MONASH University

FIT3164 Data Science Project Part 2

User Guide

Automated Health Information System

Team MDS2

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Part 1: End User Guide

This section of the guide provides step-by-step instructions on how to navigate and use the automated health information system and its functions.

1.1. Web Application

1.1.0. Access Software Application

Once the setup and configuration is completed as guided in Part 2: Technical User Guide, and the web application is up and running, the web-based application can be accessed in the browser through this URL: http://localhost:8080/home#/. The users will be greeted with a system login page.

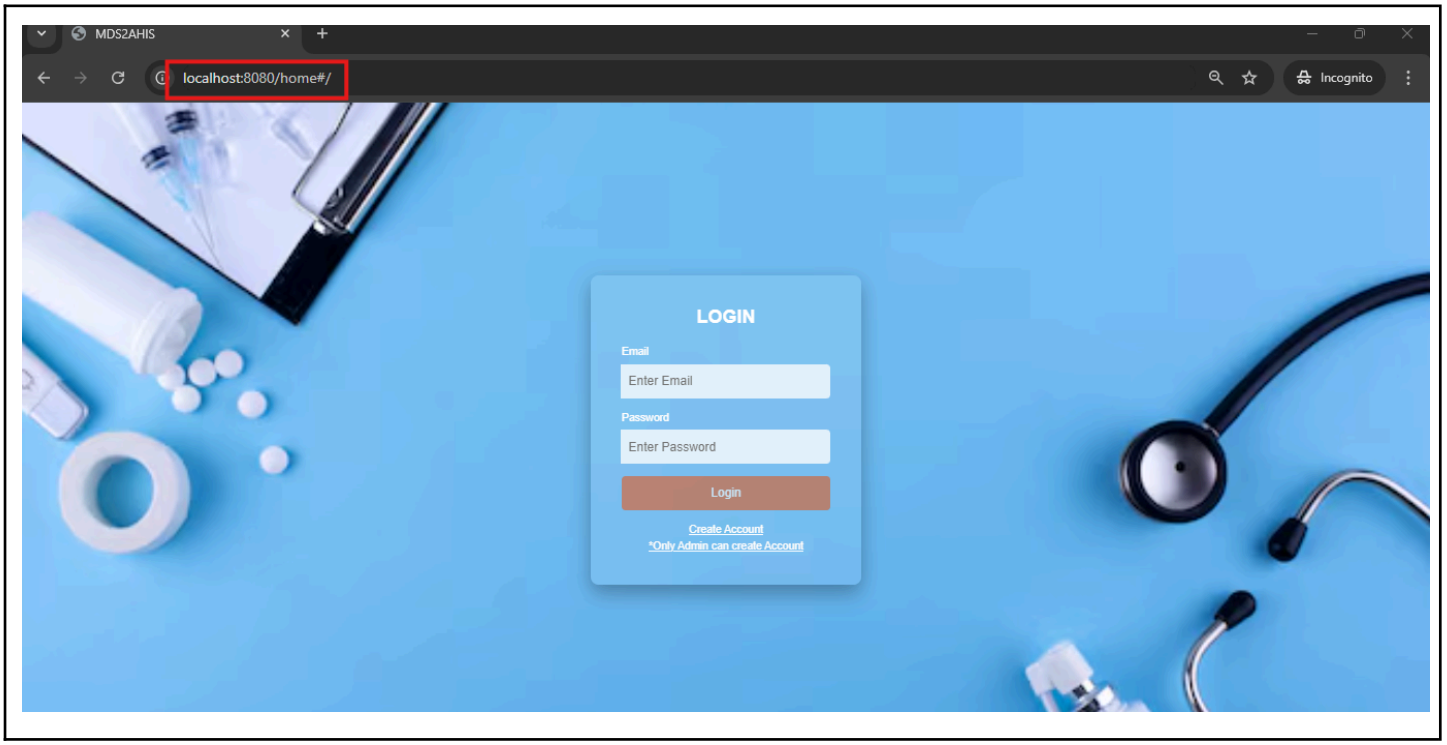


Table 1.1.0.1. Screenshots of the login page with annotation.

1.1.1. User Log In

To log in to the system, users must enter their login credentials to proceed to the system and use any of its functionality. Once a user login successfully, a success confirmation message will appear, else a failed confirmation message will be displayed.

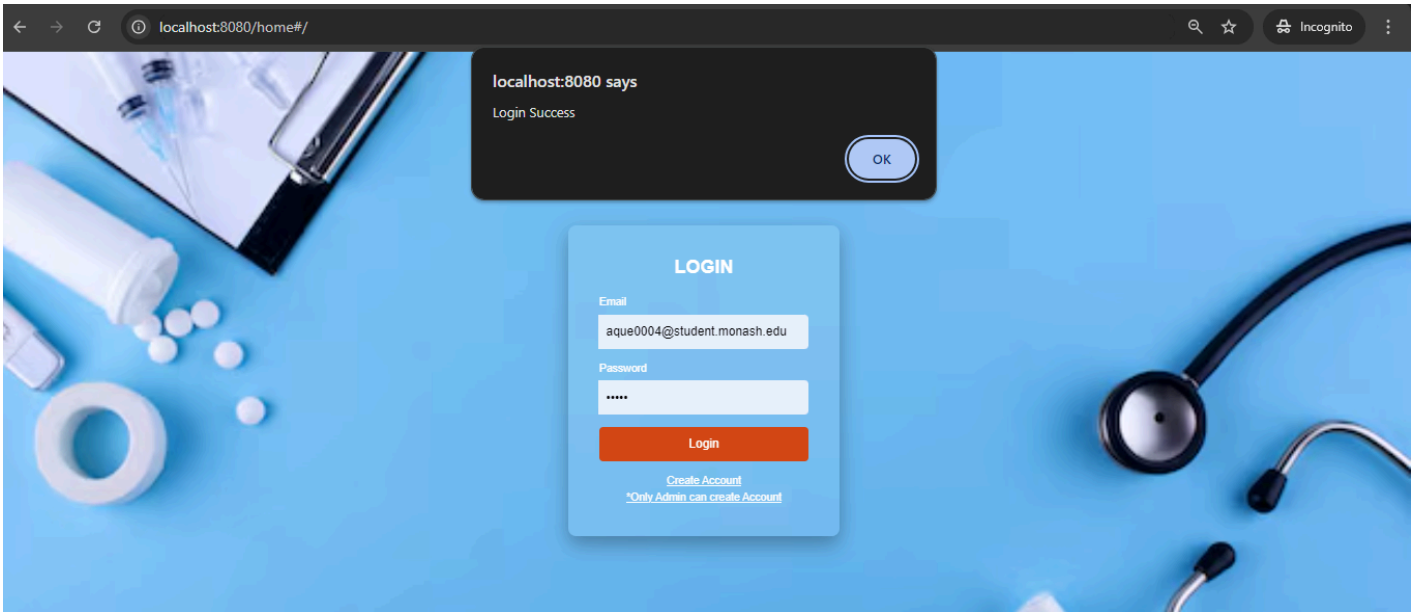


Table 1.1.1.1. Screenshots of login page with popup success confirmation message.

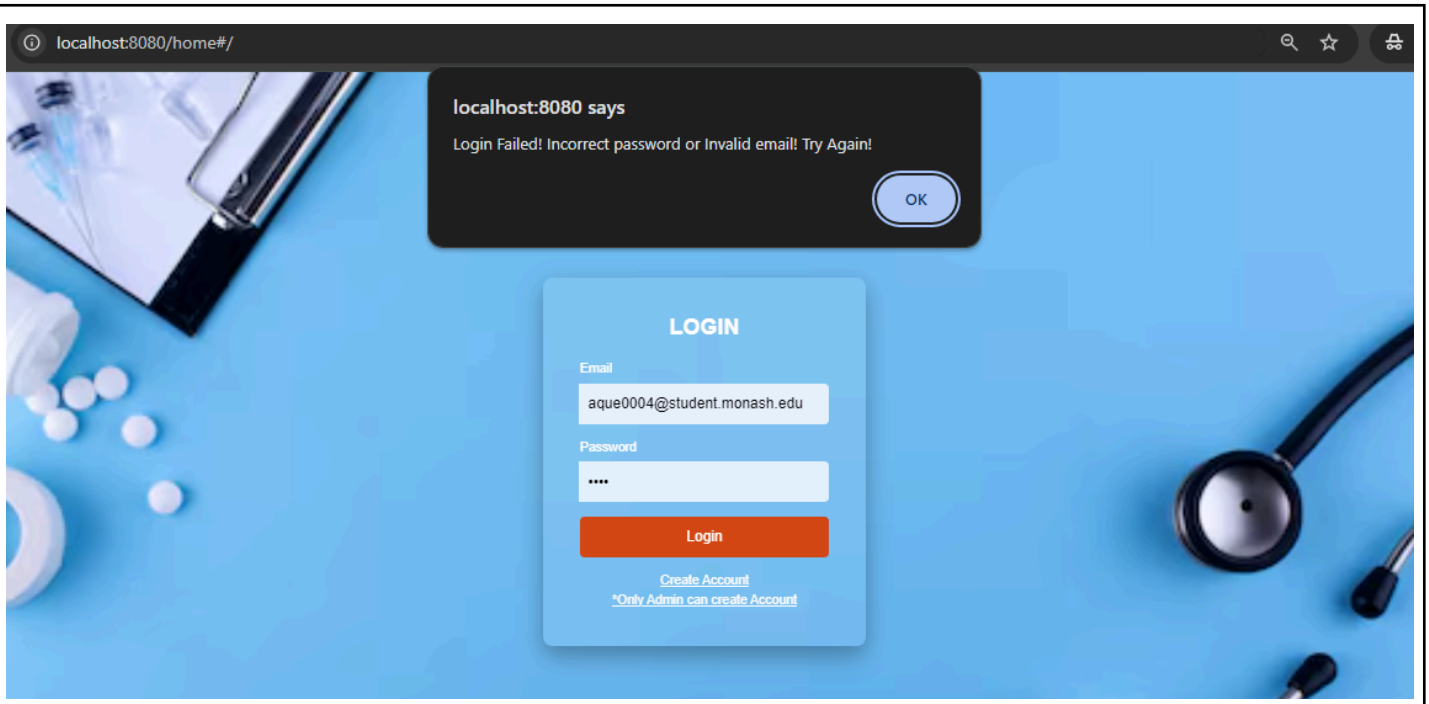


Table 1.1.1.2. Screenshots of login page with popup failed confirmation message.

Once the users dismiss the popup confirmation message, the system directs the users to the system homepage.

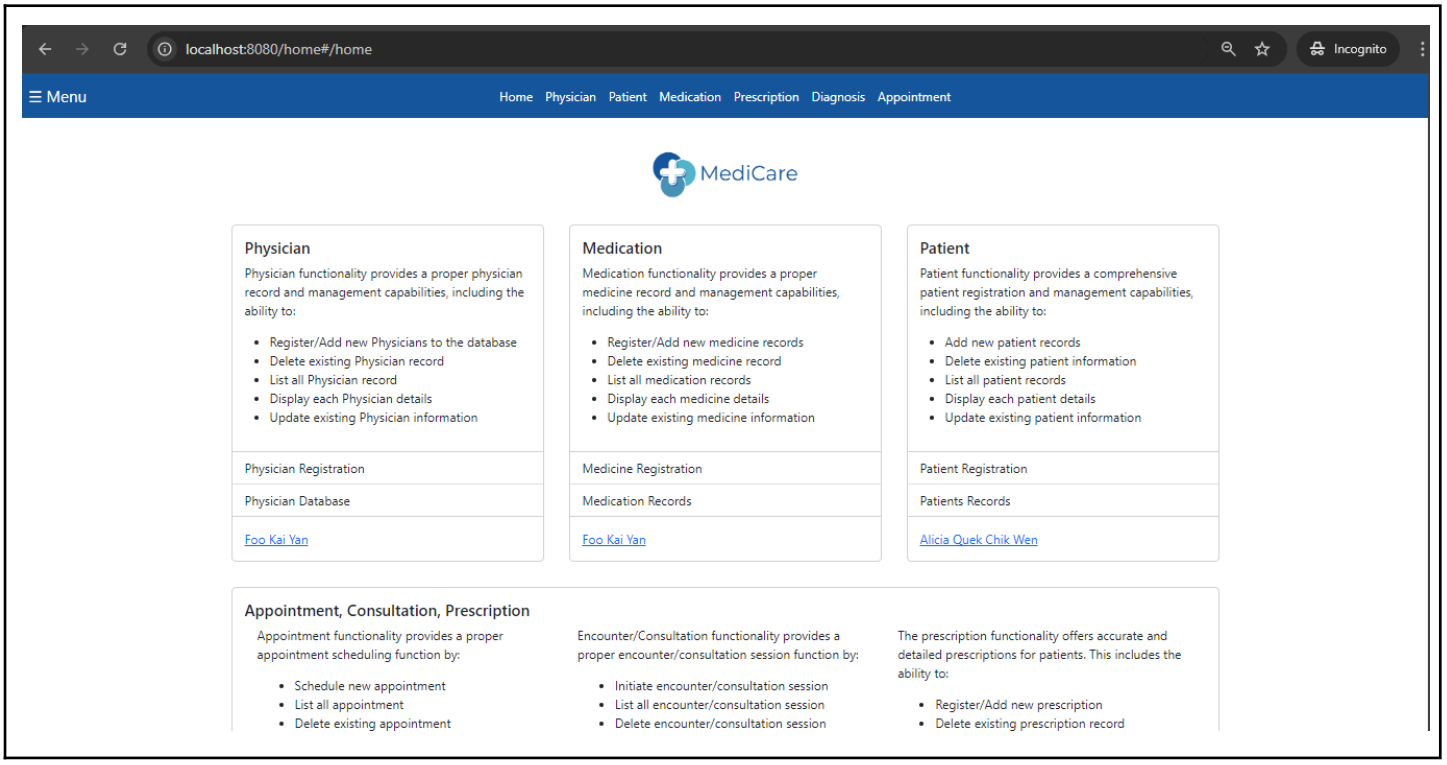
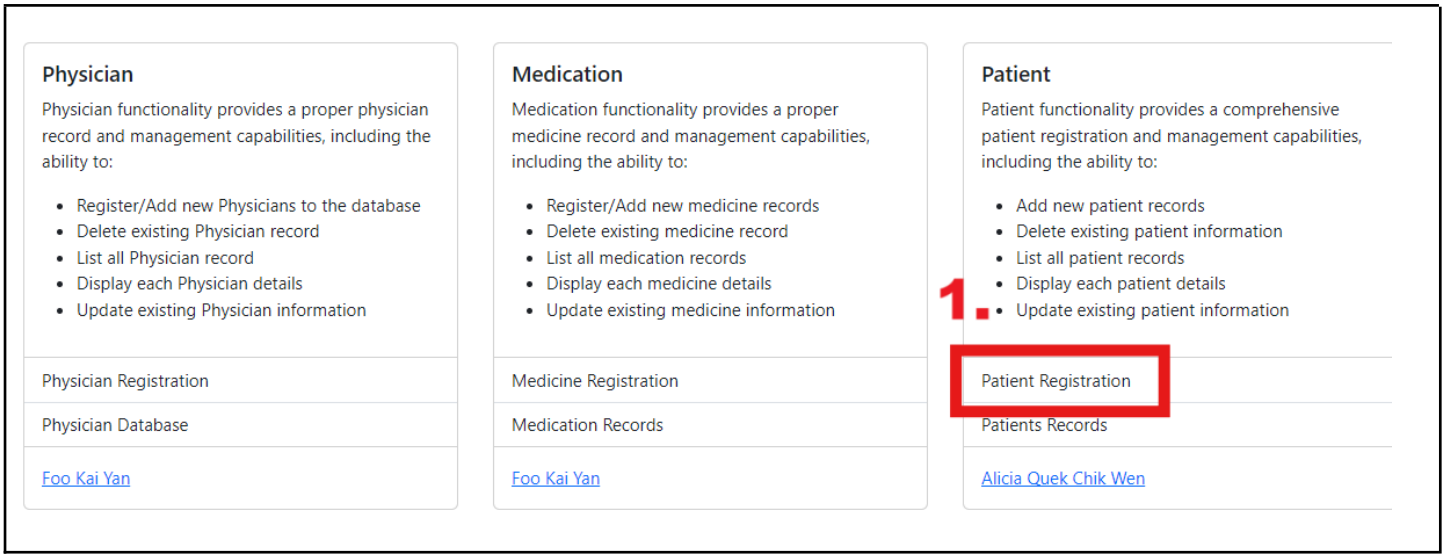
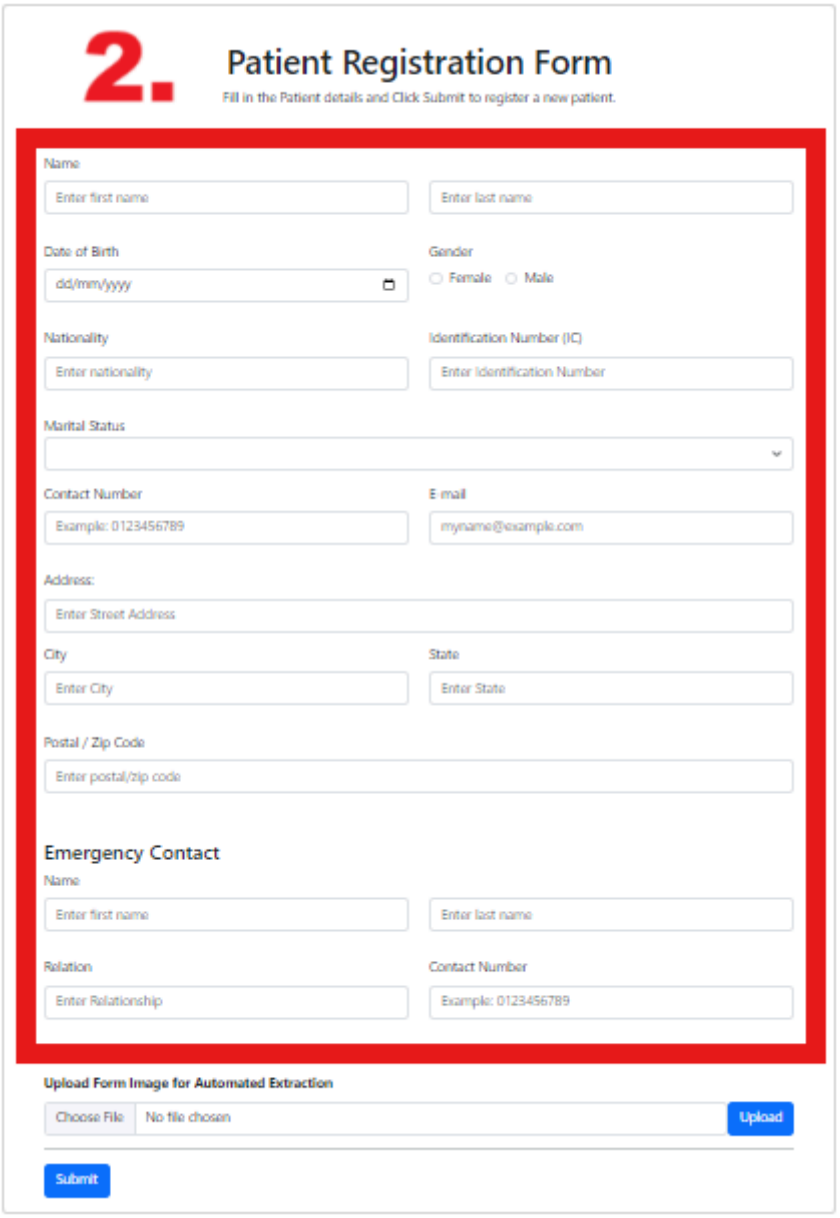


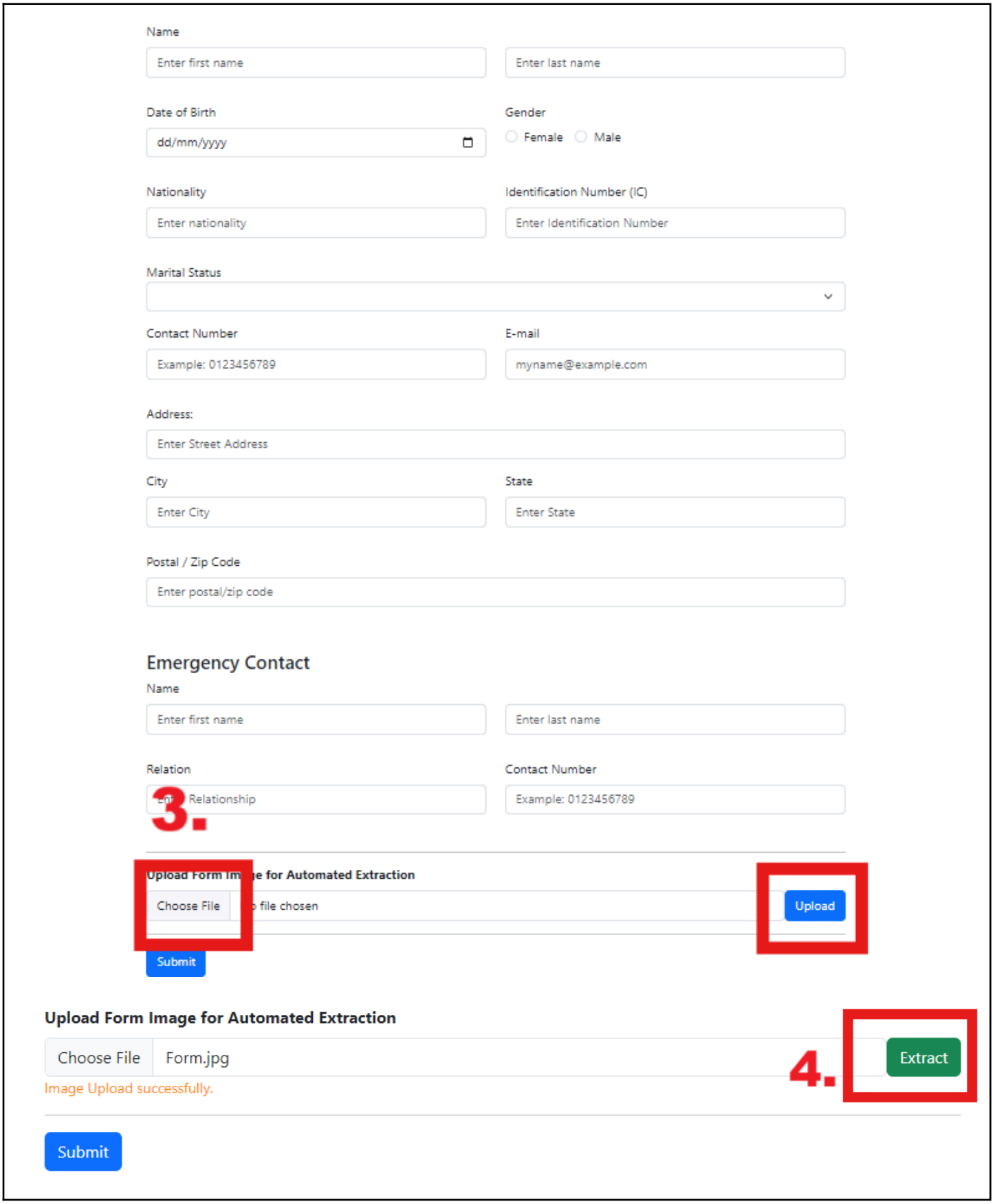
Table 1.1.1.3. Screenshots of the homepage.

