CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

System Design & Development Report

for Undergraduate Major Project: CanScan

2025 -2026

By

HARDIK SHAH (2241131)
HIMANSHI AGARWAL (2241132)

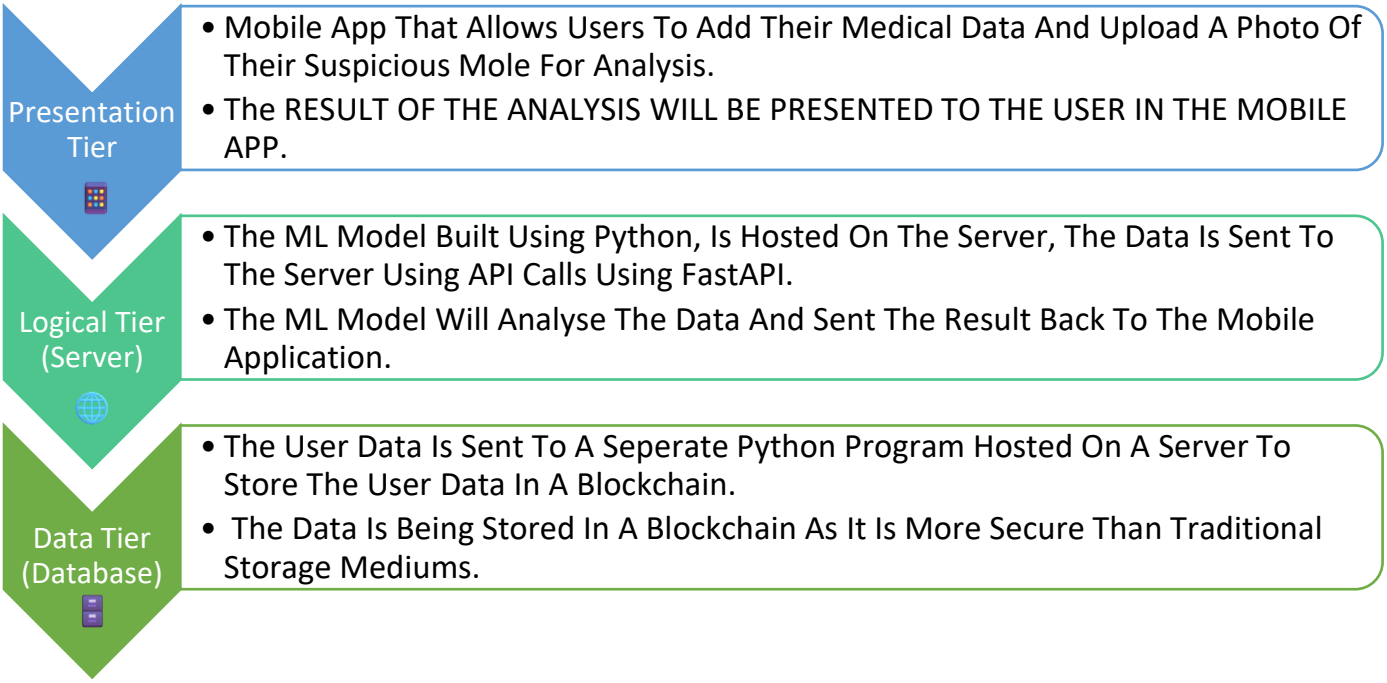
Bachelor of Computer Applications

Under the supervision of

Dr. Newbegin Luke

1. Architectural design

1.1. 3 Tier-ed Architecture



1.2. Subsystems

i. Image Capture and Analysis

Description:
CanScan allows users to capture high-resolution images of skin lesions or moles using their smartphone cameras. The application guides users with prompts to ensure proper lighting, focus, and framing to optimize image quality.

Detailed Process:

- Users take a picture of the lesion or select a previously saved image.
- The app applies pre-processing filters to enhance clarity and remove noise.
- The machine learning model analyzes the image, extracting key features based on the ABCD criteria; **Asymmetry**: Compares one half of the lesion to the other, **Border**: Identifies uneven, blurred, or jagged lesion edges, **Colour Variation**: Detects multiple shades within the lesion, **Diameter**: Measures the lesion size to identify if it exceeds a risk threshold.

ii. Risk Assessment and Recommendation Engine

Description:
The application classifies lesions into risk categories: **Low, Moderate, or High**. A personalized health path recommendation follows, advising users on next steps.

Detailed Process:

- Low risk: Suggests monitoring with periodic image capture.
- Moderate risk: Encourages users to consult a dermatologist for a professional opinion.
- High risk: Advises immediate medical attention.

iii. **User-Friendly Interface**

Description:
The interface is designed for ease of use with clear instructions and a clean layout.

