module	User registration and login functionality	Flask, Cloudant DB
9	File Handling Module	Manages uploaded images	Flask File Handling
10	Deployment Environment	Hosting and running the web application	IBM Cloud Services

Table-2: Application Characteristics:

S.No	Characteristic	Description	Approach / Technology
1.	Open-Source Frameworks	Uses open-source tools for development	Flask, TensorFlow, Keras
2.	Security	Secure user authentication and data handling	Login system, HTTPS
3.	Scalability	Supports multiple users and image uploads	Cloud-based deployment
4.	Performance	Optimized model inference and preprocessing	Pre-trained Xception model
5.	Availability	Accessible anytime via web browser	IBM Cloud Hosting