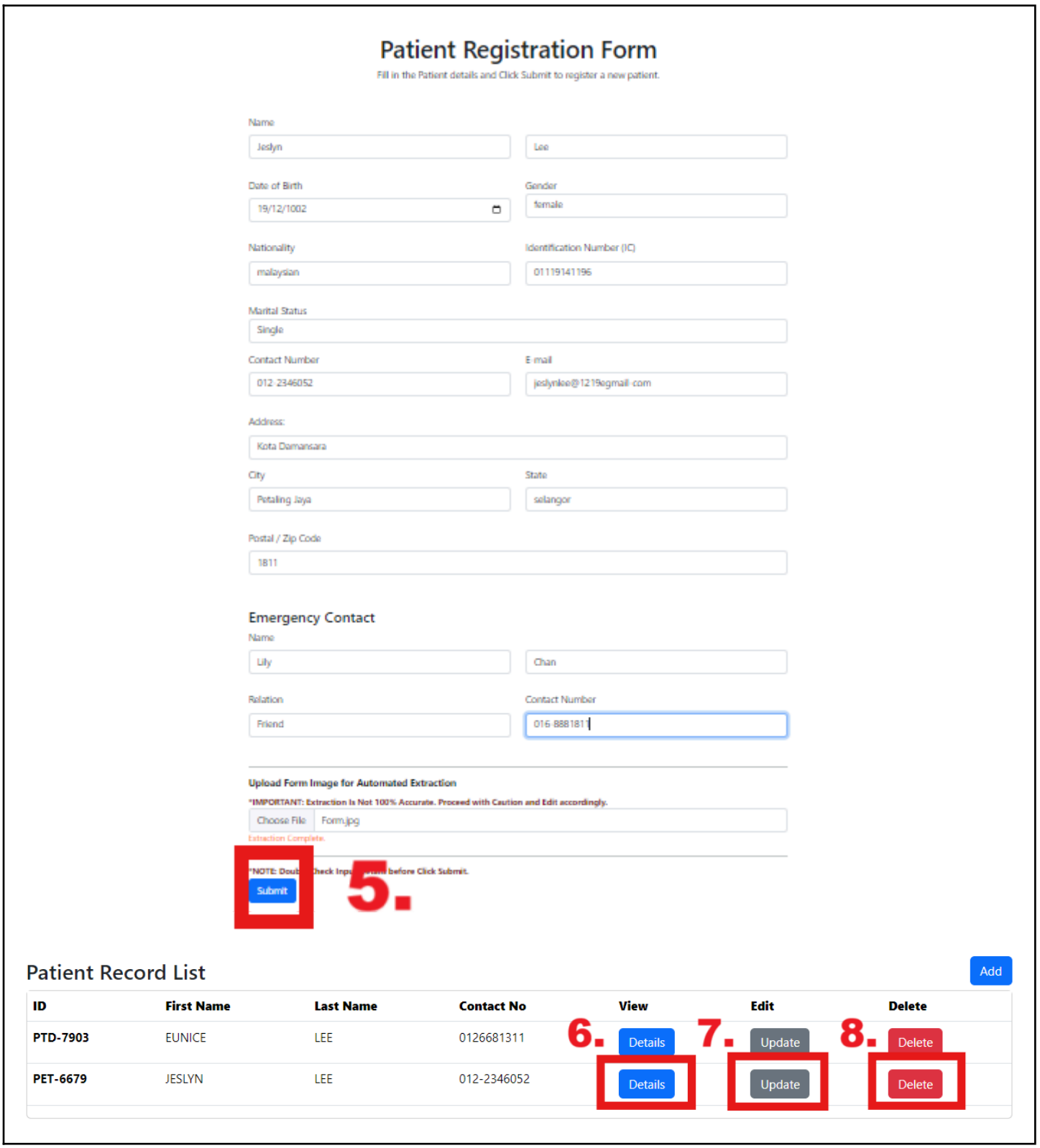
1.1.2. Register New Patient

Once the user has logged into the web application, the user can initiate the patient registration process by navigating to the "Patient" section and clicking the "Patient Registration" button. There are two options available for users to add new patients, either by entering their information manually or by uploading a customized patient registration form that automatically fills in the form fields. In this section, we will guide you on both methods of enrolling a new patient.




2.
Patient Registration Form
Fill in the Patient details and Click Submit to register a new patient.
Name
Enter first name
Enter last name
Date of Birth
dd/mm/yyyy
Gender
Female
Male
Nationality
Enter nationality
Identification Number (IC)
Enter Identification Number
Marital Status
Contact Number
Example: 0123456789
E-mail
myname@example.com
Address:
Enter Street Address
City
Enter City
State
Enter State
Postal / Zip Code
Enter postal/zip code
Emergency Contact
Name
Enter first name
Enter last name
Relation
Enter Relationship
Contact Number
Example: 0123456789
Upload Form Image for Automated Extraction
Choose File
No file chosen
Upload
Submit


Name
Enter first name
Enter last name
Date of Birth
dd/mm/yyyy
Gender
Female
Male
Nationality
Enter nationality
Identification Number (IC)
Enter Identification Number
Marital Status
Contact Number
Example: 0123456789
E-mail
myname@example.com
Address:
Enter Street Address
City
Enter City
State
Enter State
Postal / Zip Code
Enter postal/zip code
Emergency Contact
Name
Enter first name
Enter last name
Relation
Relationship
Contact Number
Example: 0123456789
3.
Upload Form Image for Automated Extraction
Choose File
file chosen
Upload
Submit
Upload Form Image for Automated Extraction
Choose File
Form.jpg
4.
Extract
Image Upload successfully.
Submit


Patient Registration Form
Fill in the Patient details and Click Submit to register a new patient.
Name
Jeslyn
Lee
Date of Birth
19/12/1002
Gender
female
Nationality
malaysian
Identification Number (IC)
01119141196
Marital Status
Single
Contact Number
012-2346052
E-mail
jeslynlee@1219egmail.com
Address:
Kota Damansara
City
Petaling Jaya
State
selangor
Postal / Zip Code
1811
Emergency Contact
Name
Lily
Chan
Relation
Friend
Contact Number
016-8881811
Upload Form Image for Automated Extraction
*IMPORTANT: Extraction Is Not 100% Accurate. Proceed with Caution and Edit accordingly.
Choose File
Form.jpg
Extraction Complete.
Submit
5.
Patient Record List
Add
ID
First Name
Last Name
Contact No
View
Edit
Delete
PTD-7903
EUNICE
LEE
0126681311
6.
Details
7.
Update
8.
Delete
PET-6679
JESLYN
LEE
012-2346052
Details
Update
Delete

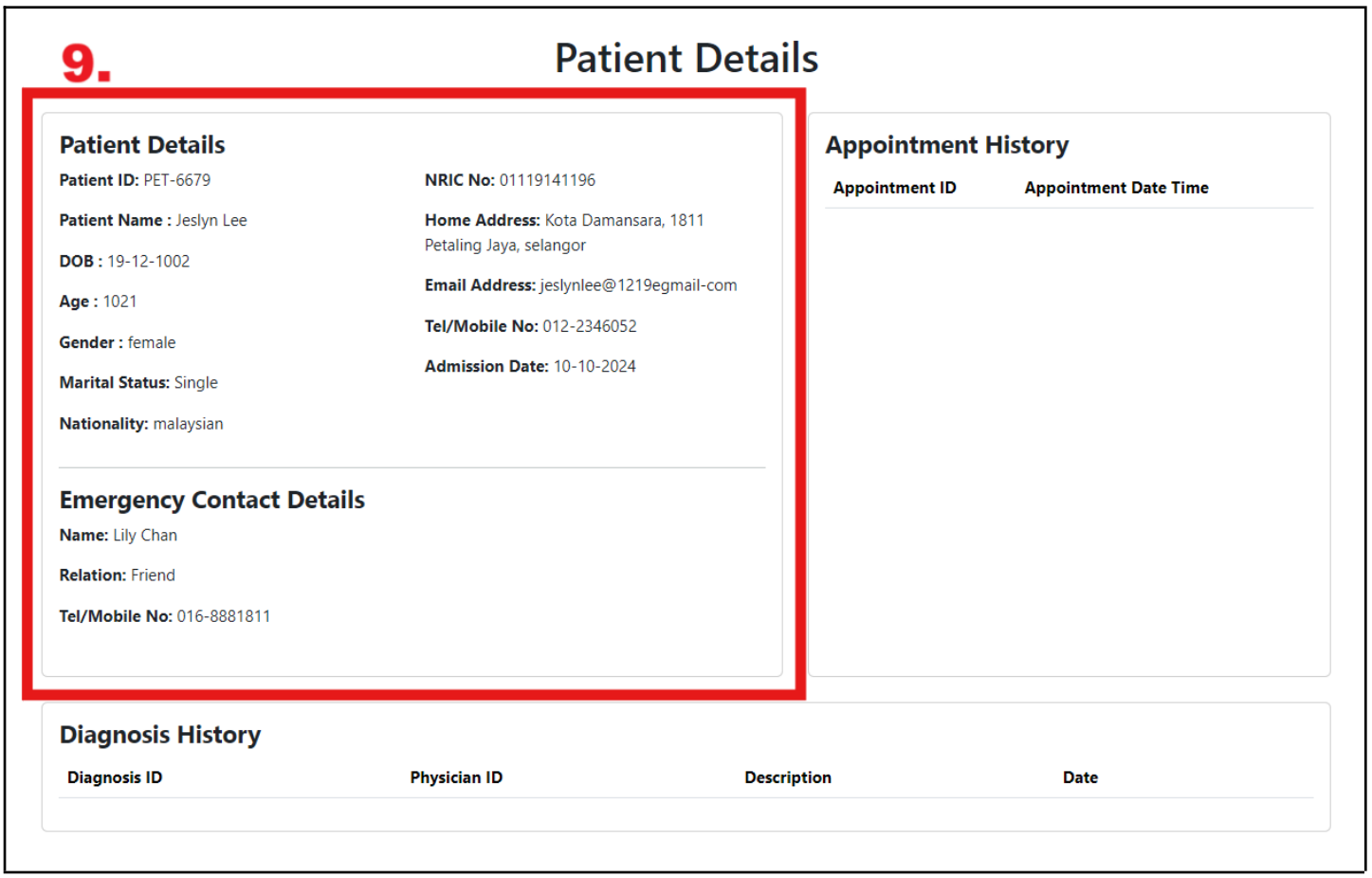


Table 1.1.2.1. Screenshots of web application with annotations

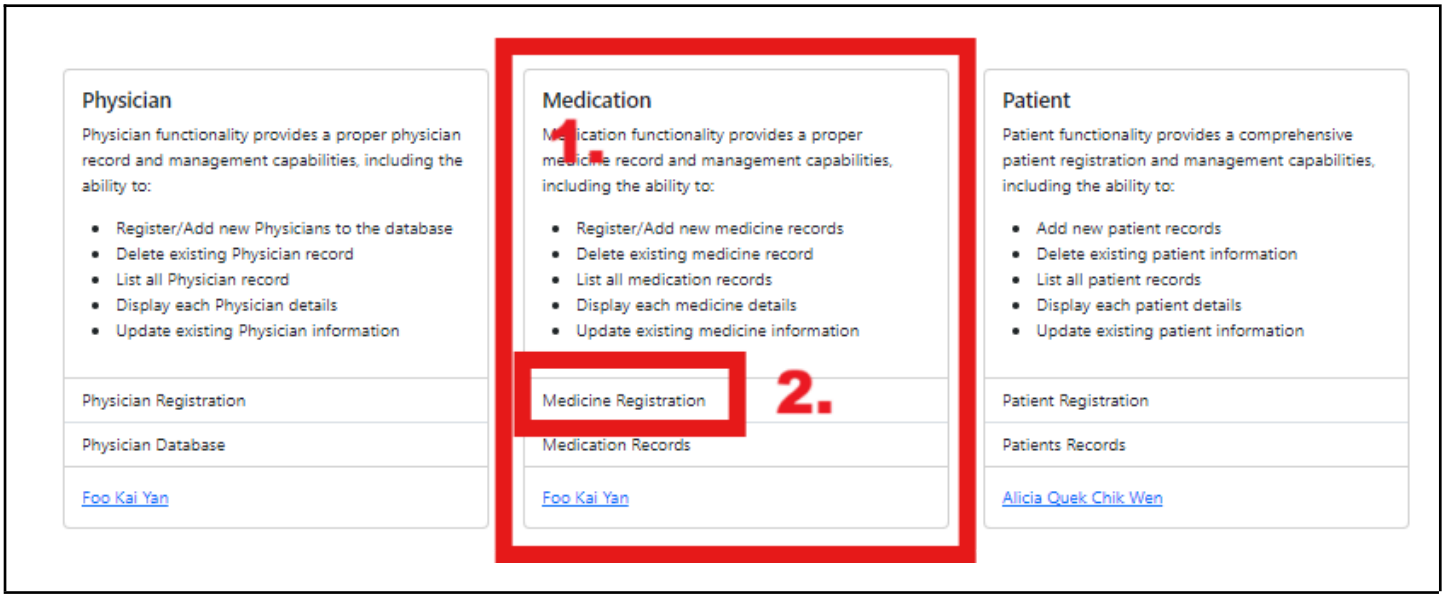
Label Number	GUI Element	Description
1.	Patient Registration Button	When the user clicks on the “Patient Registration” button, they are taken to the Patient Registration Form. Users can either manually input the patient details or use the Handwritten Text Recognition (HTR) Model to automatically populate the fields.
2.	Patient Registration Form	On this page, users can manually input the patient's information into each designated field.
3.	Upload file Button	Users can upload a completed patient registration form by selecting the “Choose file” button and then select the “Upload” button to submit the file.
4.	Extract Button	To retrieve patient details, users can click the “Extract” button, which will automatically populate the fields.
5.	Submit Button	After ensuring all fields are correctly filled and error-free,

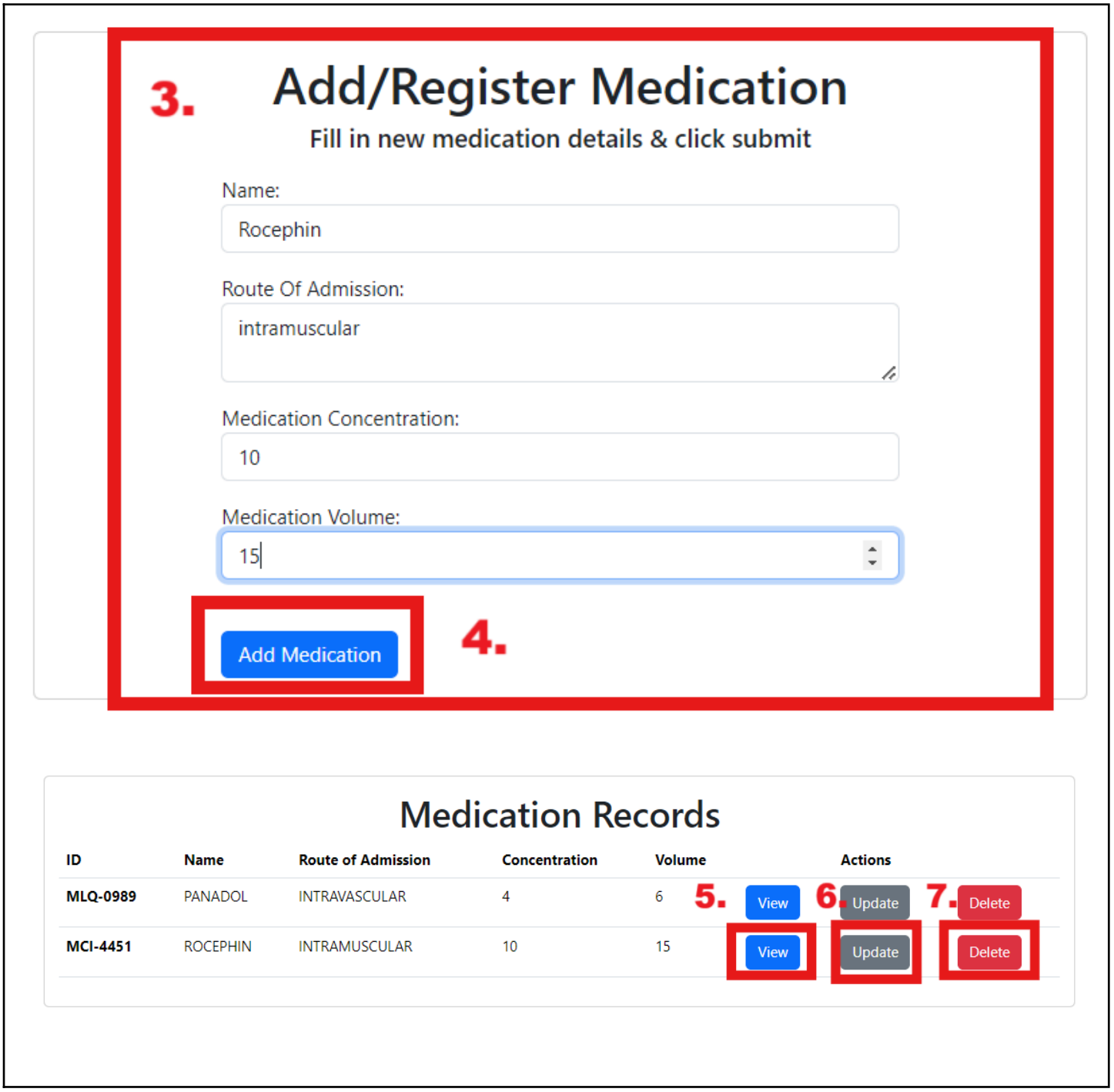
		the user can click the “Submit” button located at the bottom left to finalize the registration.
6.	View Registered Patient Detail Button	In order to see the details of the added patient, users need to click on the “Details” button, which will direct them to the relevant page on the web application.
7.	Update Patient Detail Button	In order to update the details of the added patient, users need to click on the “Update” button, which will direct them to the relevant page on the web application.
8.	Delete Patient Button	In order to delete a specific patient, users need to click on the “Delete” button, which will remove the selected patient before refreshing the page automatically.
9.	Patient Details	The card displays all the patient details.

Table 1.1.2.2. Description of functionalities of each buttons and GUI Elements

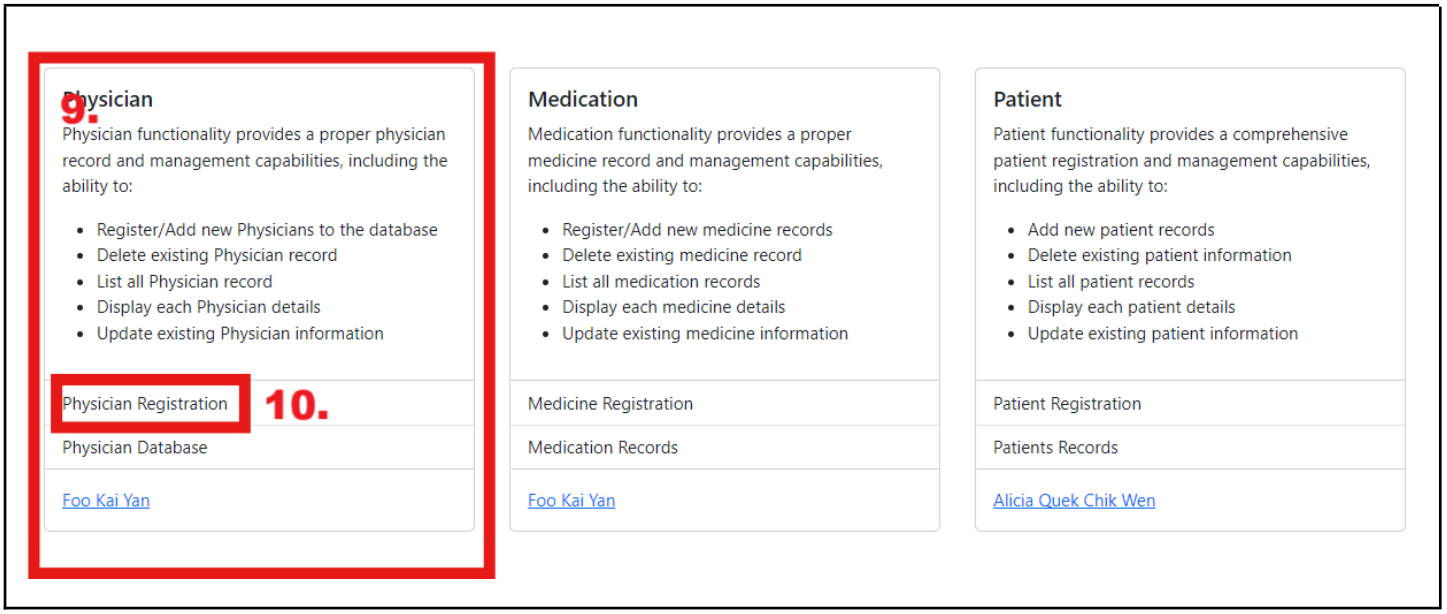
1.1.3. Navigating Medication, and Physician

Users may effectively manage vital healthcare data with the web application's Medication and Physician management functionality. It allows the user to add, update, view, and delete the medication records and physician details within the system. In this section, we will guide you how to navigate the functionality of managing both Medication and Physician records effectively.




