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

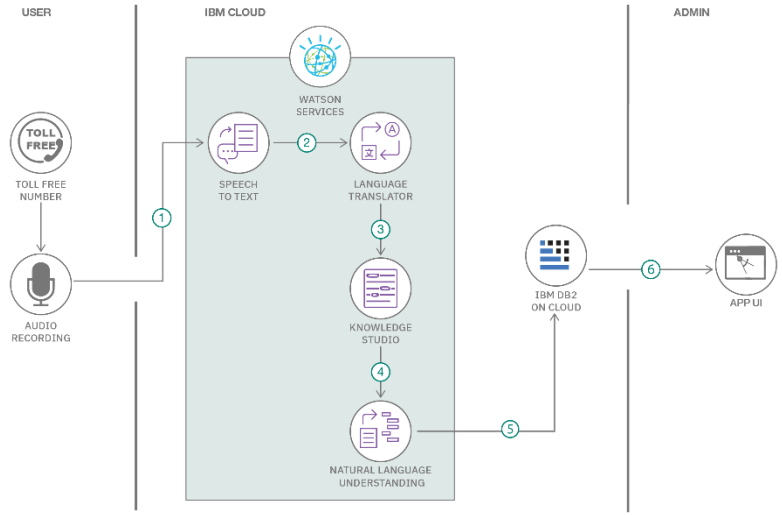
Date	19 February 2026
Team ID	LTVIP2026TMIDS89552
Project Name	Smart Sorting: Transfer Learning for Identifying Rotten Fruits and Vegetables
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Example: Order processing during pandemics for offline mode

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



Guidelines:

- Include all the processes (As an application logic / Technology Block)
- Provide infrastructural demarcation (Local / Cloud)
- Indicate external interfaces (third party API's etc.)
- Indicate Data Storage components / services
- Indicate interface to machine learning models (if applicable)

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Web-based interface where users can upload an image of a fruit or vegetable and receive freshness classification results.	HTML, CSS, JavaScript, Flask Templates
2.	Application Logic-1	Handles image upload, preprocessing and sending image to the trained CNN model for prediction.	Python, Flask
3.	Application Logic-2	Implements image preprocessing and model inference using transfer learning (VGG16).	TensorFlow, Keras, NumPy
4.	Application Logic-3	Loads the trained model (.h5 file), manages prediction results, and returns classification output.	TensorFlow / Keras Model Loading
5.	Database	Stores model training dataset (Fruits & Vegetables images categorized as Fresh and Rotten).	Local File System Dataset
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	Stores uploaded user images temporarily for prediction and stores trained model file.	Local File System, .h5 Model File
8.	External API-1	Future integration for supply chain or farm data monitoring.	Agriculture Data APIs (Future Scope)
9.	External API-2	Future integration for storage and quality monitoring systems	Smart Storage APIs (Future Scope)
10.	Machine Learning Model	Classifies fruits and vegetables into Fresh and Rotten categories across multiple classes.	VGG16, TensorFlow, Keras
11.	Infrastructure (Server / Cloud)	Local Server Configuration: Application deployed using Flask on local system via VS Code. Cloud Server Configuration : Model training performed in Google Colab.	Flask, Google Colab, Python

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Frameworks used for ML model development and web deployment.	TensorFlow, Keras, Flask, NumPy, Matplotlib, OpenCV.
2.	Security Implementations	Basic security for image upload validation and server-side processing.	Flask file validation, secure_filename, restricted file formats (JPG/PNG), input sanitization.
3.	Scalable Architecture	3-tier architecture (UI → Flask backend → CNN model) with future cloud deployment capability.	Flask + TensorFlow + Docker (future scope) + Cloud deployment
4.	Availability	Can be deployed on cloud platforms for continuous access and scalability.	AWS / GCP / Azure (future scope), Cloud VM deployment.
5.	Performance	Optimized using Transfer Learning (VGG16), image resizing, Early Stopping to prevent overfitting, fast inference time.	VGG16, EarlyStopping.

References:

https://c4model.com/

https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/

https://www.ibm.com/cloud/architecture

https://aws.amazon.com/architecture

https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d