Key Features:

- **Guided Image Capture**: Step-by-step prompts for capturing quality images.
- **Dashboard Overview**: Displays risk scores, lesion history, and recommended actions.
- **Educational Resources**: Interactive content on skin cancer prevention and self-examination techniques.

iv. **Blockchain-Based Data Storage**

Description:
Blockchain technology provides secure, decentralized data storage for users' medical data and images.

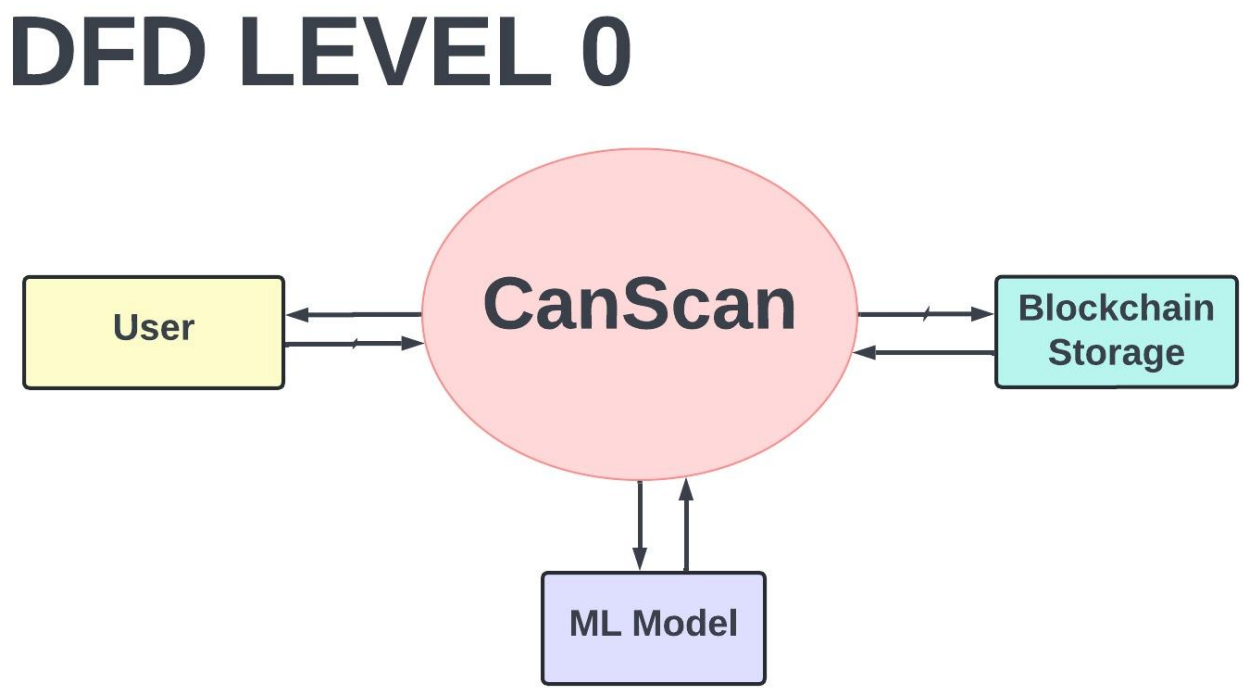
Detailed Process:

- **Decentralized Storage**: User data (images, risk assessments, and history) is stored on a blockchain ledger, ensuring data integrity and preventing unauthorized modifications.
- **Privacy and Security**: Data is encrypted, and access is restricted through private keys controlled by the user.
- **Transparency and Ownership**: Users maintain ownership of their data and control permissions for sharing with healthcare providers.
- **Immutability**: Blockchain ensures that data cannot be altered retroactively, reinforcing trust in diagnostic history and recommendations.