3.
Add/Register Medication
Fill in new medication details & click submit
Name:
Rocephin
Route Of Admission:
intramuscular
Medication Concentration:
10
Medication Volume:
15
Add Medication
4.
Medication Records
ID
Name
Route of Admission
Concentration
Volume
Actions
MLQ-0989
PANADOL
INTRAVASCULAR
4
6
5.
View
6.
Update
7.
Delete
MCI-4451
ROCEPHIN
INTRAMUSCULAR
10
15
View
Update
Delete


MCI-4451 Details
Object ID: 6708109e7f0712c27b73bf38
Medication ID: MCI-4451
Medication Name: ROCEPHIN
Route of Admission: INTRAMUSCULAR
Concentration: 10
Volume: 15
8.


9.
Physician
Physician functionality provides a proper physician record and management capabilities, including the ability to:
Register/Add new Physicians to the database
Delete existing Physician record
List all Physician record
Display each Physician details
Update existing Physician information
Physician Registration
10.
Physician Database
Foo Kai Yan
Medication
Medication functionality provides a proper medicine record and management capabilities, including the ability to:
Register/Add new medicine records
Delete existing medicine record
List all medication records
Display each medicine details
Update existing medicine information
Medicine Registration
Medication Records
Foo Kai Yan
Patient
Patient functionality provides a comprehensive patient registration and management capabilities, including the ability to:
Add new patient records
Delete existing patient information
List all patient records
Display each patient details
Update existing patient information
Patient Registration
Patients Records
Alicia Quek Chik Wen


11.
Register Physician/Doctor
Fill in the physician/doctor information
First Name:
Wooi King
Last Name:
Soo
Birth Date:
01/01/1983
Assigned Working Department:
DENTIST
Register Physician/Doctor
12.
Physician Records
ID
First Name
Last Name
Department
Actions
OOH-8587
JOHN
SMITH
GENERAL
13.
View
14.
Update
15.
Delete
OEJ-9681
WOOI KING
SOO
DENTIST
View
Update
Delete

Table 1.1.3.1. Screenshots of web application with annotations

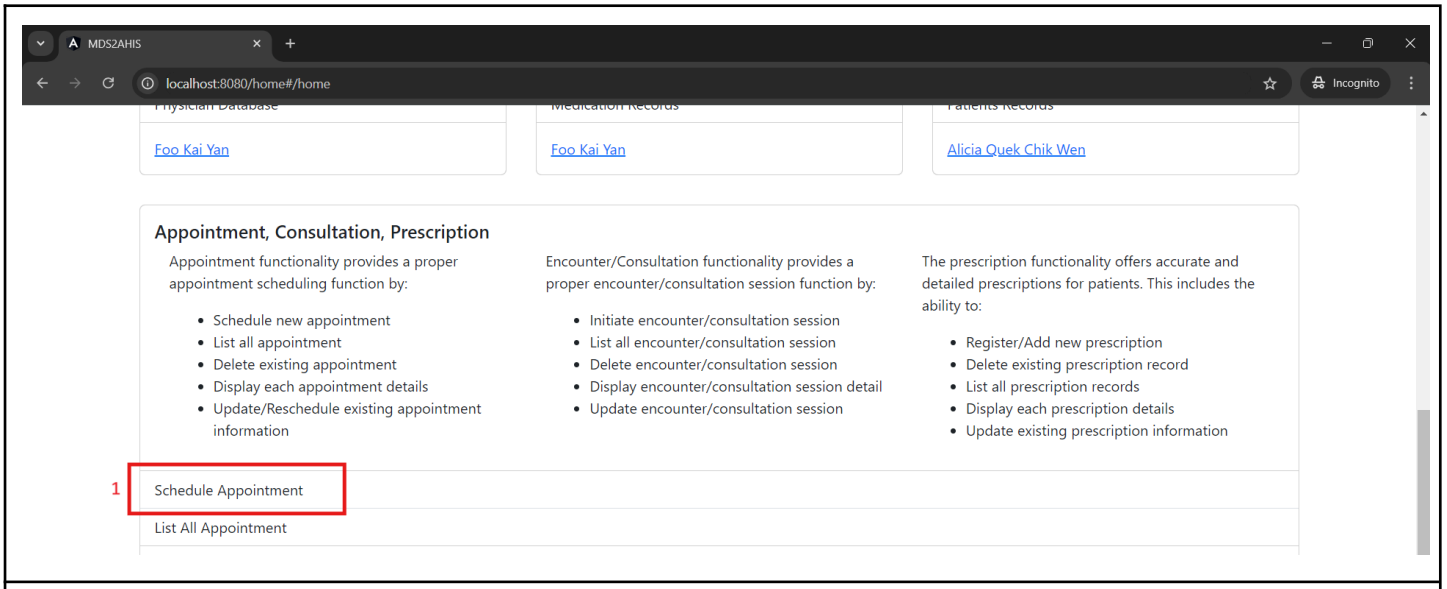
Label Number	GUI Element	Description
1, 2	Register New Medicine	When the user clicks on the “Medicine Registration” button under the medication card, they are taken to the medication entry form.
3, 4	Add Medicine Button	On this page, users can input the medication details into each designated field. After ensuring all fields are correctly filled and error-free, the user can click the “Add Medication” button located at the bottom left to register the medicine into the database.
5.	View Registered Medicine Detail Button	In order to see the details of the added medicine, users need to click on the “View” button, which will direct them to the relevant page on the web application.
6.	Update Medicine Detail Button	In order to update the details of the added medicine, users need to click on the “Update” button, which will direct them to the relevant page on the web application.
7.	Delete Medicine Button	In order to delete a specific medicine, users need to click on the “Delete” button, which will remove the selected medication before refreshing the page automatically.
8.	Medicine Details	The card displays all the medicine details.

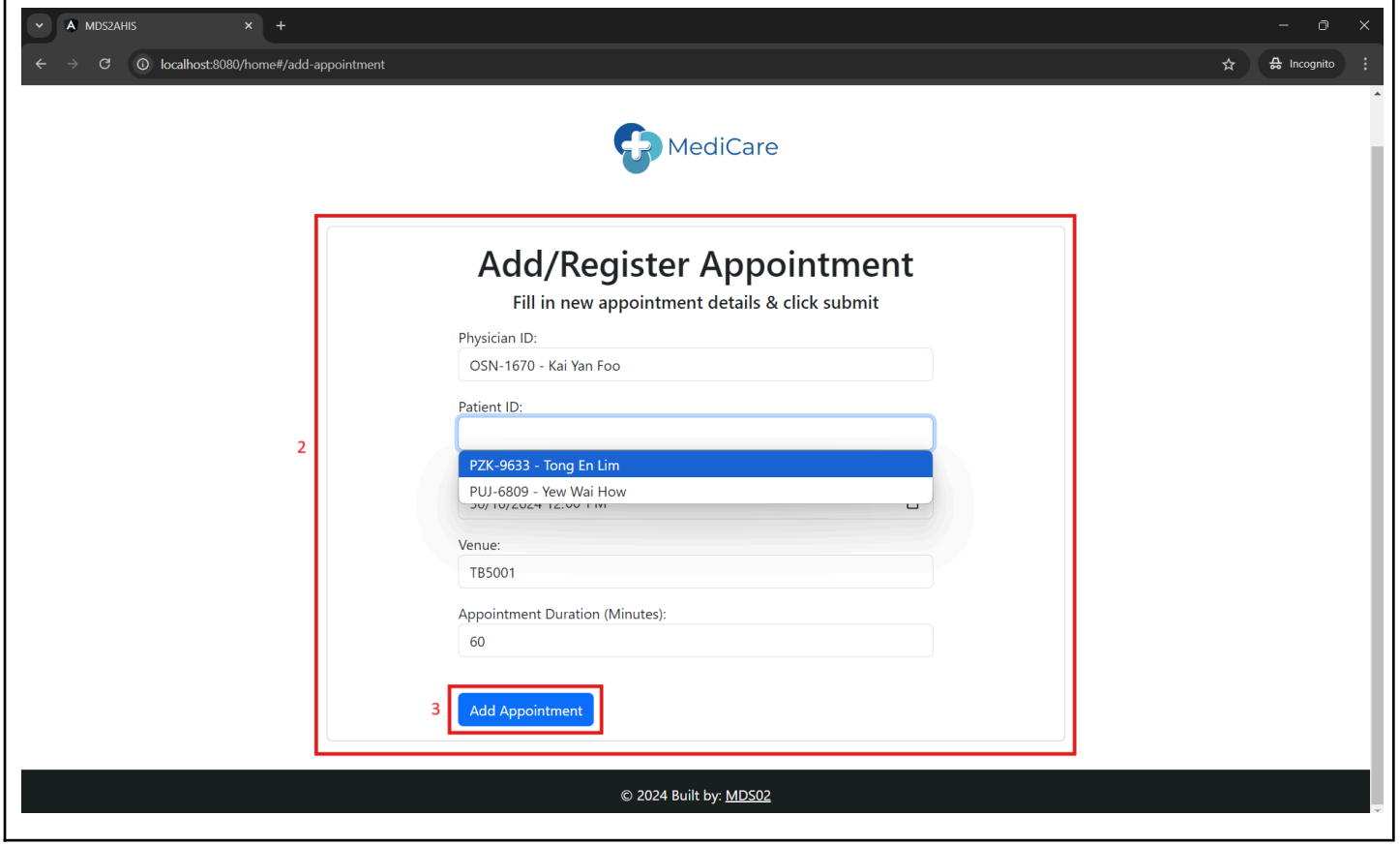
9, 10	Register Physician	When the user clicks on the “Physician Registration” button under the physician card, they are taken to the physician entry form.
11, 12	Register Physician Button	On this page, users can input the physician details into each designated field. After ensuring all fields are correctly filled and error-free, the user can click the “Register Physician/Doctor” button located at the bottom left to register the physician into the database.
13.	View Registered Physician Detail Button	In order to see the details of the added physician, users need to click on the “View” button, which will direct them to the relevant page on the web application.
14.	Update Physician Detail Button	In order to update the details of the added physician, users need to click on the “Update” button, which will direct them to the relevant page on the web application.
15.	Delete Physician Button	In order to delete a specific physician, users need to click on the “Delete” button, which will remove the selected physician before refreshing the page automatically.
16.	Physician Details	The card displays all the physician details.

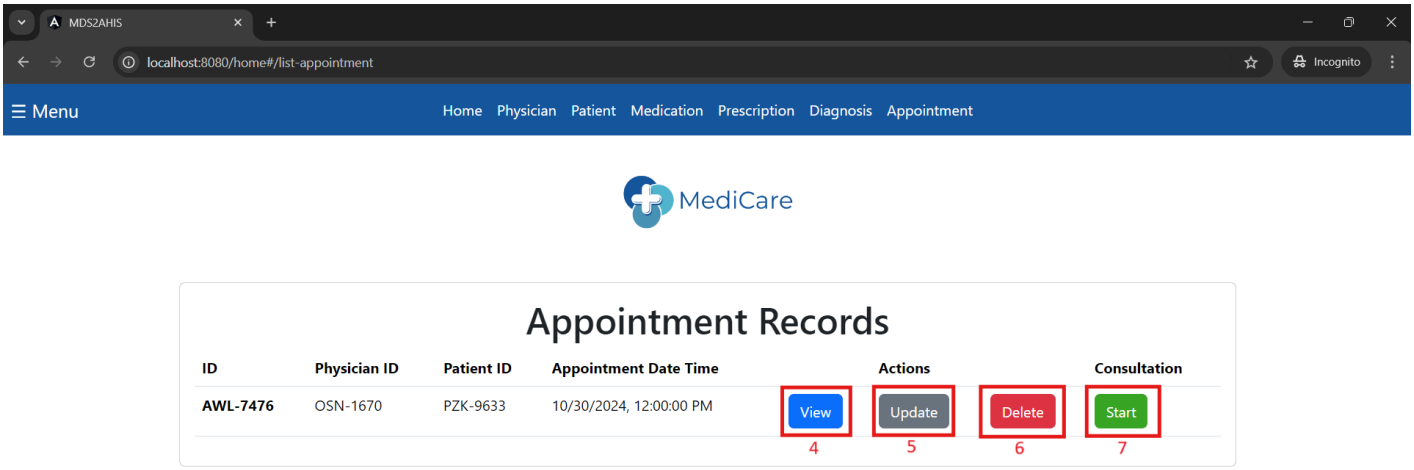
Table 1.1.3.2. Description of functionalities of each buttons and GUI Elements

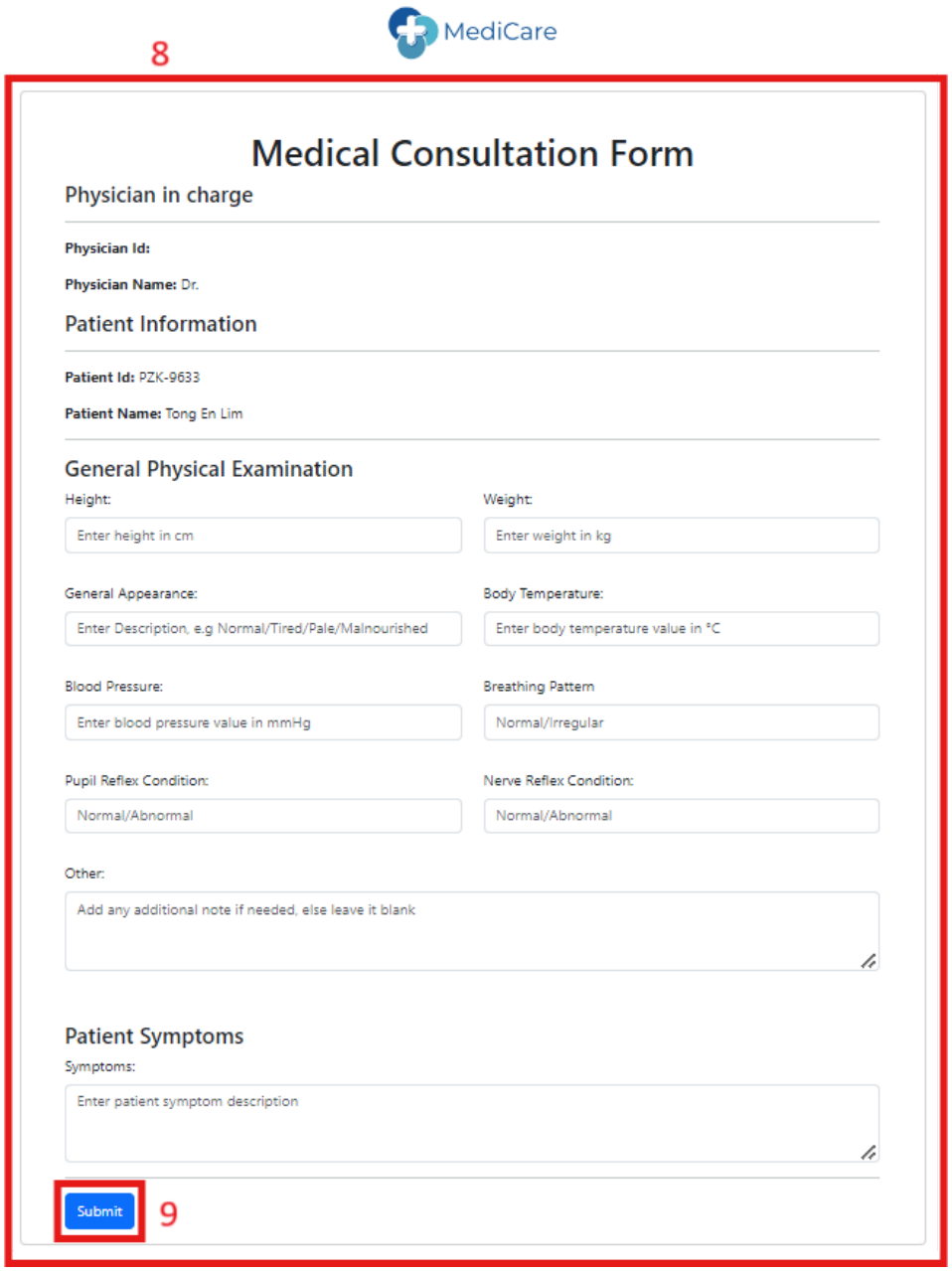
1.1.4. Navigating Appointment, Encounter, Diagnosis, and Prescription

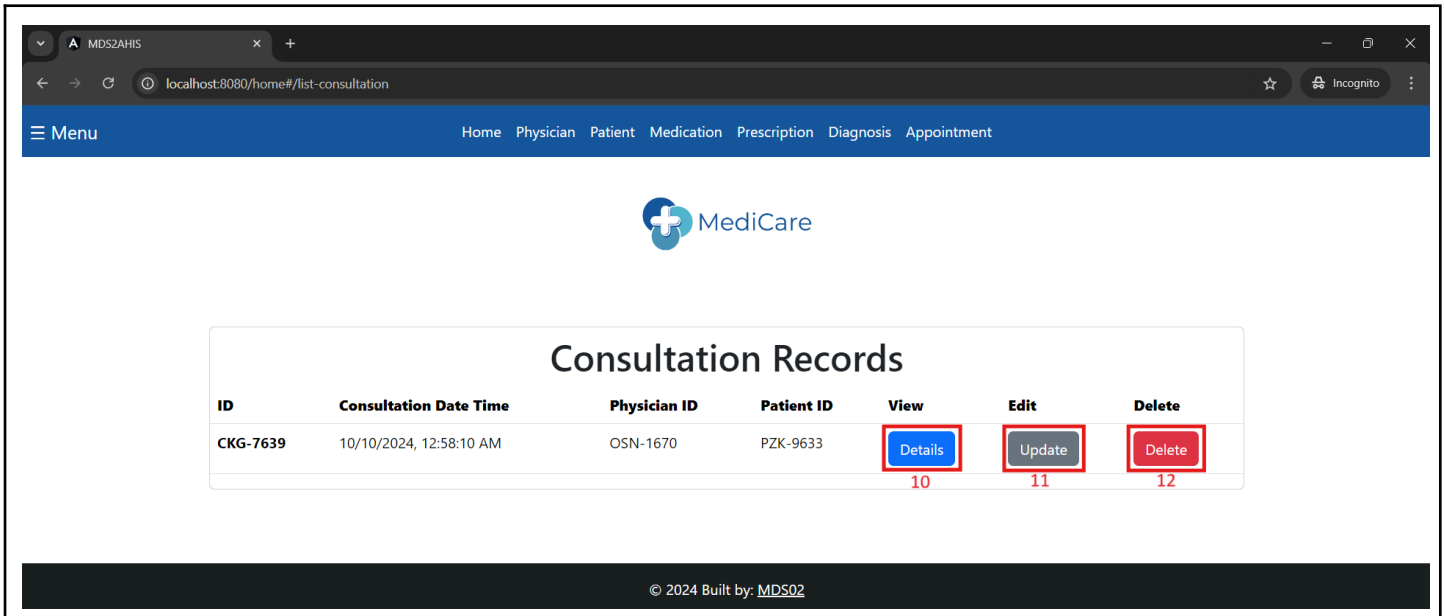
After registering the patient and populating the medication and physician database with data, the user can now schedule an appointment between a patient and a physician. Users can start scheduling appointments between patient and physician by navigating to the homepage and selecting the “Schedule Appointment” button within the homepage. Within this section, we will guide you through the whole process of appointment scheduling, encounter initiation, diagnosis writing, as well as prescription assignment within the web application.

