Solution Architecture Document

Project: PoultryDetect - AI-Powered Poultry Disease Detection System
Location: Ongole, Andhra Pradesh
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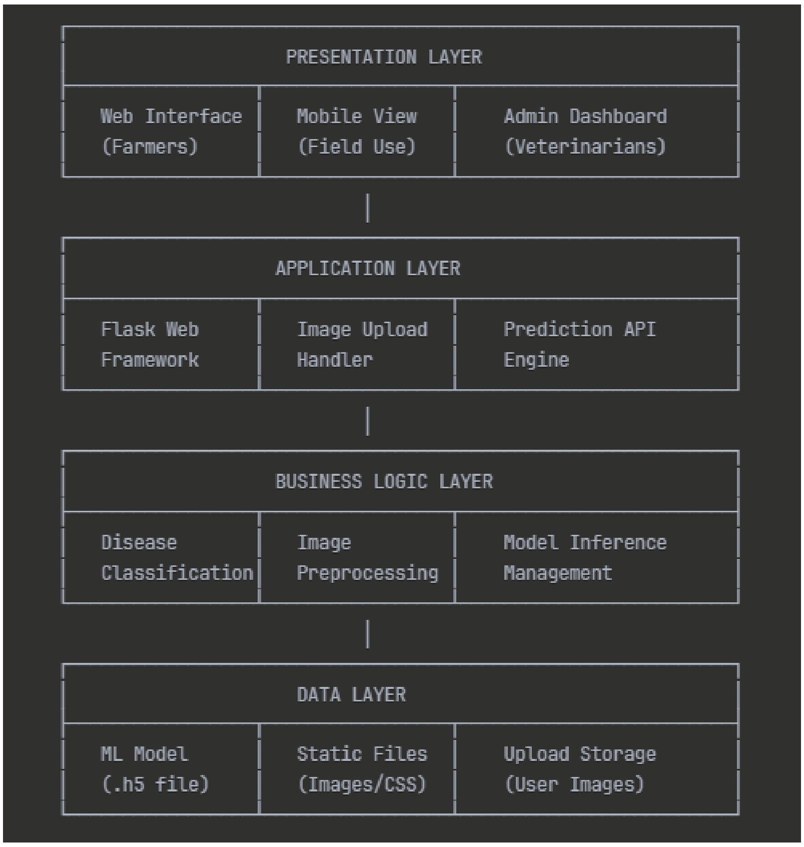
1. System Architecture Overview

PoultryDetect is a web-based AI application designed to assist farmers and veterinarians in early detection of poultry diseases through image analysis using deep learning models.

1.1 High-Level Architecture Diagram



PRESENTATION LAYER

Web Interface (Farmers)	Mobile View (Field Use)	Admin Dashboard (Veterinarians)

APPLICATION LAYER

Flask Web Framework	Image Upload Handler	Prediction API Engine

BUSINESS LOGIC LAYER

Disease Classification	Image Preprocessing	Model Inference Management

DATA LAYER

ML Model (.h5 file)	Static Files (Images/CSS)	Upload Storage (User Images)

1.2 Technology Stack

Frontend Technologies:

- HTML5, CSS3, JavaScript
- Tailwind CSS for styling
- Lottie animations for UI enhancement

Backend Technologies:

- Python 3.8+
- Flask web framework

- Keras/TensorFlow for ML model
- NumPy for numerical operations
- Werkzeug for file handling

Machine Learning:

- Deep Learning CNN model
- Image preprocessing with Keras
- Classification for 4 disease categories:
    - Coccidiosis
    - Healthy
    - Salmonella
    - Newcastle Disease

1.3 System Components

1. Web Application (Flask)

- Route handling for different pages
- File upload management
- Template rendering engine
- Static file serving

2. AI/ML Engine

- Pre-trained CNN model (healthy_vs_rotten.h5)
- Image preprocessing pipeline
- Prediction confidence scoring
- Real-time inference capabilities

3. User Interface

- Responsive web design
- Multi-page navigation
- Image upload interface
- Results display system

4. File Management System

- Secure file upload handling
- Image storage in static/uploads
- File validation and sanitization

2. Deployment Architecture

2.1 Development Environment

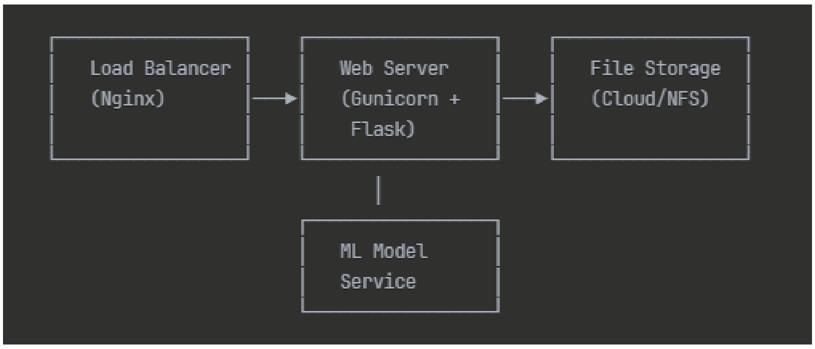
Local Development Server

├── Flask Development Server (Port 5000)

├── File System Storage

└── Local Model Loading

2.2 Production Architecture (Recommended)



3. Security Architecture

3.1 Security Measures

- File upload validation using secure_filename()
- File type restrictions for image uploads
- Error handling for malicious files
- Path traversal protection

3.2 Data Protection

- No persistent storage of sensitive data
- Temporary file handling
- Input sanitization

4. Performance Considerations

4.1 Optimization Strategies

- Model loading optimization on startup
- Image preprocessing efficiency
- Asynchronous file handling
- Caching static resources

4.2 Scalability Features

- Stateless application design

- Horizontal scaling capability
- Load balancer compatibility
- Cloud deployment ready

5. Integration Points

5.1 External Services

- Google Scholar API integration for research links
- Lottie Files CDN for animations
- Tailwind CSS CDN for styling

5.2 Future Integration Possibilities

- Database integration for user management
- API endpoints for mobile applications
- Real-time notification systems
- Analytics and monitoring tools