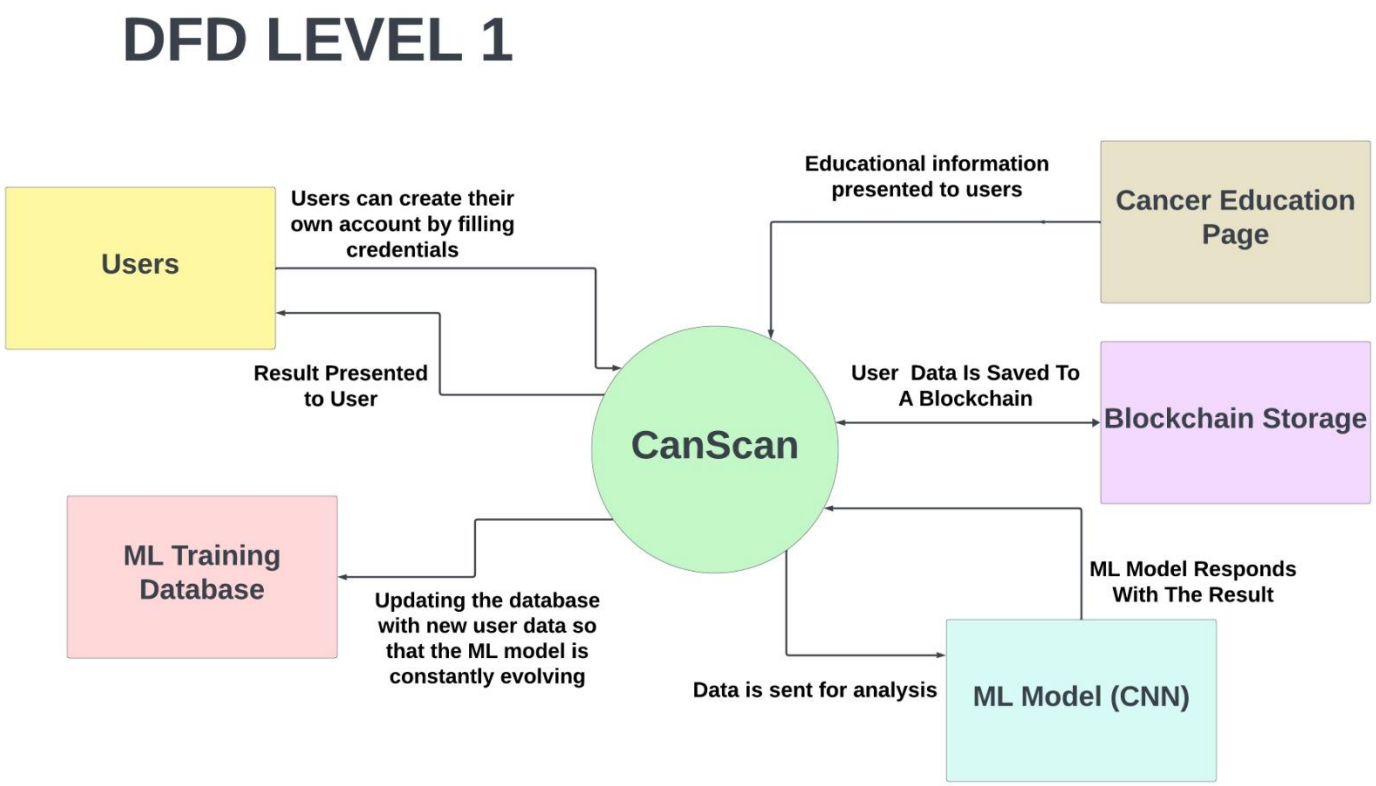
---

2. Dataflow Diagram

2.1. DFD Level-0

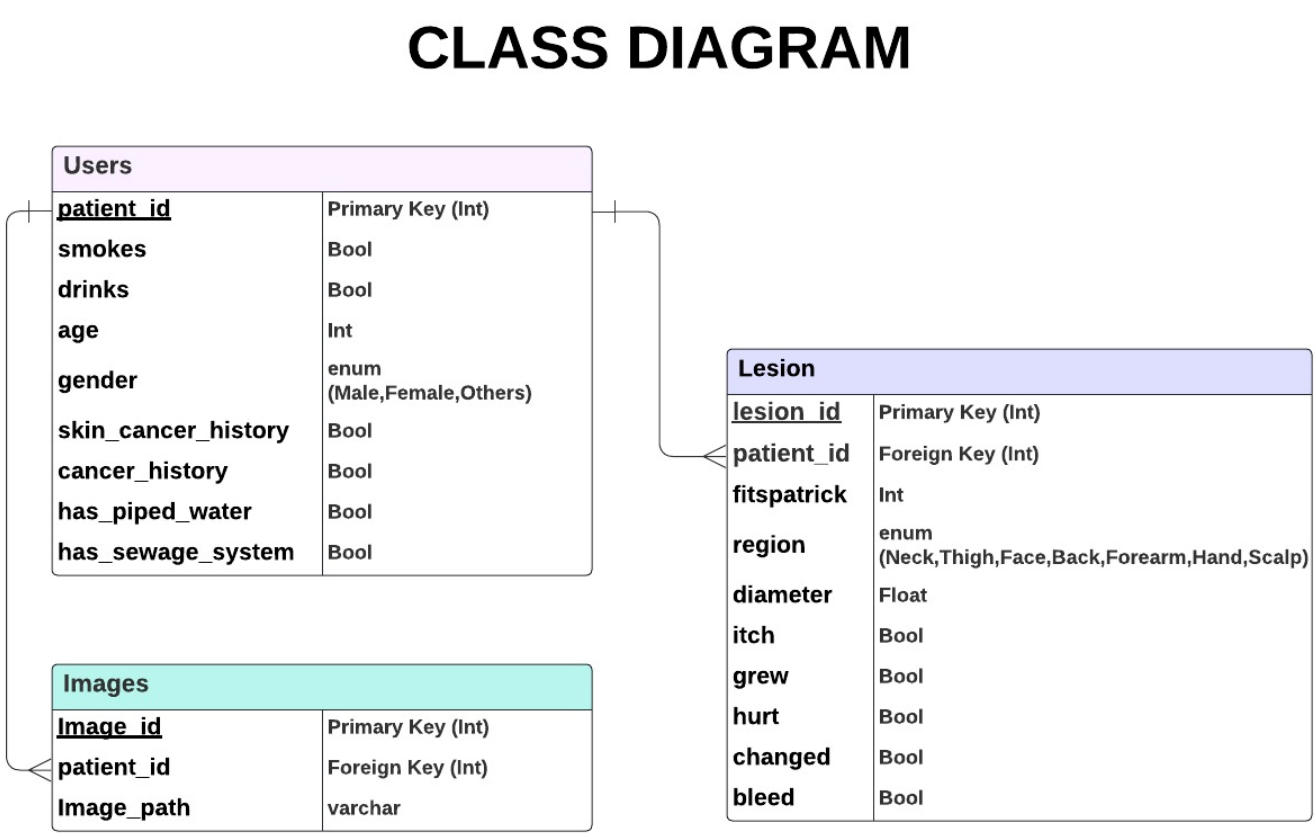


2.2. DFD Level-1



3. Database Design

3.1. Class Diagram



3.2. Database Screenshot

patient_id	smoke	drink	age	pesticide	gender	skin_cancer_history	cancer_history	has_piped_water	has_sewage_system	fitspatrick	region	diameter_1	diagnostic	itch	grew	hurt	changed	bleed	img_id
PAT_1516	TRUE	TRUE	8	FALSE	FEMALE	FALSE	FALSE	FALSE	TRUE	6	ARM	4	NEV	FALSE	FALSE	FALSE	FALSE	FALSE	PAT_1516_1765_530.png
PAT_46	FALSE	FALSE	55	FALSE	FEMALE	TRUE	TRUE	TRUE	TRUE	3	NECK	6	BCC	TRUE	TRUE	FALSE	TRUE	TRUE	PAT_46_881_939.png
PAT_1545	FALSE	TRUE	77	FALSE	FEMALE	FALSE	FALSE	FALSE	FALSE	4	FACE	5	ACK	TRUE	FALSE	FALSE	FALSE	FALSE	PAT_1545_1867_547.png
PAT_1989	TRUE	FALSE	75	FALSE	MALE	FALSE	FALSE	FALSE	FALSE	2	HAND	6	ACK	TRUE	FALSE	FALSE	FALSE	FALSE	PAT_1989_4061_934.png
PAT_684	FALSE	TRUE	79	FALSE	MALE	TRUE	FALSE	FALSE	FALSE	1	FOREARM	5	BCC	TRUE	TRUE	FALSE	FALSE	TRUE	PAT_684_1302_588.png

3.3. Column Details

1) **patient_id**: Identifier of the patient under study.
2) **smoke**: Whether the patient has a history of smoking or not.
3) **drink**: Whether the patient has a history of alcohol consumption or not.
4) **age**: Age of the patient at the time of examination.
5) **pesticide**: Whether the patient has been exposed to pesticides or other chemicals.
6) **gender**: Gender of the patient.
7) **skin_cancer_history**: History of skin cancer in the patient's family.
8) **cancer_history**: History of cancer in the patient's family.
9) **has_piped_water**: Indicates whether the location or area of the patient's residence has access to piped water or not.
10) **has_sewage_system**: Indicates whether the location or area of the patient's residence has a proper sewage system or not.
11) **Fitzpatrick**: Skin tolerance to sunlight.
12) **region**: The area of the body where the lesion or wound has been examined.
13) **diameter_1**: Primary diameter of the lesion or wound.
14) **diagnostic**: The type of lesion or wound is diagnosed.
15) **itch**: Whether the lesion or wound has itched or not.
16) **grew**: Whether the size of the lesion or wound has grown or not.
17) **hurt**: Whether the lesion or wound has hurt or not.
18) **changed**: Whether the appearance of the lesion or wound has changed or not.
19) **bleed**: Whether the lesion or wound has bled or not.
20) **img_id**: Identifier of the image related to the lesion or wound.

3.4. Database File (EDA Complete):

metadata_EDA_Reference_Only.csv