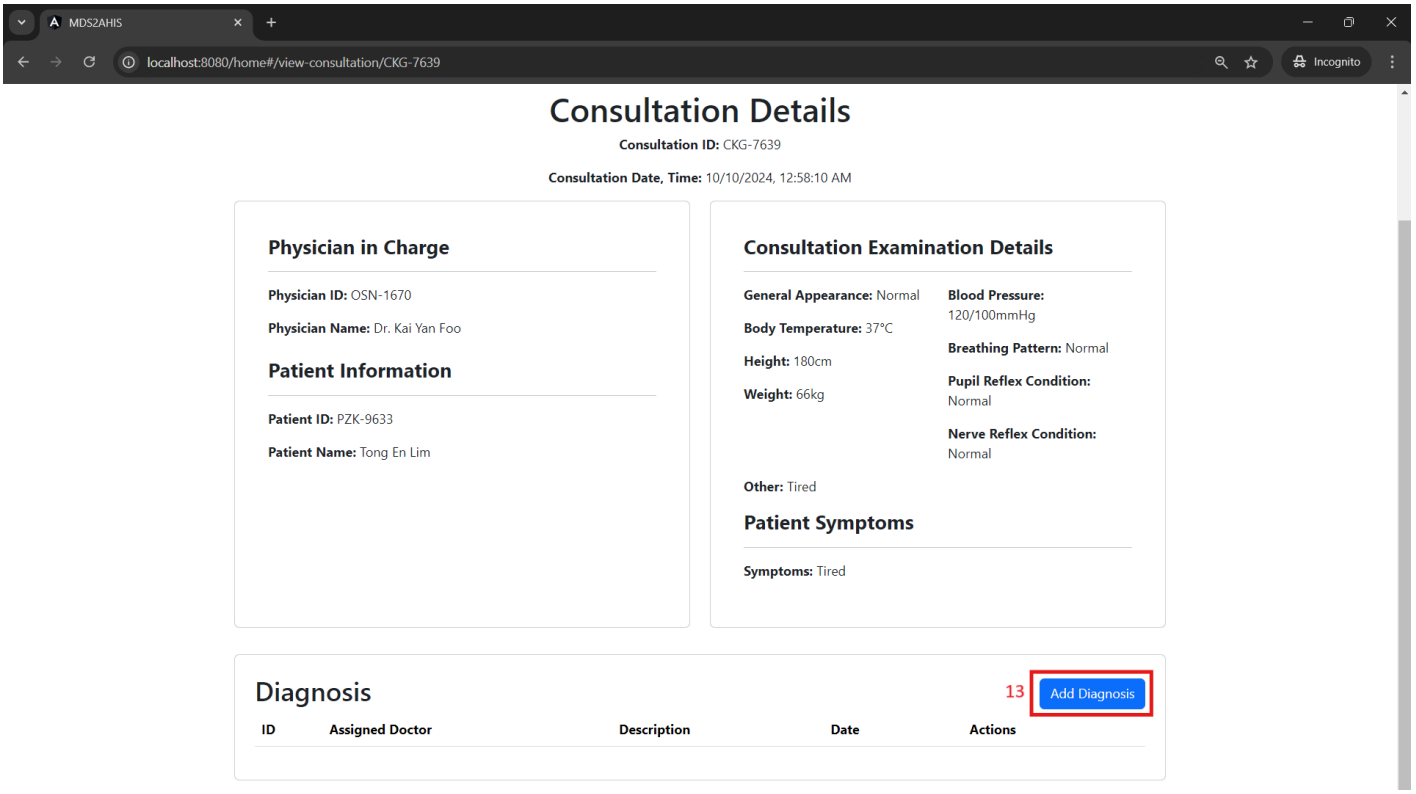

MDS2AHIS
localhost:8080/home#/home
Incognito
Foo Kai Yan
Foo Kai Yan
Alicia Quek Chik Wen
Appointment, Consultation, Prescription
Appointment functionality provides a proper appointment scheduling function by:
Schedule new appointment
List all appointment
Delete existing appointment
Display each appointment details
Update/Reschedule existing appointment information
Encounter/Consultation functionality provides a proper encounter/consultation session function by:
Initiate encounter/consultation session
List all encounter/consultation session
Delete encounter/consultation session
Display encounter/consultation session detail
Update encounter/consultation session
The prescription functionality offers accurate and detailed prescriptions for patients. This includes the ability to:
Register/Add new prescription
Delete existing prescription record
List all prescription records
Display each prescription details
Update existing prescription information
1
Schedule Appointment
List All Appointment

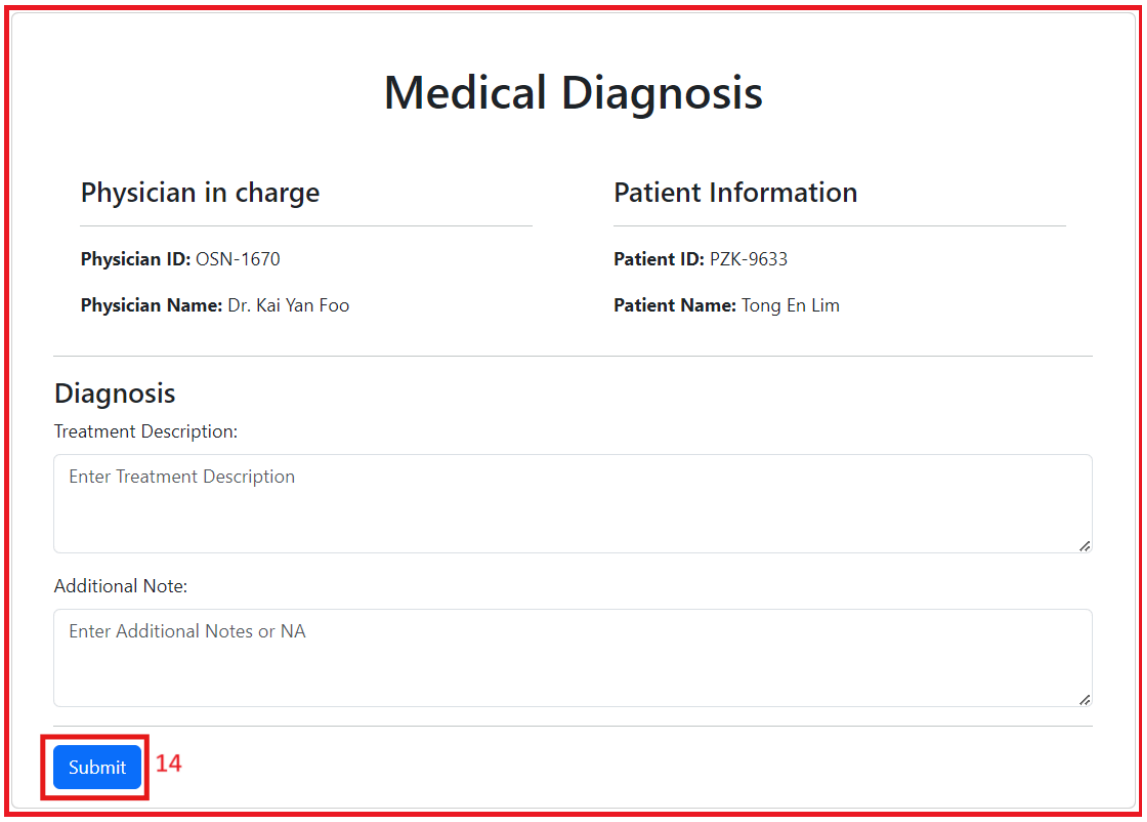

MDS2AHIS
localhost:8080/home#/add-appointment
Incognito
MediCare
Add/Register Appointment
Fill in new appointment details & click submit
Physician ID:
OSN-1670 - Kai Yan Foo
Patient ID:
2
PZK-9633 - Tong En Lim
PUJ-6809 - Yew Wai How
Venue:
TB5001
Appointment Duration (Minutes):
60
3
Add Appointment
© 2024 Built by: MDS02

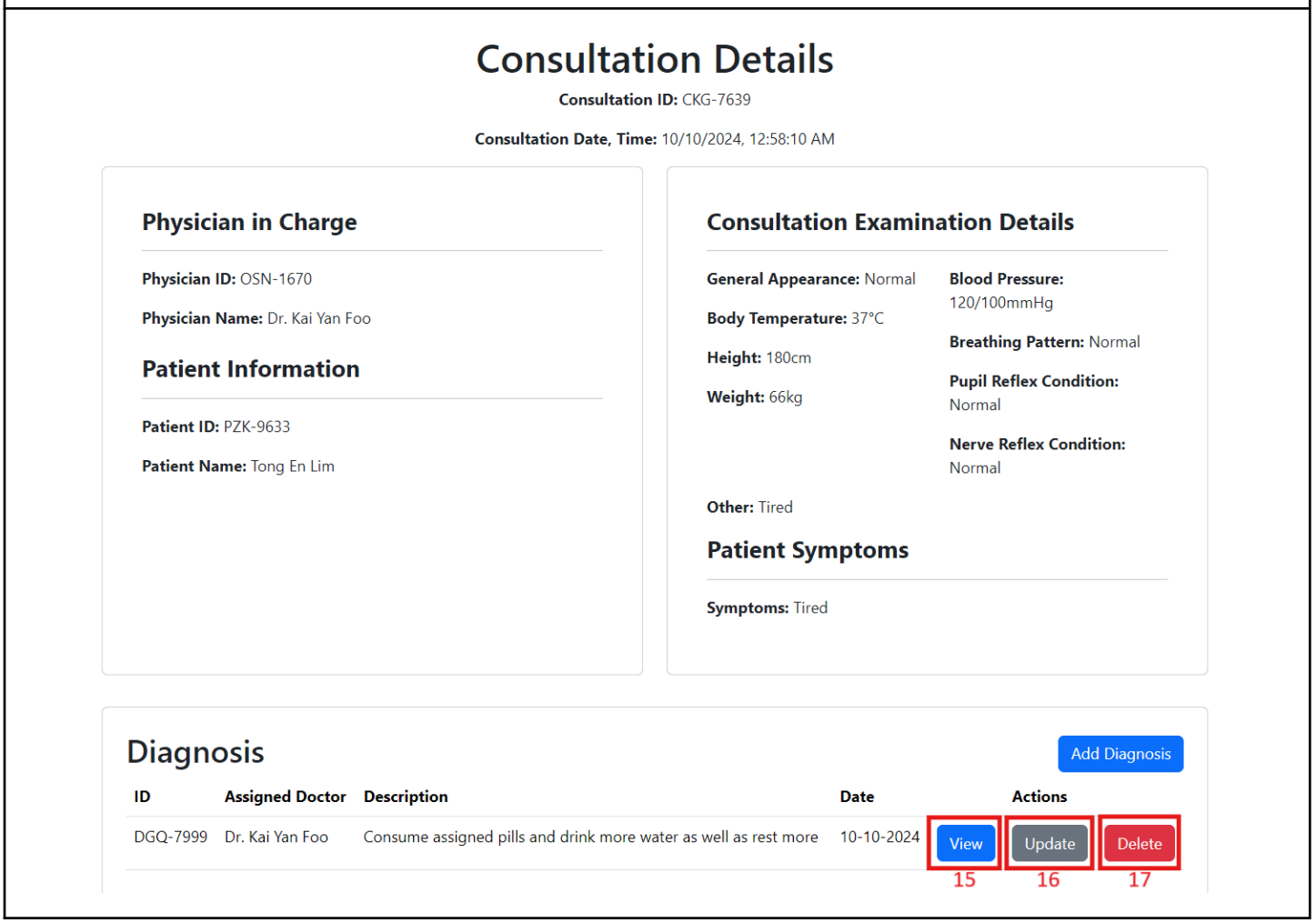

MDS2AHIS
localhost:8080/home#/list-appointment
Incognito
☰ Menu
Home
Physician
Patient
Medication
Prescription
Diagnosis
Appointment
MediCare
Appointment Records
ID
Physician ID
Patient ID
Appointment Date Time
Actions
Consultation
AWL-7476
OSN-1670
PZK-9633
10/30/2024, 12:00:00 PM
View
Update
Delete
Start
4
5
6
7


8
MediCare
Medical Consultation Form
Physician in charge
Physician Id:
Physician Name: Dr.
Patient Information
Patient Id: PZK-9633
Patient Name: Tong En Lim
General Physical Examination
Height:
Enter height in cm
Weight:
Enter weight in kg
General Appearance:
Enter Description, e.g Normal/Tired/Pale/Malnourished
Body Temperature:
Enter body temperature value in °C
Blood Pressure:
Enter blood pressure value in mmHg
Breathing Pattern
Normal/Irregular
Pupil Reflex Condition:
Normal/Abnormal
Nerve Reflex Condition:
Normal/Abnormal
Other:
Add any additional note if needed, else leave it blank
Patient Symptoms
Symptoms:
Enter patient symptom description
Submit
9


MDS2AHIS
localhost:8080/home#/list-consultation
Incognito
☰ Menu
Home Physician Patient Medication Prescription Diagnosis Appointment
MediCare
Consultation Records
ID
Consultation Date Time
Physician ID
Patient ID
View
Edit
Delete
CKG-7639
10/10/2024, 12:58:10 AM
OSN-1670
PZK-9633
Details
Update
Delete
10
11
12
© 2024 Built by: MDS02


MDS2AHIS
localhost:8080/home#/view-consultation/CKG-7639
Incognito
Consultation Details
Consultation ID: CKG-7639
Consultation Date, Time: 10/10/2024, 12:58:10 AM
Physician in Charge
Physician ID: OSN-1670
Physician Name: Dr. Kai Yan Foo
Patient Information
Patient ID: PZK-9633
Patient Name: Tong En Lim
Consultation Examination Details
General Appearance: Normal
Body Temperature: 37°C
Height: 180cm
Weight: 66kg
Blood Pressure: 120/100mmHg
Breathing Pattern: Normal
Pupil Reflex Condition: Normal
Nerve Reflex Condition: Normal
Other: Tired
Patient Symptoms
Symptoms: Tired
Diagnosis
13
Add Diagnosis
ID
Assigned Doctor
Description
Date
Actions


Medical Diagnosis
Physician in charge
Physician ID: OSN-1670
Physician Name: Dr. Kai Yan Foo
Patient Information
Patient ID: PZK-9633
Patient Name: Tong En Lim
Diagnosis
Treatment Description:
Enter Treatment Description
Additional Note:
Enter Additional Notes or NA
Submit
14


Consultation Details
Consultation ID: CKG-7639
Consultation Date, Time: 10/10/2024, 12:58:10 AM
Physician in Charge
Physician ID: OSN-1670
Physician Name: Dr. Kai Yan Foo
Patient Information
Patient ID: PZK-9633
Patient Name: Tong En Lim
Consultation Examination Details
General Appearance: Normal
Body Temperature: 37°C
Height: 180cm
Weight: 66kg
Blood Pressure: 120/100mmHg
Breathing Pattern: Normal
Pupil Reflex Condition: Normal
Nerve Reflex Condition: Normal
Other: Tired
Patient Symptoms
Symptoms: Tired
Diagnosis
Add Diagnosis
ID
Assigned Doctor
Description
Date
Actions
DGQ-7999
Dr. Kai Yan Foo
Consume assigned pills and drink more water as well as rest more
10-10-2024
View
Update
Delete
15
16
17

Consultation and Diagnosis Details

Consultation ID: CKG-7639

Consultation Date, Time: 10/10/2024, 12:58:10 AM

Prescriptions

18 Add

ID	Prescription	View

Diagnosis Details

Update

Diagnisis ID: DGQ-7999 **Date:** 10-10-2024

Treatment Description: Consume assigned pills and drink more water as well as rest more

Additional Note: Patient lacks water percentage within body

Physician in Charge

Physician ID: OSN-1670

Physician Name: Dr. Kai Yan Foo

Patient Information

Patient ID: PZK-9633

Patient Name: Tong En Lim

Consultation Examination Details

General Appearance: Normal

Blood Pressure: 120/100mmHg

Body Temperature: 37°C

Breathing Pattern: Normal

Height: 180cm

Pupil Reflex Condition: Normal

Weight: 66kg

Nerve Reflex Condition: Normal

Other: Tired

Patient Symptoms

Symptoms: Tired

Physician in charge

Physician ID: OSN-1670

Physician Name: Dr. Kai Yan Foo

Patient Information

Patient ID: PZK-9633

Patient Name: Tong En Lim

19

20

Issue Prescription

Fill in the prescription information for the patient

Prescription Name:

Enter prescription name

Medication:

Medication Dosage:

Enter medication dosage

Consumption Frequency:

Enter medication consumption frequency

Issued Date:

dd/mm/yyyy

Consume Before:

dd/mm/yyyy

Special Instructions:

Enter any potential special instructions

Issue Prescription

21

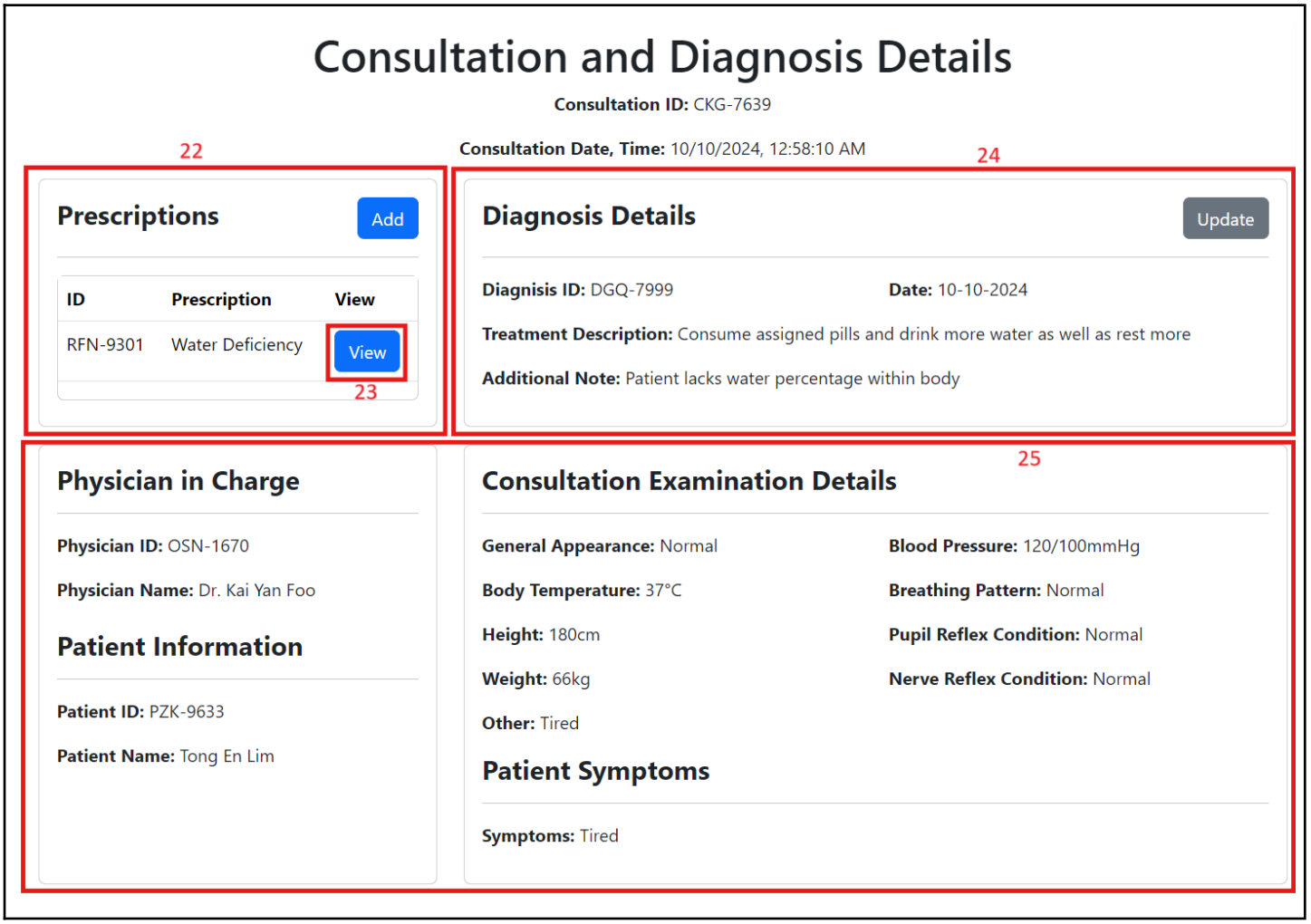


Table 1.1.4.1. Screenshots of web application with annotations

Label Number	GUI Element	Description
1, 2	Schedule Appointment Button	When the user clicks “Schedule Appointment”, they will be taken directly to the Add Appointment page. On this page, users must enter the appointment details as shown in the second image and labeled as ‘2’ in Table 1.1.4.1. above.
3	Add Appointment Button	To officially add the appointment into the database, users will have to click this “Add Appointment” button.
4	View Appointment Detail Button	In order to see the details of the added appointment, users need to click on the “View” button, which will direct them to the relevant page on the web application.
5	Update Appointment Detail Button	In order to update the details of the added appointment, users need to click on the “Update” button, which will direct them to the relevant page on the web application.

6	Delete Appointment Button	In order to delete a specific appointment, users need to click on the “Delete” button, which will remove the selected appointment before refreshing the page automatically.
7	Initiate Encounter Button	In order to start an appointment, users need to click on the “Start” button, which will direct them to the consultation feature of the web application. When the appointment has started, this appointment will not show in the list appointment anymore as the appointment has been met.
8, 9	Medical Consultation Form, Add Consultation Button	On this page, users will have to fill in the relevant and required details to complete the medical consultation form before submitting the form by clicking on “Submit” labeled as ‘9’ within the fourth image in Table 1.1.4.1. above.
10	View Consultation Detail Button	In order to see the details of the encounter/consultation, users need to click on the “Details” button, which will direct them to the relevant page on the web application.
11	Update Consultation Detail Button	In order to update the details of the encounter/consultation, users need to click on the “Update” button, which will direct them to the relevant page on the web application.
12	Delete Consultation Button	In order to delete a specific encounter/consultation, users would need to click on the “Delete” button, which will remove the selected encounter/consultation before refreshing the page automatically.
13	Add Diagnosis Button	To be directed to the Add Diagnosis page, users would have to click on the “Add Diagnosis” button within the consultation details page.
14	Submit Diagnosis Button	Once the user is directed to the Add Diagnosis page, users would have to fill in the relevant and required information before clicking this button to submit the diagnosis to be stored in the database. Note: Multiple diagnosis can be added for each consultation
15	View Diagnosis Detail Button	In order to see the details of the diagnosis, users need to click on the “Details” button, which will direct them to the

		relevant page on the web application.
16	Update Diagnosis Detail Button	In order to update the details of the diagnosis, users need to click on the “Update” button, which will direct them to the relevant page on the web application.
17	Delete Diagnosis Button	In order to delete a specific diagnosis, users would need to click on the “Delete” button, which will remove the selected diagnosis before refreshing the page automatically.
18	Add Prescription Button	In order to add a prescription for the patient, users would have to click this button to be redirected to the Add Prescription page of the web application.
19	Physician and Patient Information	These 2 cards display the patient and physician ID and name.
20, 21	Prescription Form, Submit Prescription Button	Once the user is directed to the Add Prescription page, users would have to fill in the relevant and required information before clicking the button labeled as ‘21’ to submit the prescription to be stored in the database. Note: Multiple prescription can be added for each diagnosis
22, 23	Prescription Assigned, View Prescription Detail Button	These card display a list of prescription assigned to the patient by a physician for a specific Diagnosis Note: Multiple prescription can be added for each diagnosis
24, 25	Diagnosis Details, Physician Information, Patient Information, Consultation Examination Detail	These 3 cards display diagnosis detail, physician and patient information, as well as consultation examination detail for the user to see and know who wrote this diagnosis, what is the diagnosis written, who was the diagnosis written for, and what examination was done during the physician-patient consultation.

Table 1.1.4.2. Description of functionalities of each buttons and GUI Elements

1.1.5. Navigating Banner, Navigation Menu, and Navigation Bar

If the user intends to navigate to the homepage of the web application from any page within the web application, the user can opt to head to the homepage from 3 different methods:

1. Clicking banner logo image.
2. Selecting the homepage option from the navigation bar.
3. Selecting the homepage option from the navigation menu.

Within this section, we will guide you through the steps to use the Banner Logo, Navigation Bar, and Navigation Menu.

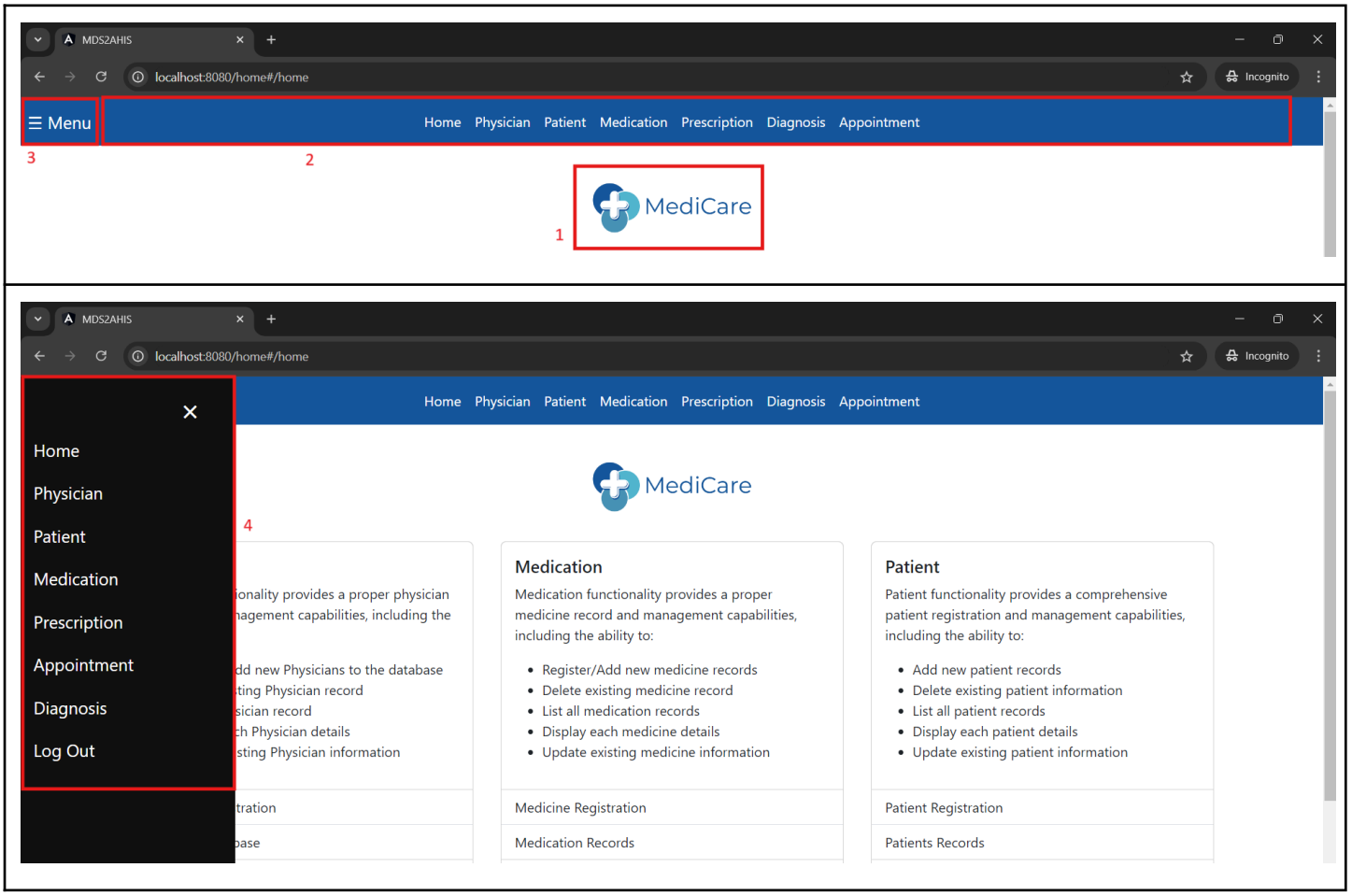


Table 1.1.5.1. Homepage with annotations

The table provided below will help you identify the GUI elements on your screen and explain their functionalities.

Label Number	GUI Element	Description
1	Banner with Logo	Clicking on the logo labeled ‘Medicare’ serves as a quick access button for users to instantly reach the homepage.

		Upon clicking, the web application will immediately redirect the user to its homepage.
2	Navigation Bar	The navigation bar is the extended blue bar situated at the top of all the functionalities in the web application. Clicking on any of the features will take you to the corresponding feature's list all page. If a user clicks on “Patients”, they will be directed to the “List All Patient” page where all patient records in the database will be displayed.
3, 4	Navigation Menu	The menu button, labeled as ‘3’ in the third image of Table 1.1.5.1. above, triggers the display of the Navigation Menu as a sidebar labeled as ‘4’. The options in the Navigation Menu are identical to those in the Navigation Bar, except for the additional option of a “Log Out” button that takes users to the Login page upon selection.

Table 1.1.5.2. Description of functionalities of GUI Elements

1.1.6. Web Application: Limitation and Constraints

A significant constraint of the web application is the time consumption involved in extracting text from uploaded patient registration forms. Although the HTR model is effective at accurately recognizing handwritten text, it can be time-consuming. This delay impacts the overall efficiency of the system. Additionally, the text recognition feature is only limited to patient registration forms, and other sections of the application, such as medication entry, physician information, and diagnosis details, do not yet utilize HTR functionality. Therefore, expanding the HTR capabilities to these areas could significantly streamline the data entry process and reduce the time spent on administrative tasks.

The web application has not yet been formally deployed, which limits access to its database. This is another significant disadvantage as the database is stored locally on users’ machines, which limits data sharing and synchronization. This local storage hinders collaboration, as updates made on one machine are not reflected on others. Without a centralized database, maintaining data consistency is challenging, and the application’s effectiveness in a multi-user environment is compromised. Therefore, deploying the application on a server with a centralized database is necessary for real-time updates and seamless data sharing among multiple users.

Part 2: Technical User Guide

This section outlines the setup and configuration needed for the software system that is to be done by system administrator. In order to proceed to the configuration and the set up for the web-based system, the HTR and the Image Cropping (ICROP) model, there are prerequisites that must be met. This includes the following software installation:

1. **Visual Studio Code** (**VS Code**)**:** This is a source code editor. Use the following link to download the version that matches your system specifications.
2. **Node.js**: This is a JavaScript backend runtime environment. Use the following link to download the version that matches your system specifications.
3. **MongoDB Compass**: This is a GUI for MongoDB. Use the following link to download the version that matches your system specifications.
4. **Angular:** This is a frontend web application framework. To download, run this code `npm install -g @angular/cli` in your terminal.
5. **HTR**: This is the HTR model for recognizing text and extracting text from handwritten input within uploaded images. Use the following link to download the python version 3.8 to run the HTR model.
6. **ICROP**: This is the ICROP model that preprocesses images by cropping out unnecessary background details and focusing on the fields of the handwritten text for better recognition accuracy. Use the following link to download the opencv-python version to run the ICROP model.

2.1. Web Application

2.1.1. Download and Installation

Below outline the procedure needed to download and configure the web application.

1. Download the source code from this GitLab repository by selecting the zip download button.

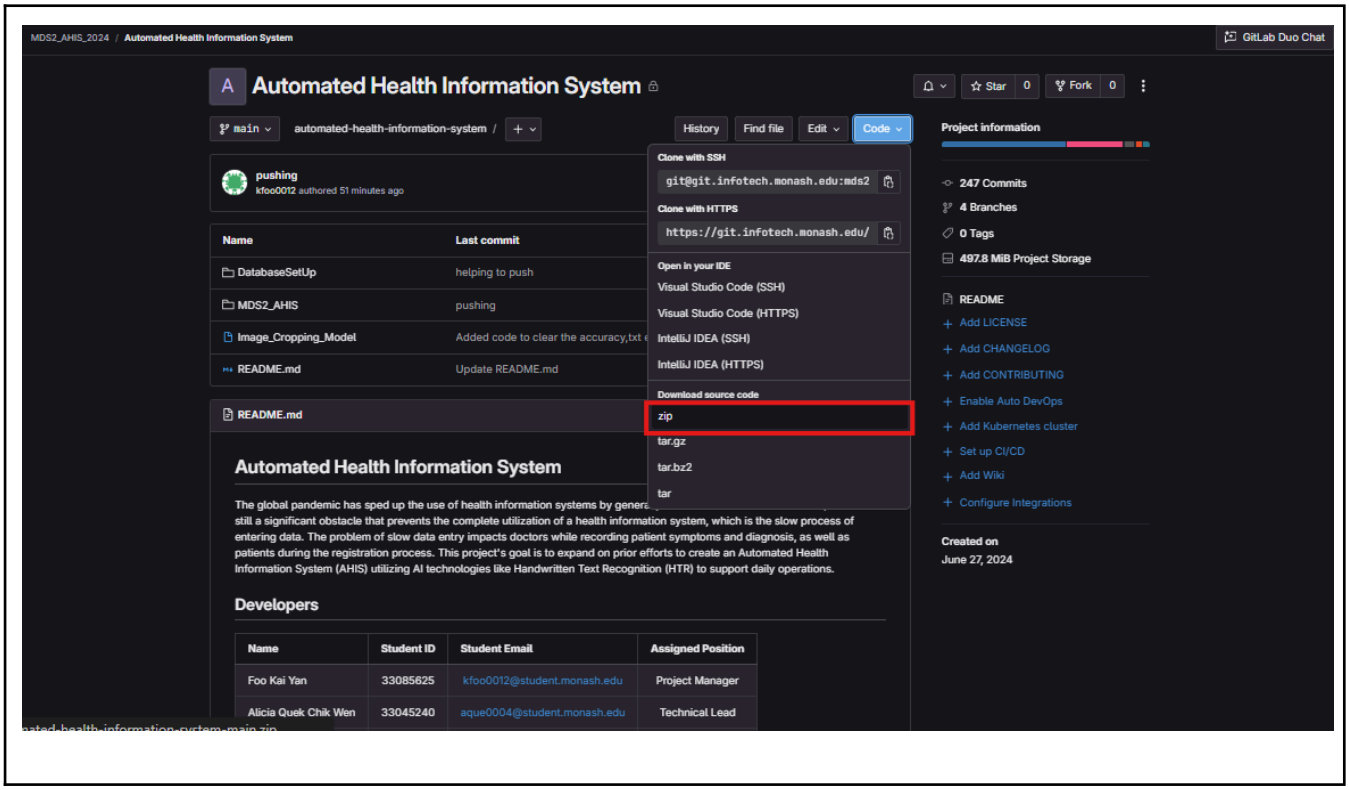


Table 2.1.1.1. Screenshots of the GitLab repository with annotation.

2. Once the zip file is downloaded, unzip the file and save it in the desired destination.
3. Open VS Code and click 'Open Folder'

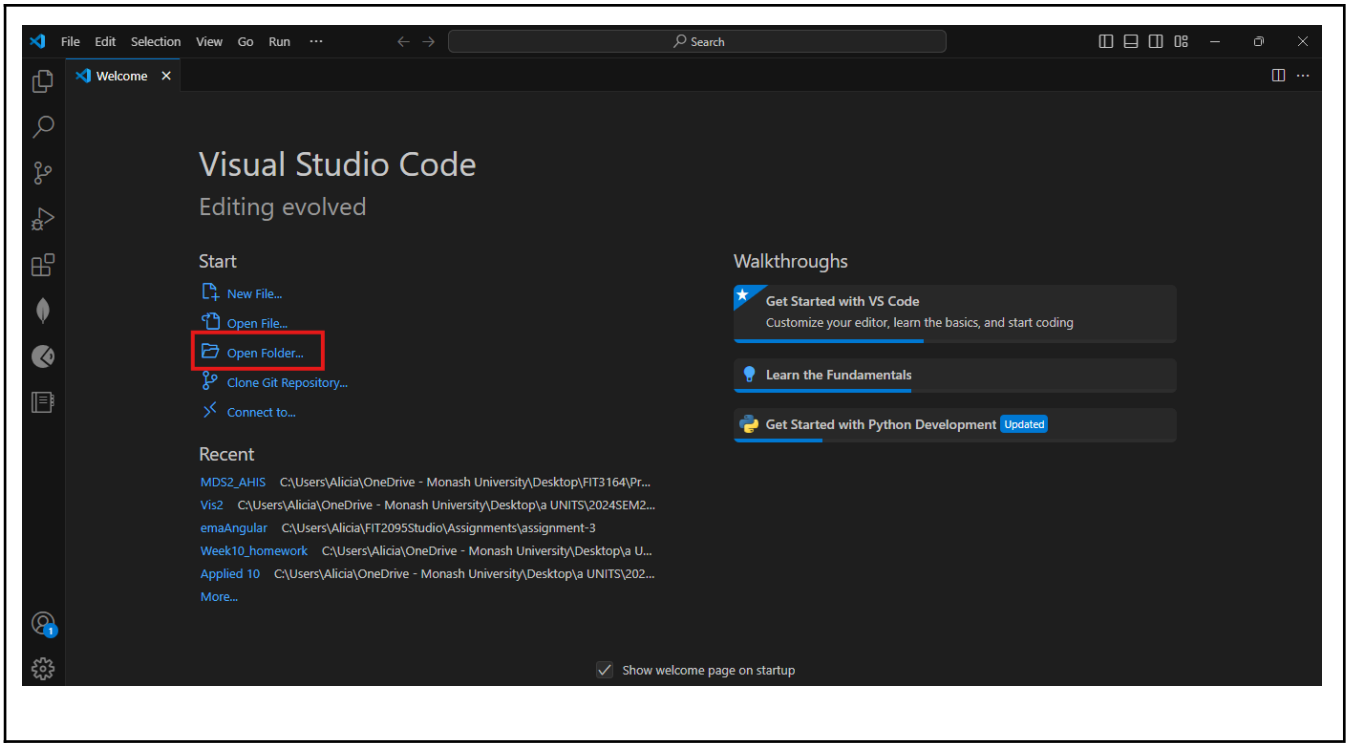


Table 2.1.1.2. Screenshots of the VS Code with annotation.

4. Locate the destination path in which the software source code is stored and click into the folder till you encounter a folder named MDS2_AHIS, in which you select to open.

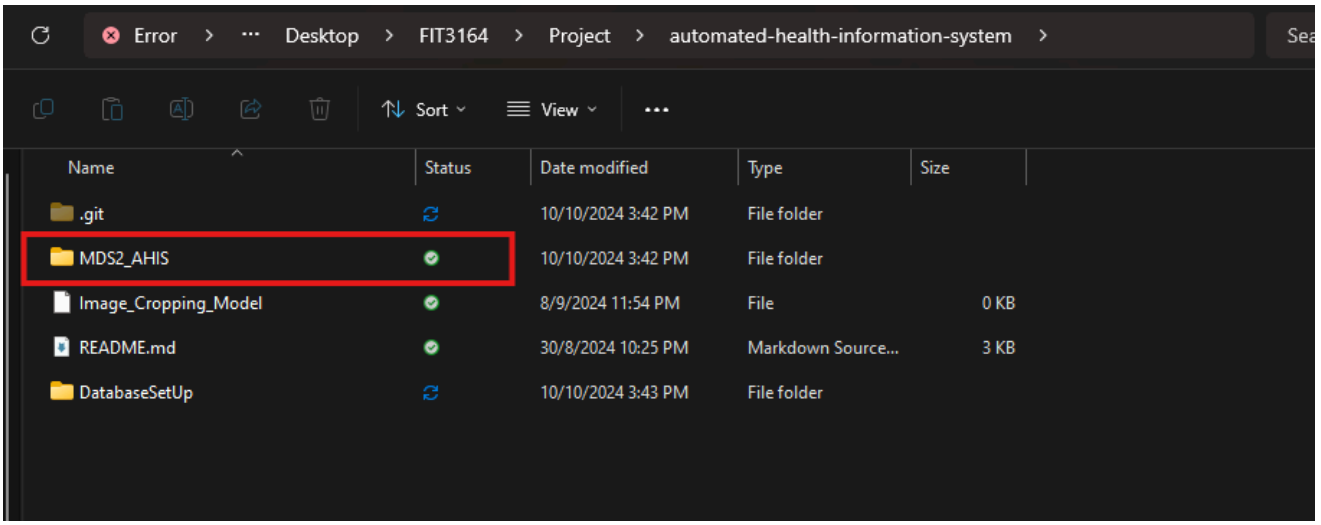


Table 2.1.1.3. Screenshots of the file explorer with annotation.

5. Open a new terminal and enter `npm install`, which will immediately install all the necessary dependencies specified in the project for the web-based system. Once similar output is displayed in the terminal like below, you are ready to proceed to run the web application as guided in 2.1.2. Run Web Application.

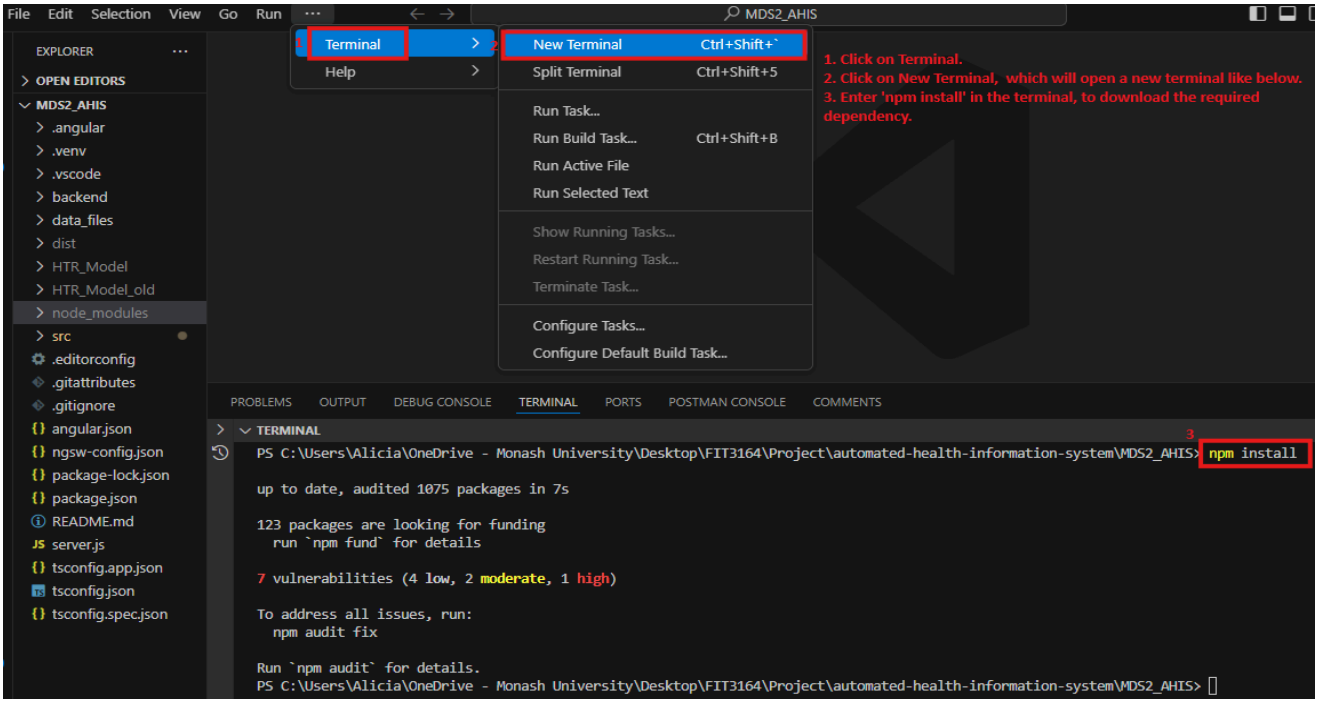


Table 2.1.1.4. Screenshots of the VS Code with annotation.

2.1.2. Run Web Application

Before running the web application, ensure that you are in the right directory by using the command `cd MDS2_AHIS` if necessary to move to the directory where the main project files are stored. To run the application, you will need to compile the Angular application. The command `ng build` compiles the project's code and assets into a deployable version, creating essential files and configurations. After the completion of the construction, the next step is to execute the main server file `server.js` by typing: `node server.js`.

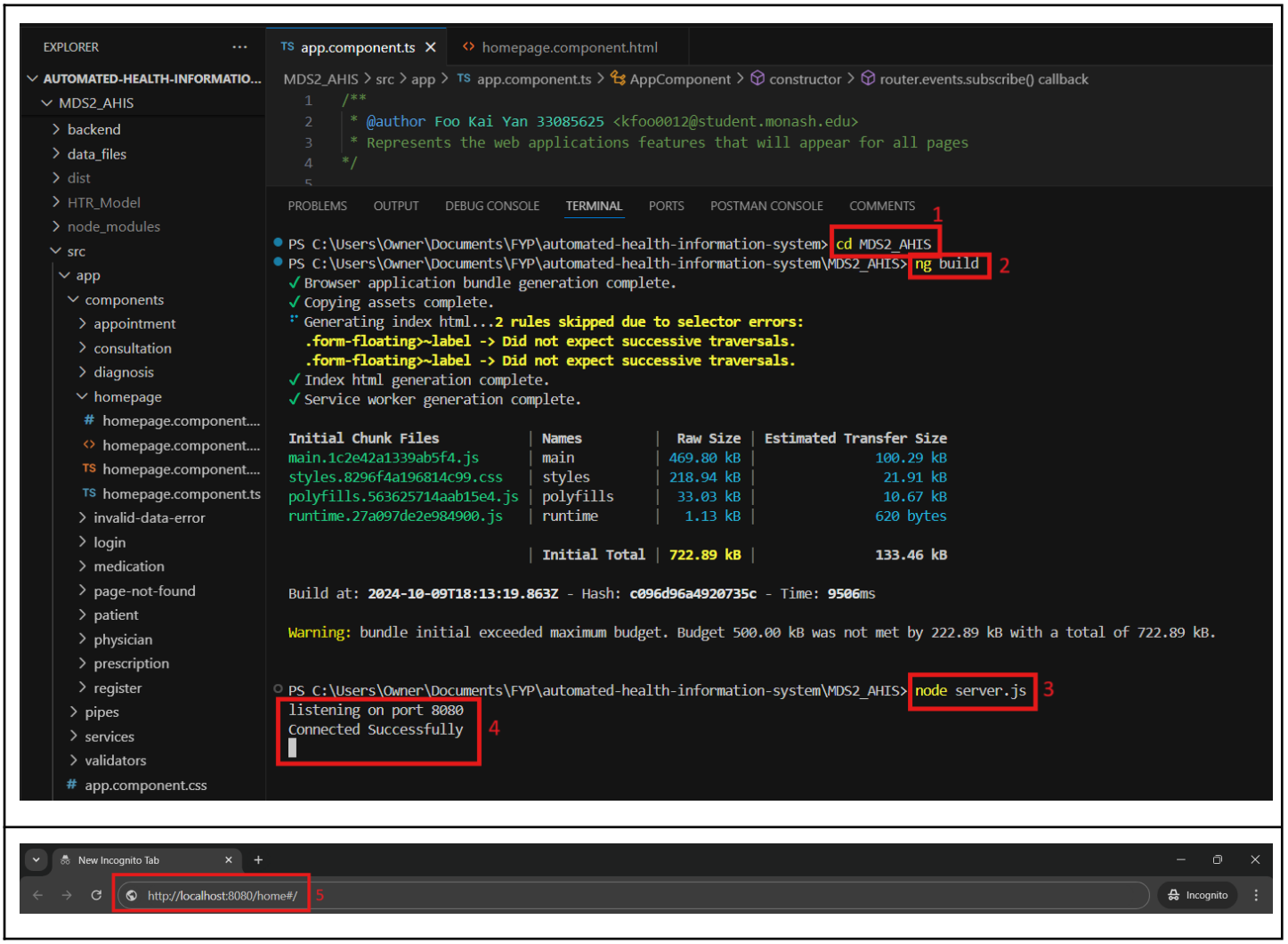


Table 2.1.2.1. Screenshots with annotations

After following the steps outlined above and seeing similar output as displayed in the 4th red box on the terminal, it can be confirmed that the web application is running smoothly following a successful connection to the MongoDB server. Hence, the last step is to access the web application itself. If you have installed the web application before then you can directly access the web application else open any browser and access the web application from this link: http://localhost:8080/home#/ as shown in the second image in Table 2.2.2.1.

2.1.3. Set up MongoDB Database

Before setting up user accounts, the MongoDB database needs to be configured to enable smooth operation on setting up user accounts.

Below outline the procedure needed to configure the MongoDB database.

1. Open MongoDB Compass and add a new connection.

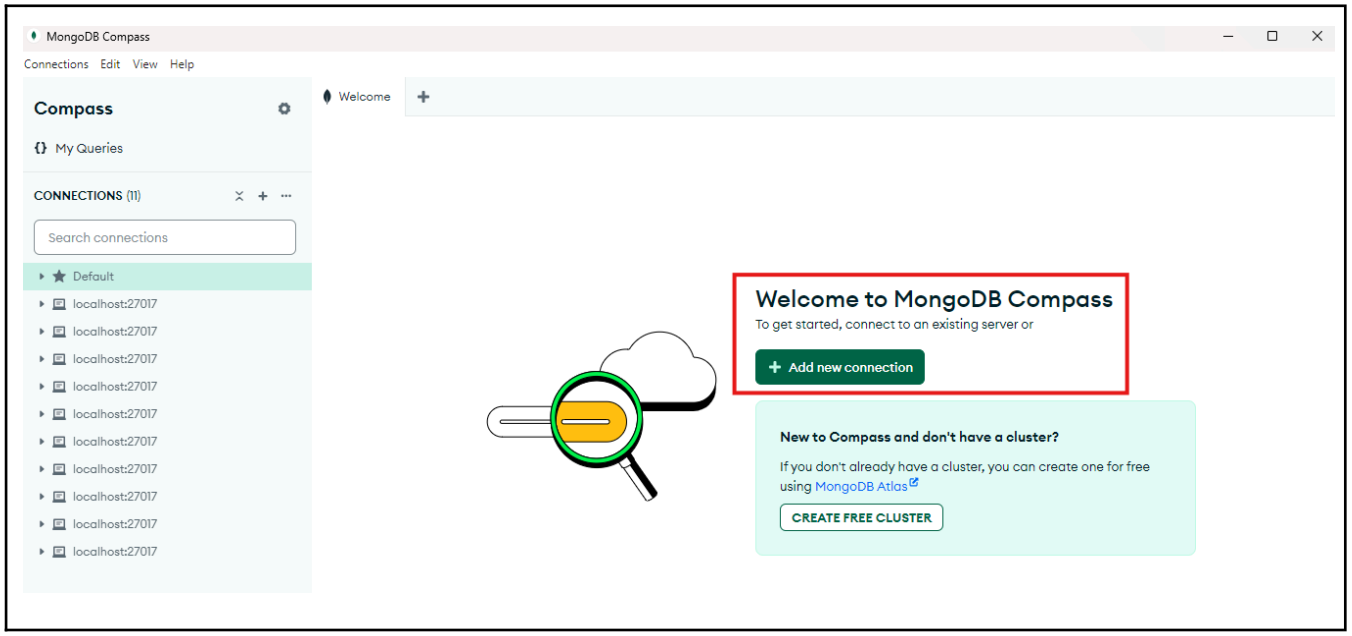


Table 2.1.3.1. Screenshots of the MongoDB Compass with annotation.

2. Using the default MongoDB URI connection string, enter the desired name for the MongoDB Database Server.

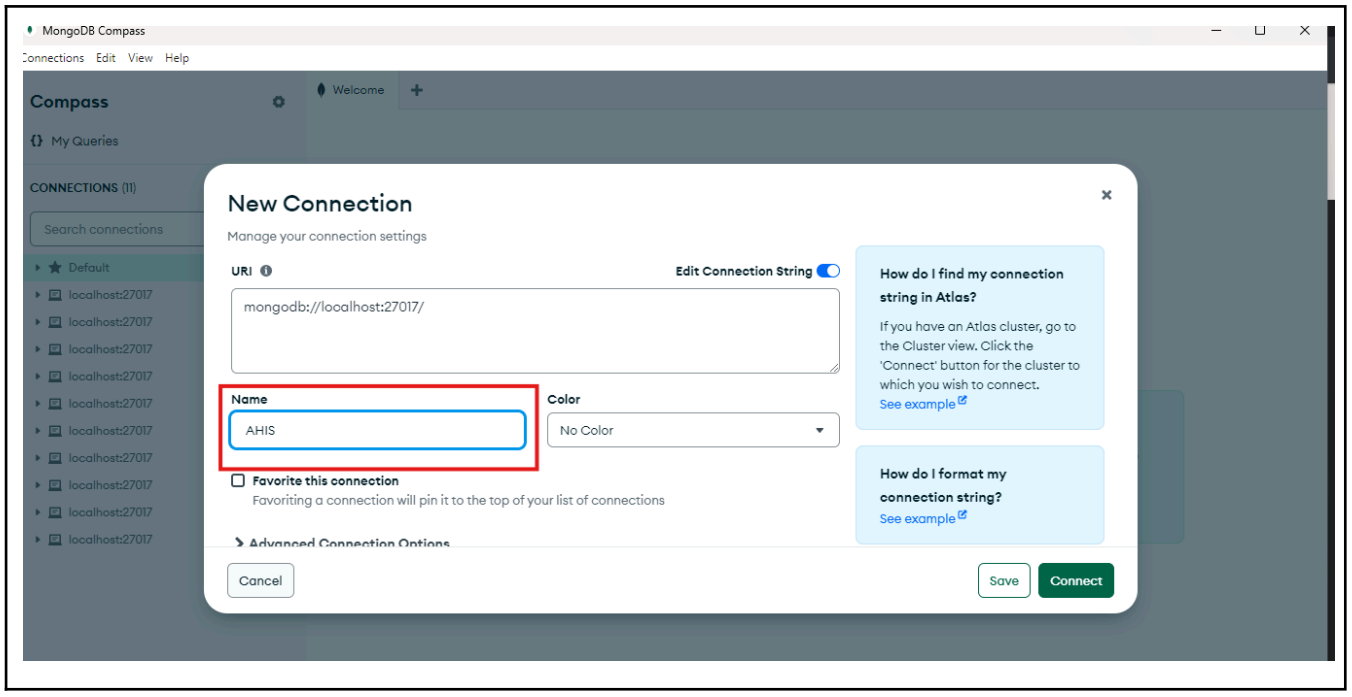


Table 2.1.3.2. Screenshots of the MongoDB Compass with annotation.

3. Upon successful connection:
    1. Select a database, named HeathInformationDB.
    2. Select a collection, named roles.
    3. Select import data to import roles data from HealthInformationDB.roles.csv file in DatabaseSetUp folder.

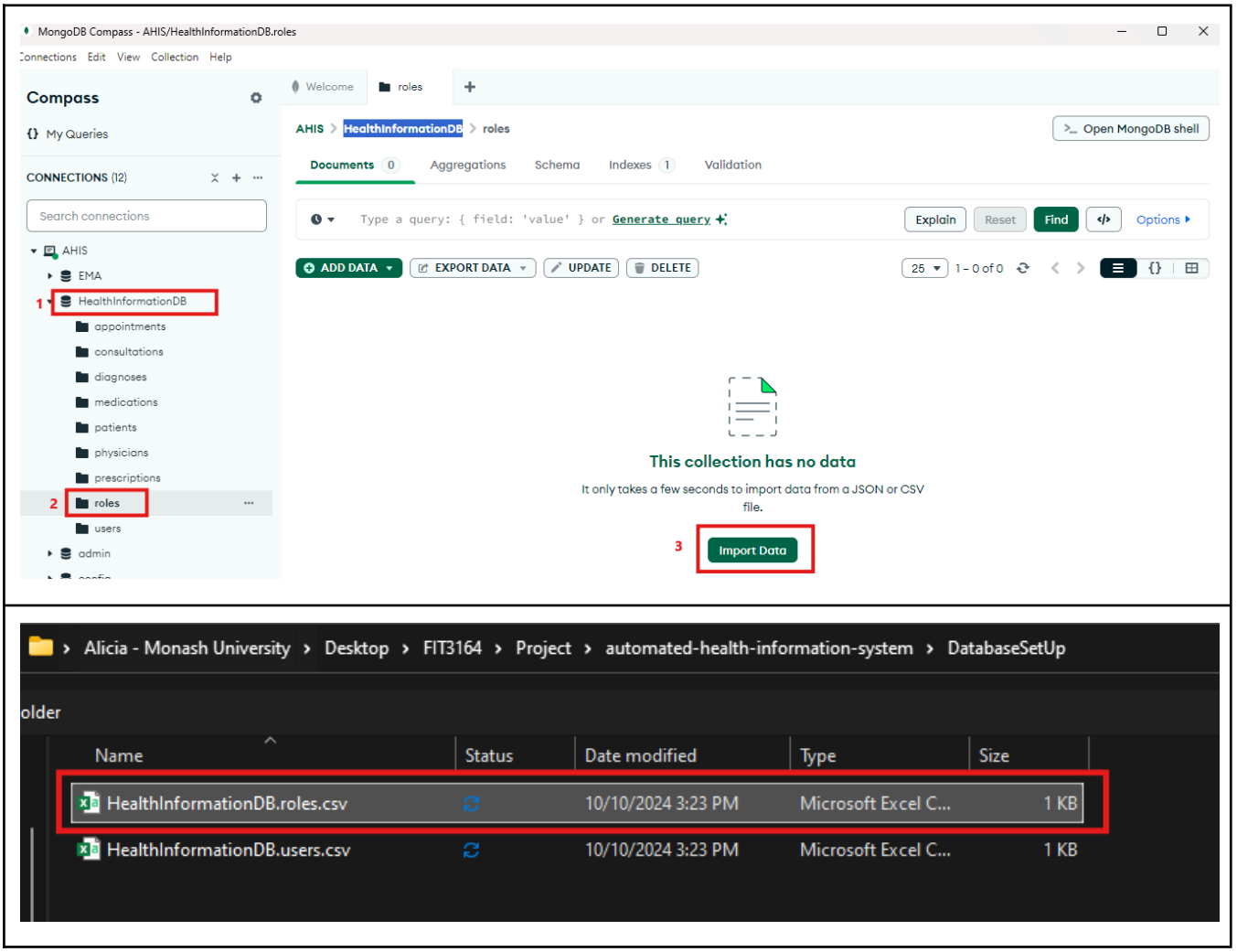


Table 2.1.3.3. Screenshots of the MongoDB Compass and file explorer with annotation.

4. If imported successfully;
    1. Popup confirmation message will appear.
    2. Roles collection will be populated with role data.

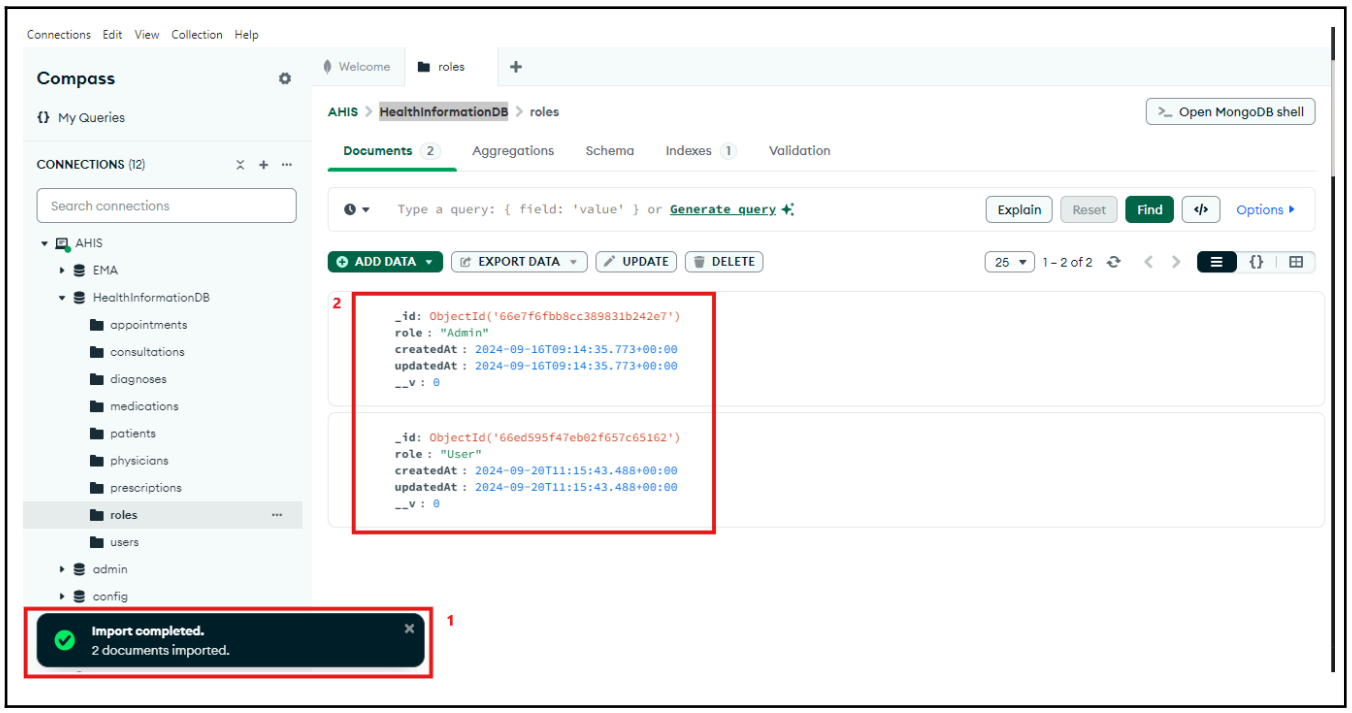
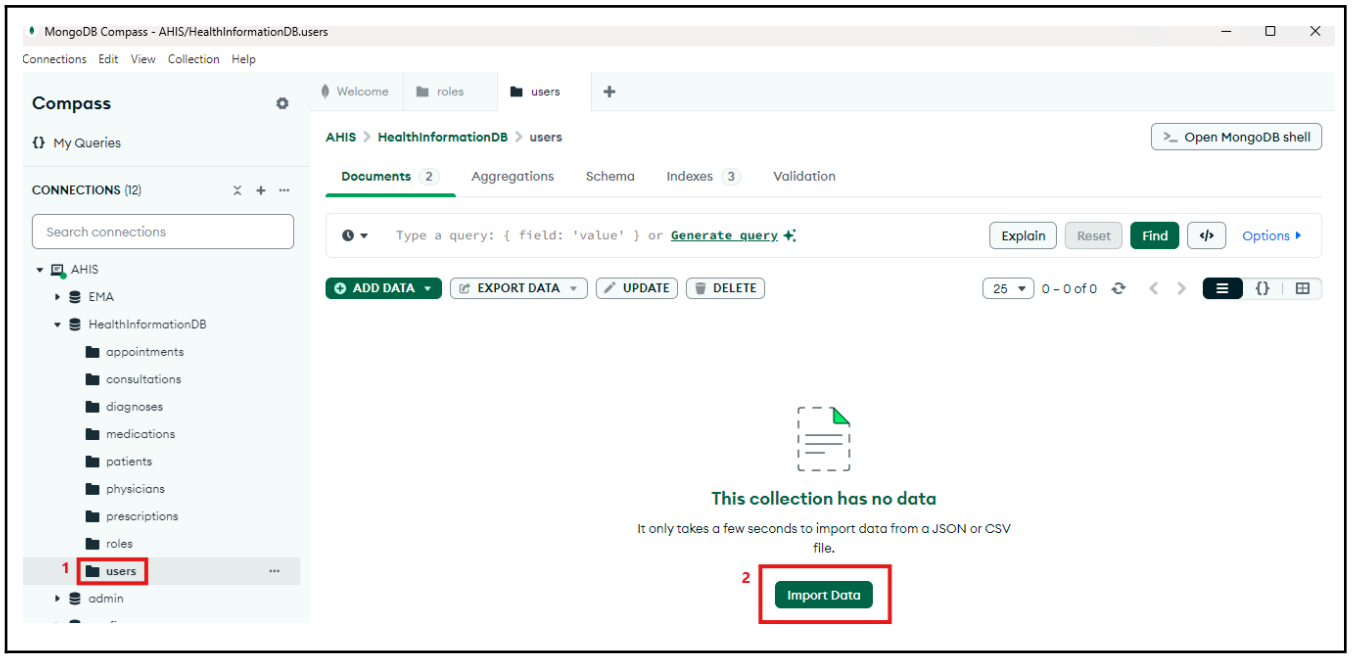


Table 2.1.3.4. Screenshots of the MongoDB Compass with annotation.

5. Same goes for importing users data from HealthInformationDB.users.csv file in DatabaseSetUp folder.
    1. Select a collection, named users.
    2. Select import data to import users data from HealthInformationDB.users.csv file in DatabaseSetUp folder.



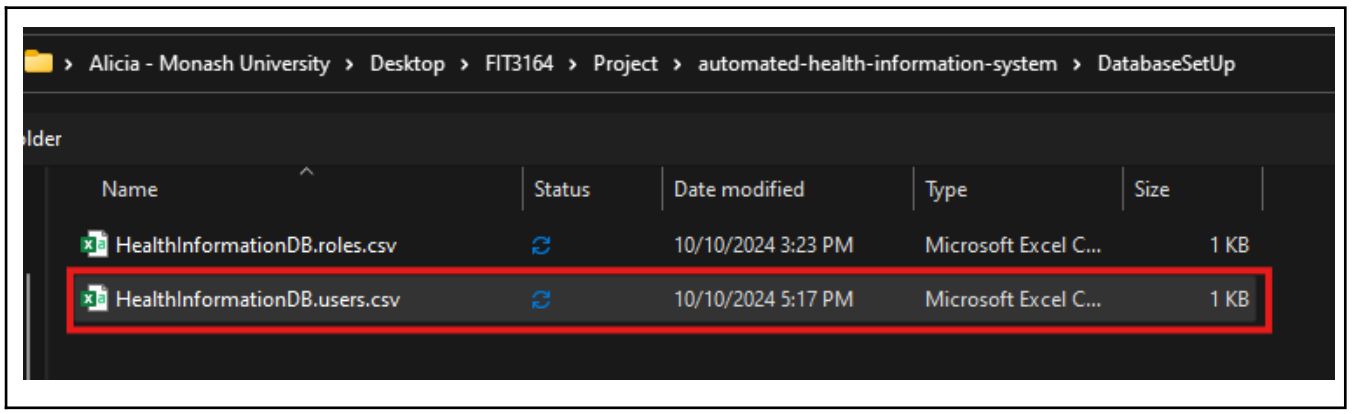


Table 2.1.3.5. Screenshots of the MongoDB Compass and file explorer with annotation.

6. If imported successfully;
    1. Popup confirmation message will appear.
    2. Users collection will be populated with user data.

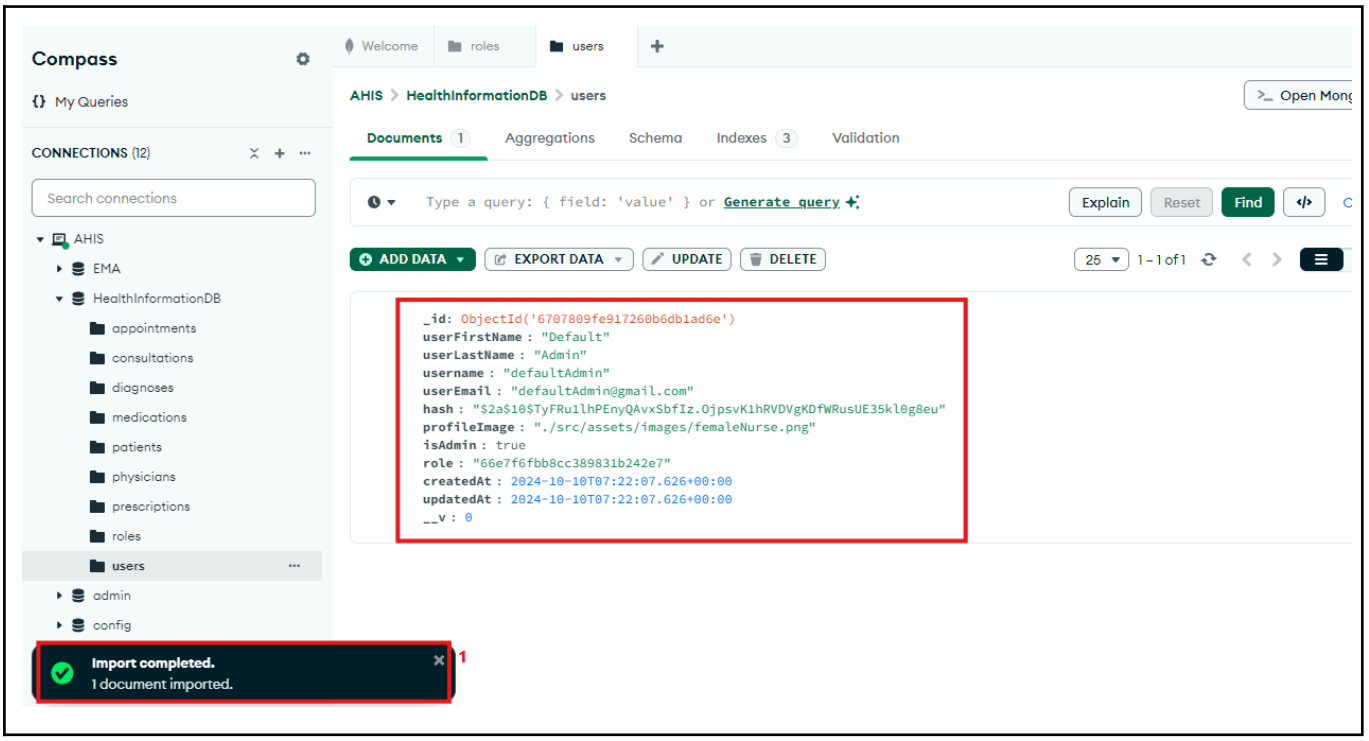


Table 2.1.3.6. Screenshots of the MongoDB Compass with annotation.

7. Once done, proceed to setting up accounts as guided in 2.1.4. Set up User Accounts.

2.1.4. Set up User Accounts

Before proceeding to use the automated health information system, user accounts need to be set up. In the system, there are two main account roles that can be assigned to users in the system, which are administrator and normal user. Both roles have the same capabilities to access the system core functionalities. The difference between these roles is that the administrator has the capability to

access the register user page to create an account, while normal users can not access the register user page.

Below outline the procedure needed to create an administrator or user account.

1. In the browser, access the system through this URL: http://localhost:8080/home#, where you will be greeted with the system login page.

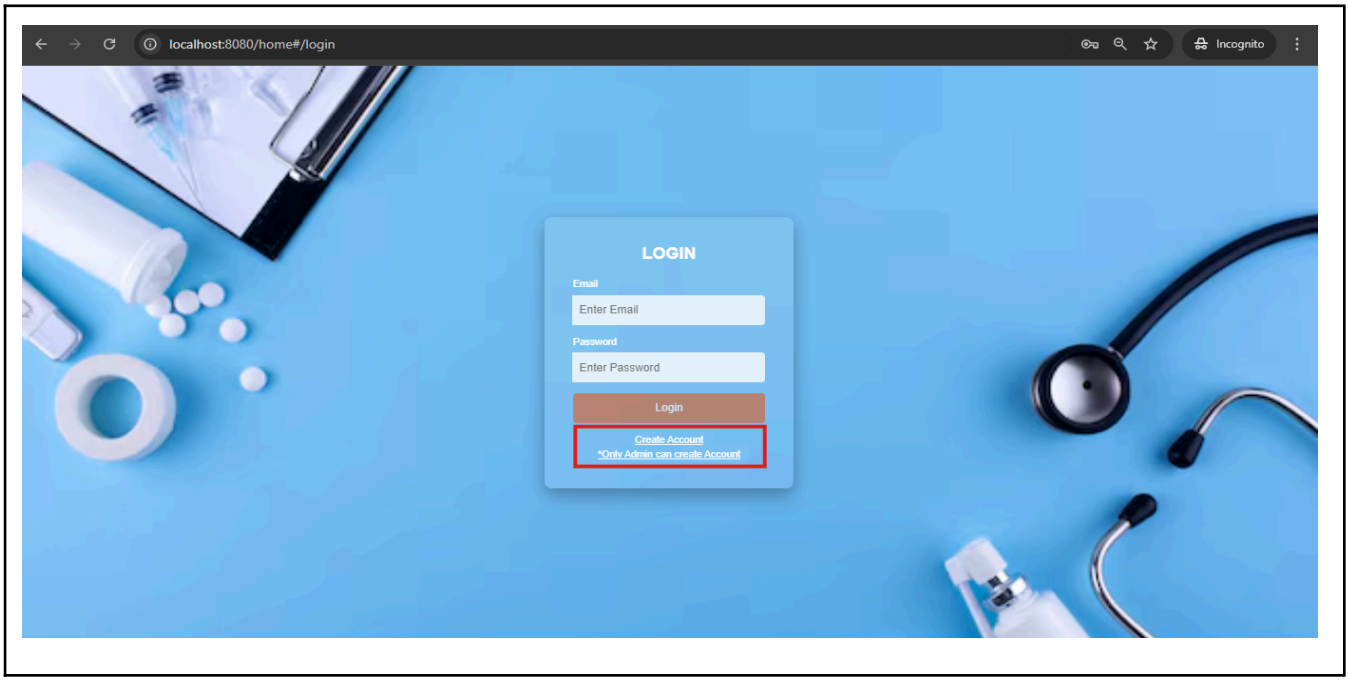


Table 2.1.4.1. Screenshots of the login page with annotation.

Note in the image above, only the administrator has the access to view the register account page and the power to create an account.

2. As a system administrator, click on the 'Create Account' link. This will send you to an administrator authentication page, where you will need to authenticate yourself that you are an authorized administrator.

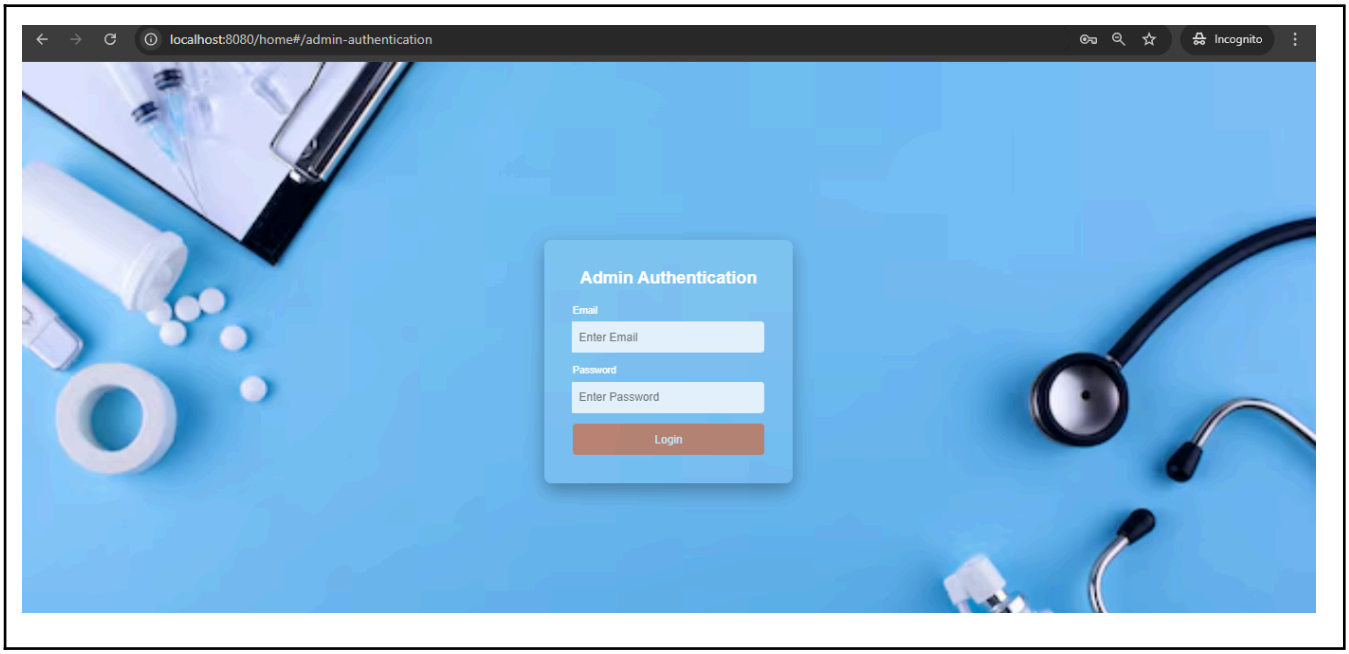


Table 2.1.4.2. Screenshots of the admin authentication page.

However, if you are a new system administrator with no created administrator account, you can enter the default password: 54321 and default email address that can be found in the MongoDB Compass User Database. This default admin account can be removed once an actual administrator account is created.

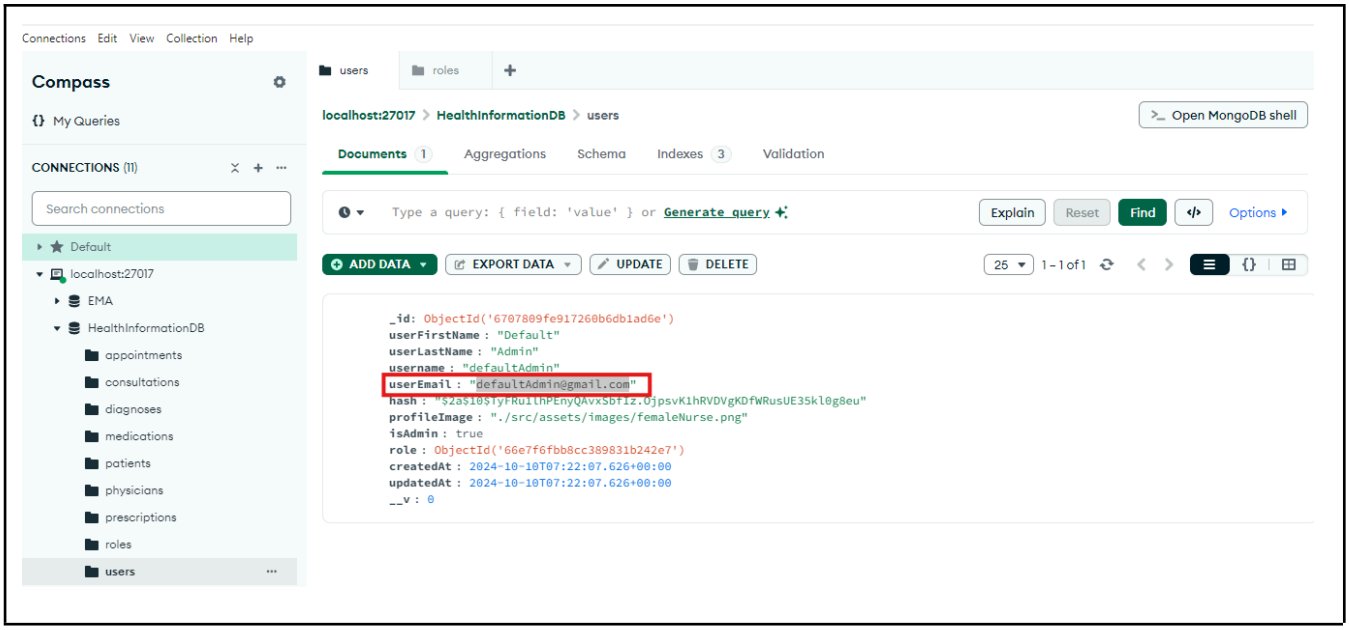


Table 2.1.4.3. Screenshots of the MongoDB Compass with annotation.

3. Once the authentication form is filled, the 'Login' button will be enabled to click. Upon successful administrator authentication, you will be greeted with a popup success confirmation message, else a popup failed confirmation message will appear.

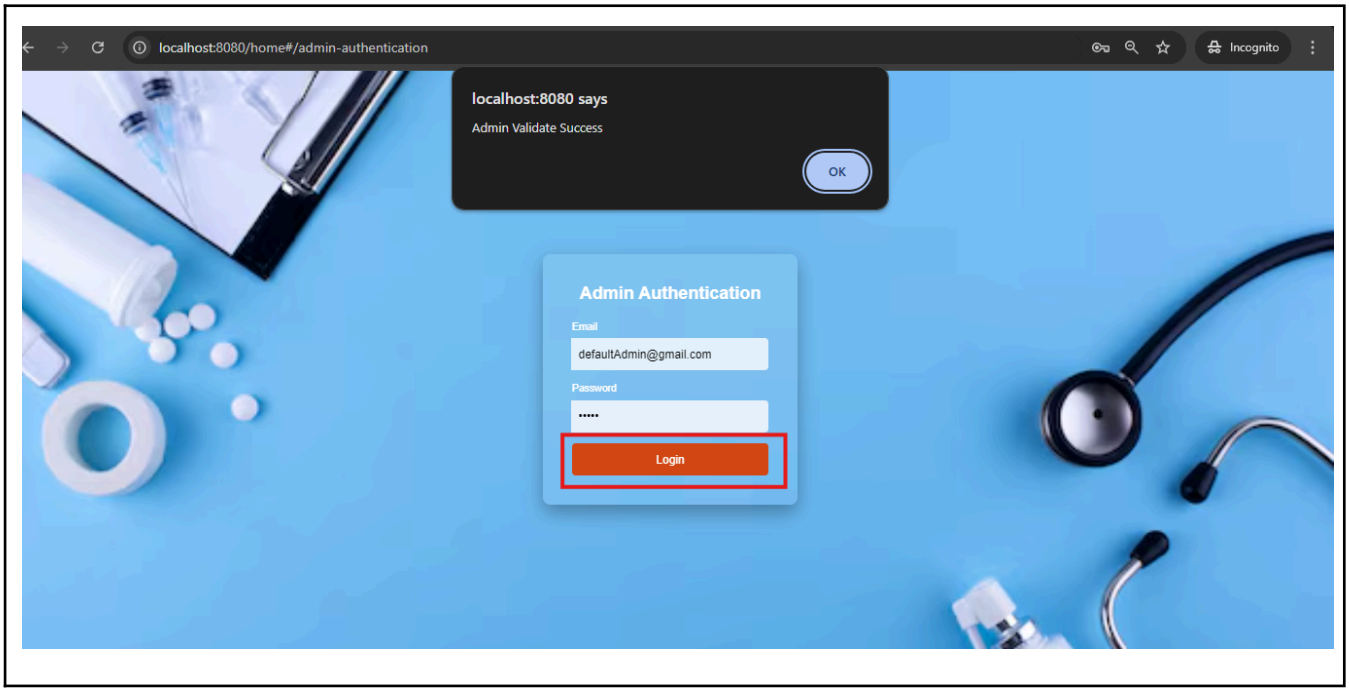


Table 2.1.4.4. Screenshots of authentication page with popup success confirmation message.

4. It will then lead you to a register account page where you will be able to create an administrator or a user account by assigning the role in the 'Assigned Role' field accordingly.

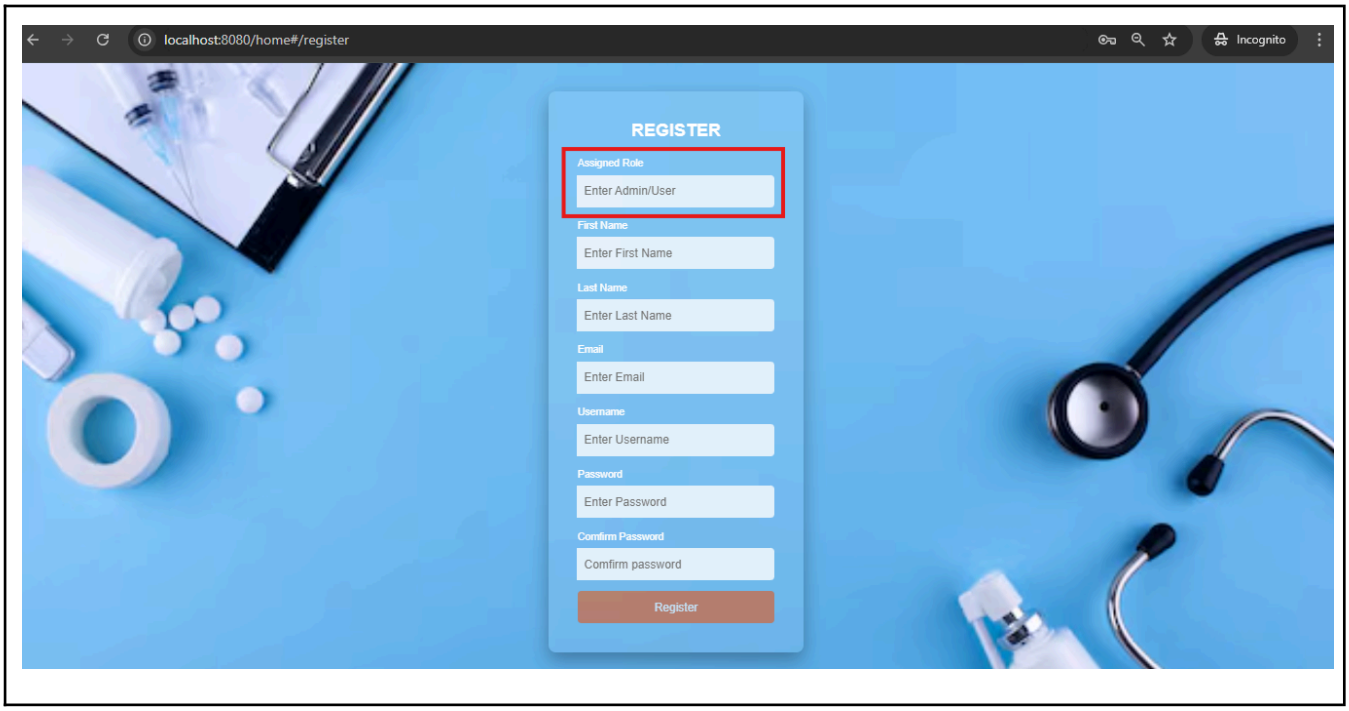


Table 2.1.4.5. Screenshots of register page with annotation.

5. Once the register form is filled, the 'Register' button will be enabled to click. A popup confirmation message will be displayed once the account is created.

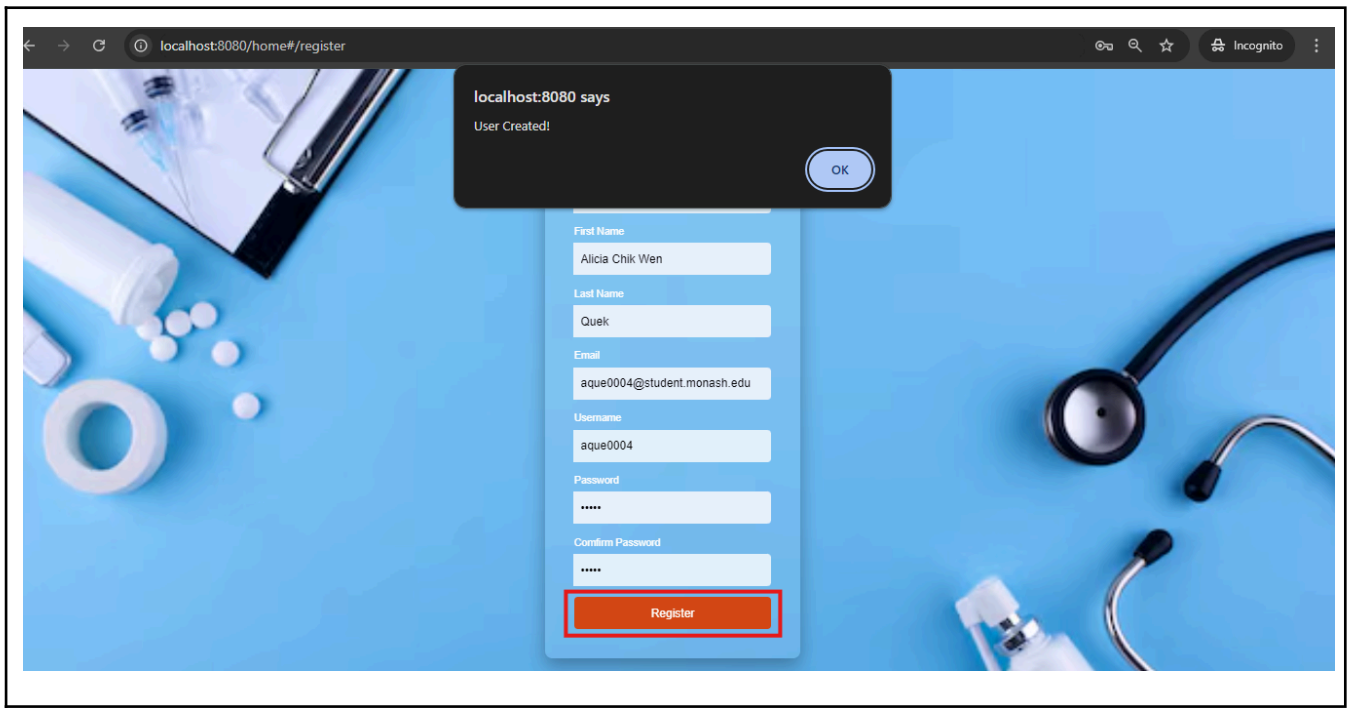


Table 2.1.4.6. Screenshots of register page with popup confirmation message.

2.1.5. Troubleshooting

1. **Verify Installed Dependencies**: Users should ensure all dependencies for the web application are installed correctly and are also up-to-date. Dependencies are essential to the web application as they consist of libraries and frameworks that your software needs in order to work properly.

2. **Check Console Errors**: The web application has to be built before being able to execute. Therefore, if the web application cannot be accessed because the building process failed, the user should seek assistance from a technical expert to review error messages in the terminal, browser console, or server logs for identifying problems in the building process. The technical expert can review the build process for any errors or warnings that might indicate issues and solve it accordingly.

3. **Check MongoDB Connection**: It should be known that the web application relies heavily on the connection to the MongoDB database to send data to the database for safe storage so if by any chance the application would not run after building then the user might need to check if the web application is correctly connected to MongoDB.

4. **Clear Irrelevant Cache**: Users can opt to clear the browser cache and cookies to ensure the latest version of the application is being served when the web application is loaded. Cached files and cookies have the potential to retain obsolete data, resulting in the browser loading a previous version. Clearing cache will force the browser to fetch fresh, up-to-date content from the server, solving display or functionality issues caused by old data.

5. **Verify Devices' Execution Policy**: If users were to encounter `FullyQualifiedErrorId : UnauthorizedAccess` error when executing the web application, users can opt to run any terminals

like Command Prompt and Windows PowerShell as Administrator and run the following line to change the execution policy: `Set-ExecutionPolicy RemoteSigned -Scope CurrentUser` to allow local scripts to be executed without issues.

2.2. HTR and ICROP Model

2.2.1. Install Dependencies and Set up Model Configurations

After installing python version 3.8, it is essential to ensure that all the required dependencies for the HTR and ICROP models are installed. This can be done by running the following commands in your terminal or Visual Studio Code (VSC) environment.

Below outline the procedure needed to install the necessary dependencies for the HTR model.

1. Open your Visual Studio Code (or terminal).
2. Click on 'Open Folder' and open where you have stored in your desired location mentioned in 2.2.1 step 2.
3. Open the terminal in VSC by navigating to 'Terminal".

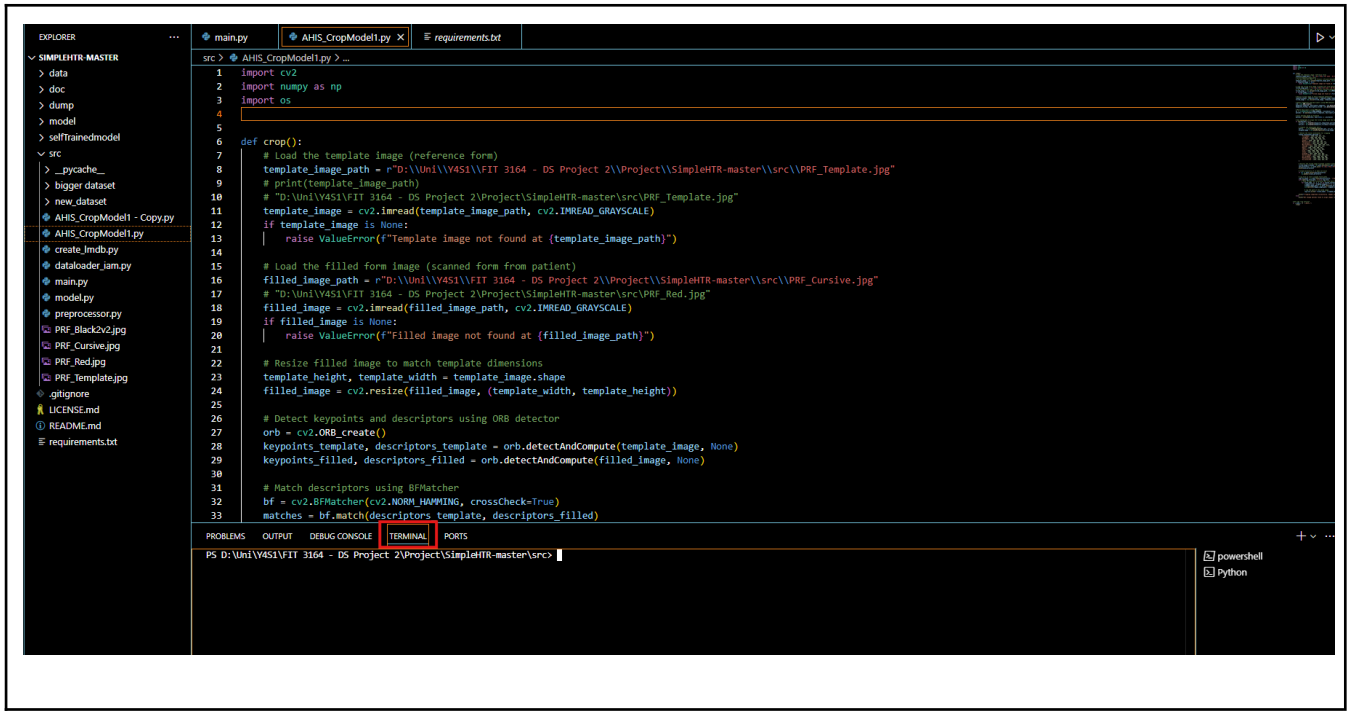


Table 2.2.1.1. Screenshots of the terminal tab in VSC.

4. For HTR model - Use pip to install all required packages for the HTR model. Below are the following required packages for the HTR model. Repeat pip install for all other required packages.

```
editdistance==0.5.2
lmdb==1.0.0
matplotlib==3.2.1
numpy==1.19.5
opencv-python==4.4.0.46
path==15.0.0
tensorflow==2.4.0
```

Table 2.2.1.2. Screenshots of the requirement for HTR model

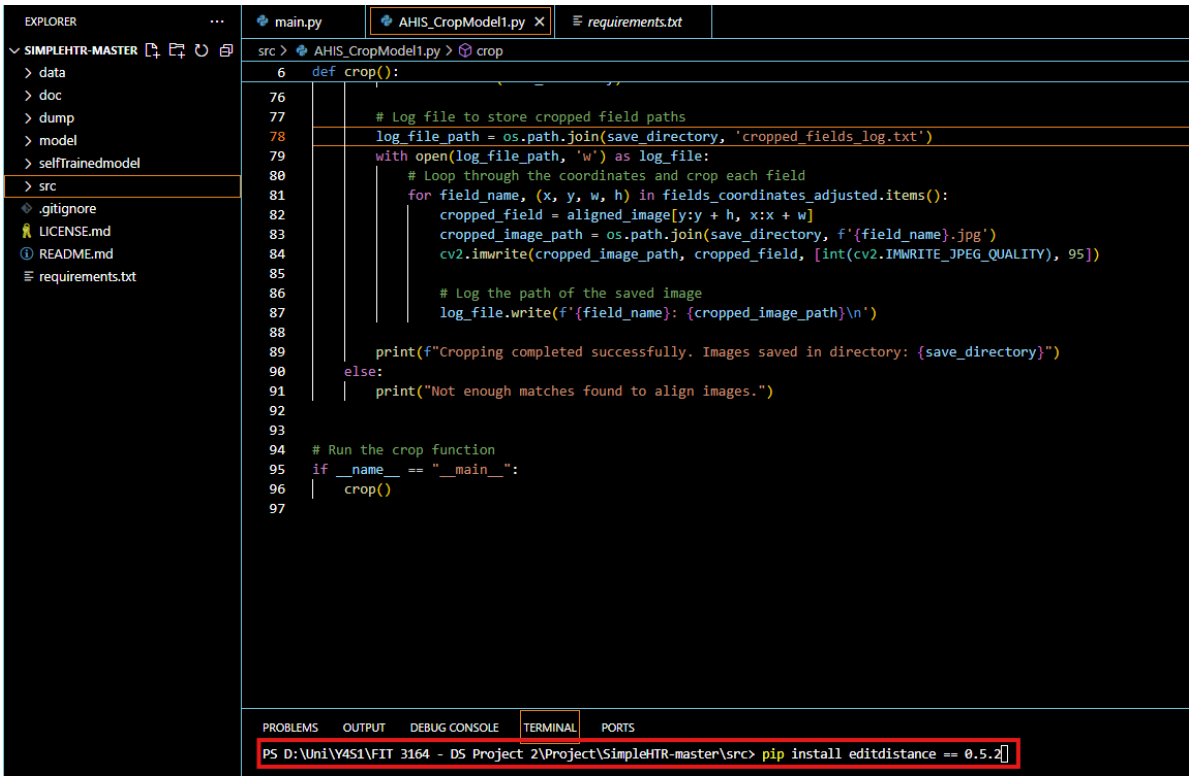


Table 2.2.1.3. Screenshots of the installation packages for the HTR model.

Note: Long path must be enabled when installing path 15.0.0. Follow this link to youtube on how to do it.

5. For ICROP model -pip install required packages opencv-python, numpy and os for the ICROP model. The latest version of these packages are sufficient for the ICROP model to run.

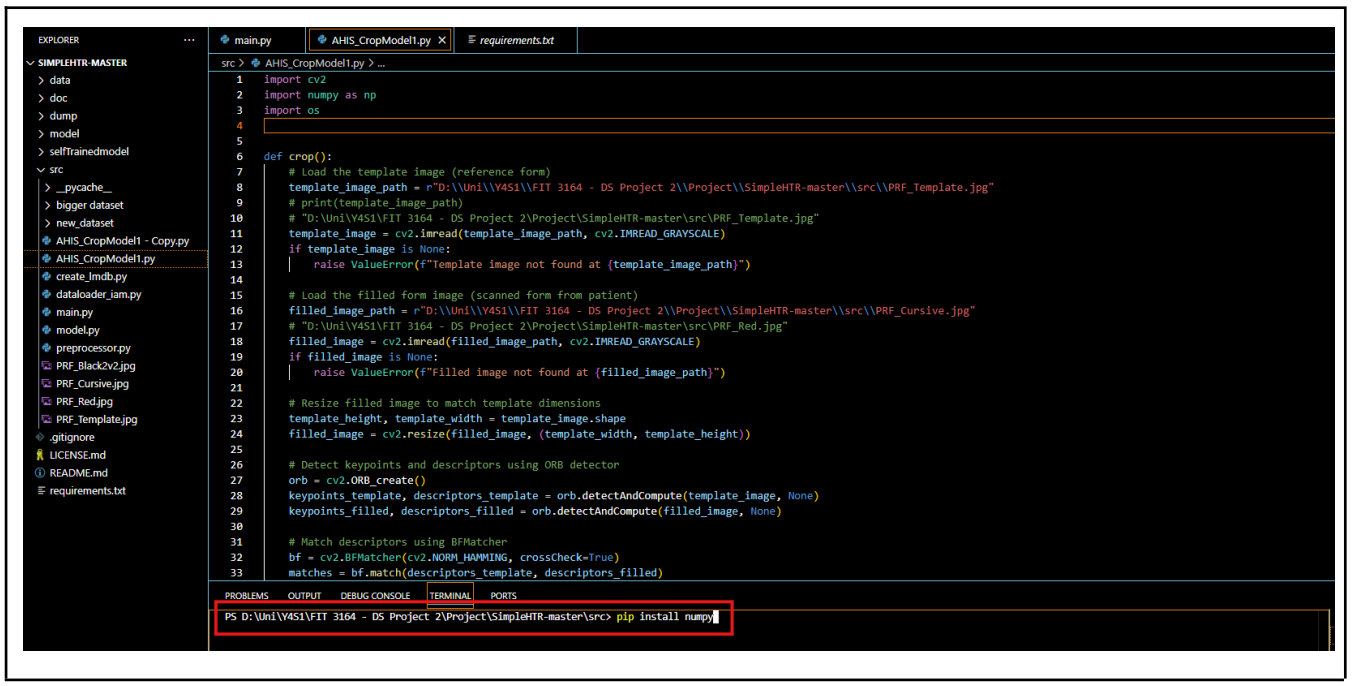


Table 2.2.1.4. Screenshots of the installation packages for the ICROP model.

6. Verify installation of all required packages. Ensure that all the required packages are listed, and their versions match the specified requirements for the HTR and ICROP models.

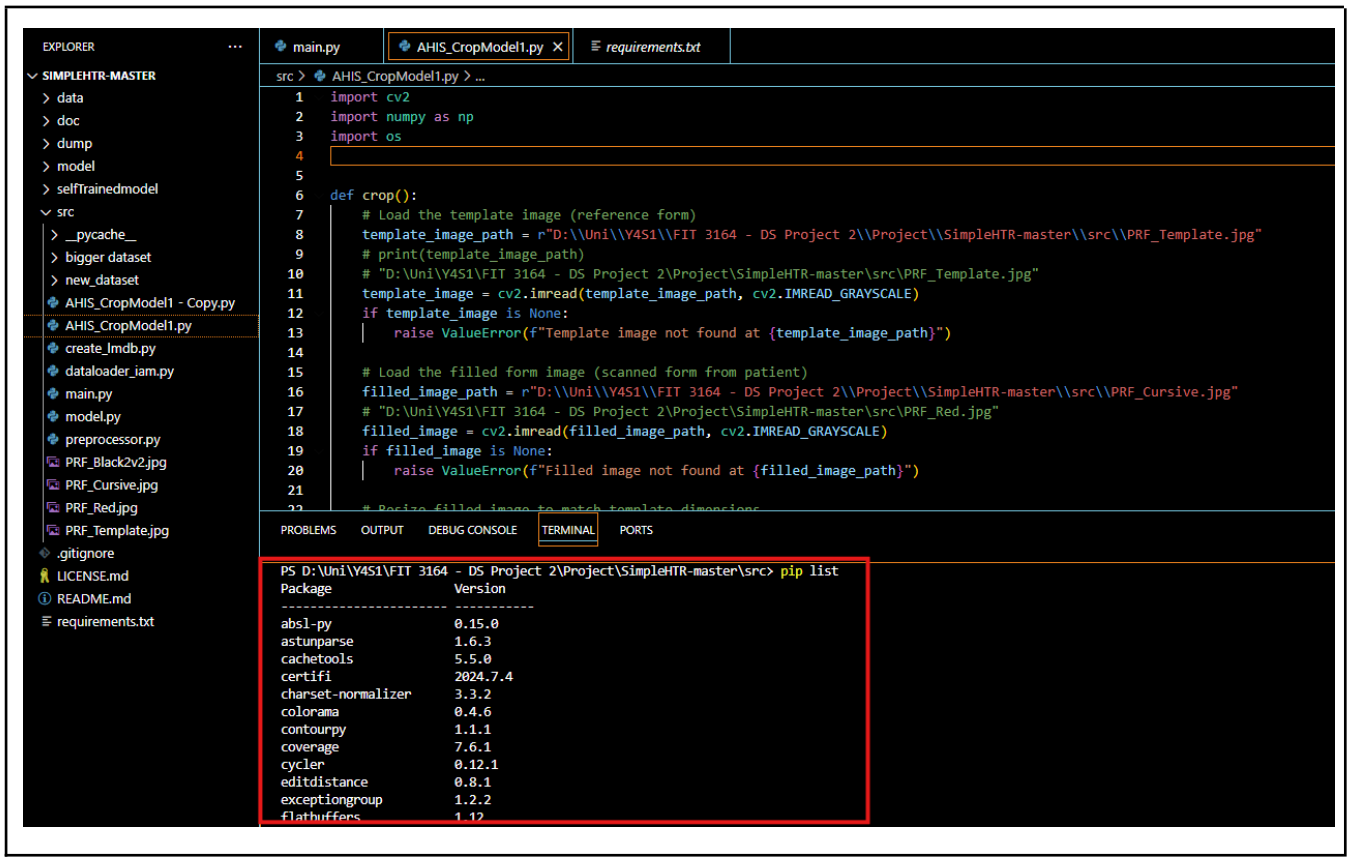


Table 2.2.1.5. Screenshots of the list of packages for the HTR and ICROP model.

2.2.2. Run ICROP Model

The ICROP model is already integrated into the web-based system providing a streamlined experience for users. However, if you want to run the ICROP model independently, you can follow these steps:

1. Open Visual Studio Code (VSC)
2. Navigate to the folder where the ICROP model is stored. Open the 'AHIS_CropModel1.py' python file.
3. Ensure that the path to the form template exists and is correct.

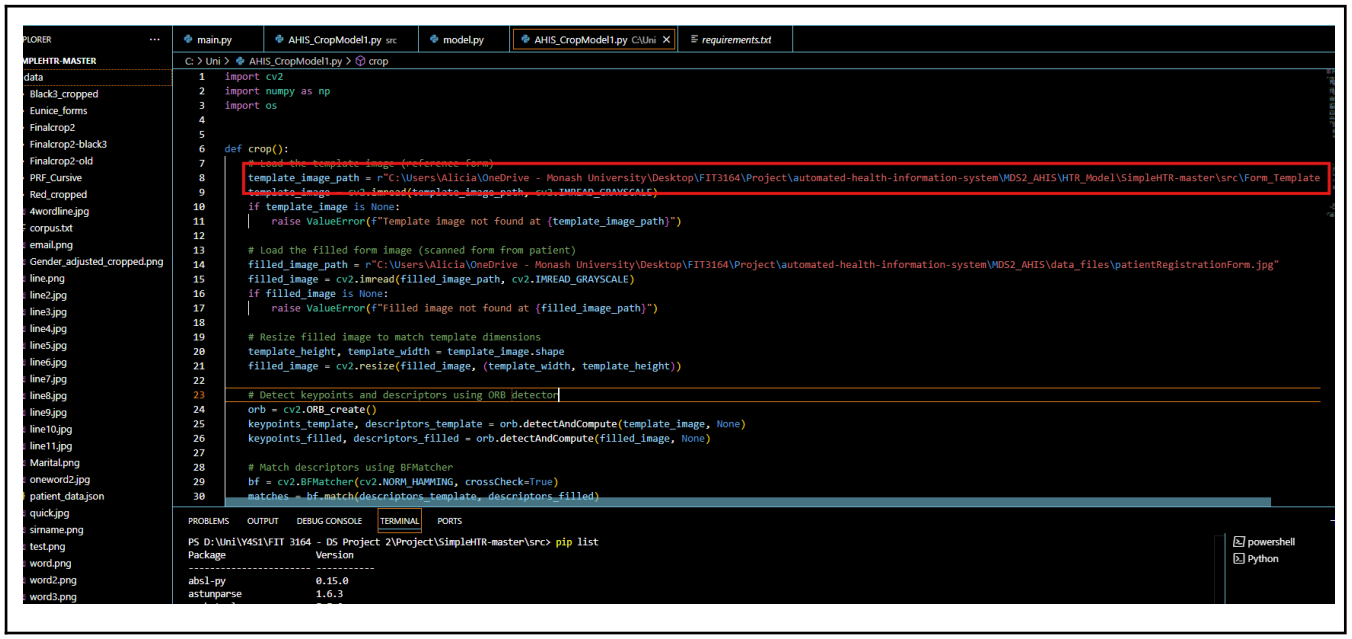


Table 2.2.2.1. Screenshots of the template path for the ICROP model.

4. Ensure that the path to the form that you want to crop.

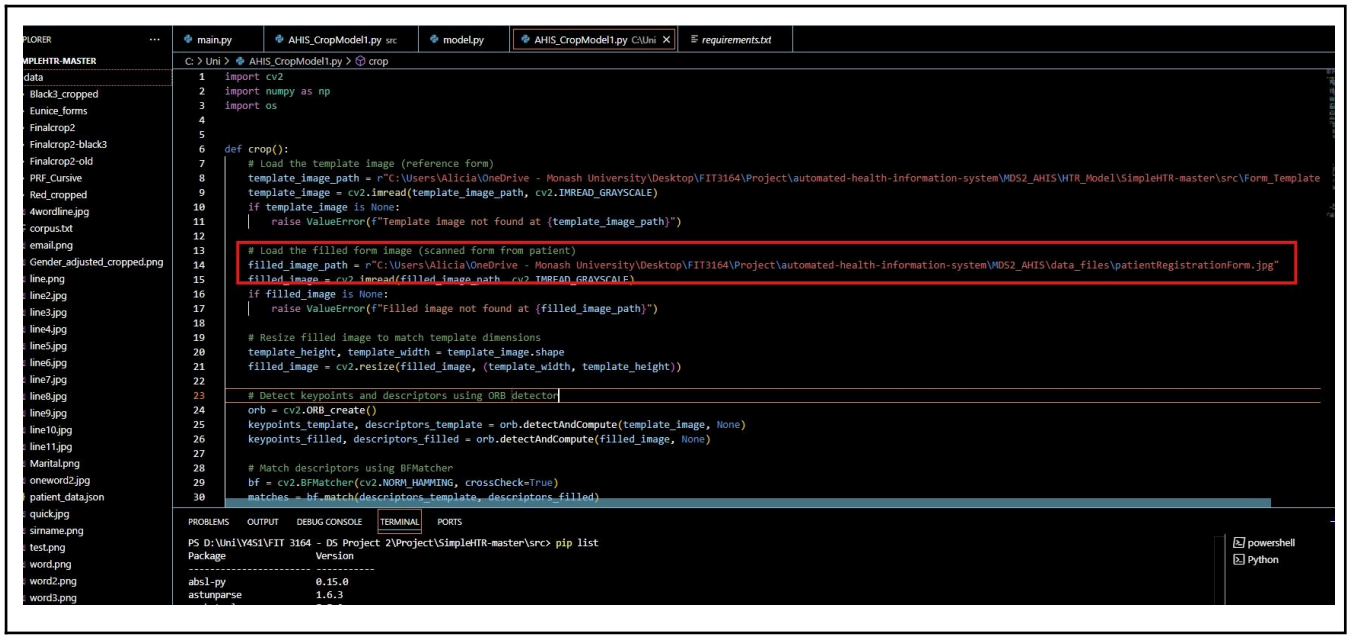


Table 2.2.2.2. Screenshots of the filled form path for the ICROP model.

5. Ensure that the path to cropped images is to the crop_images folder.

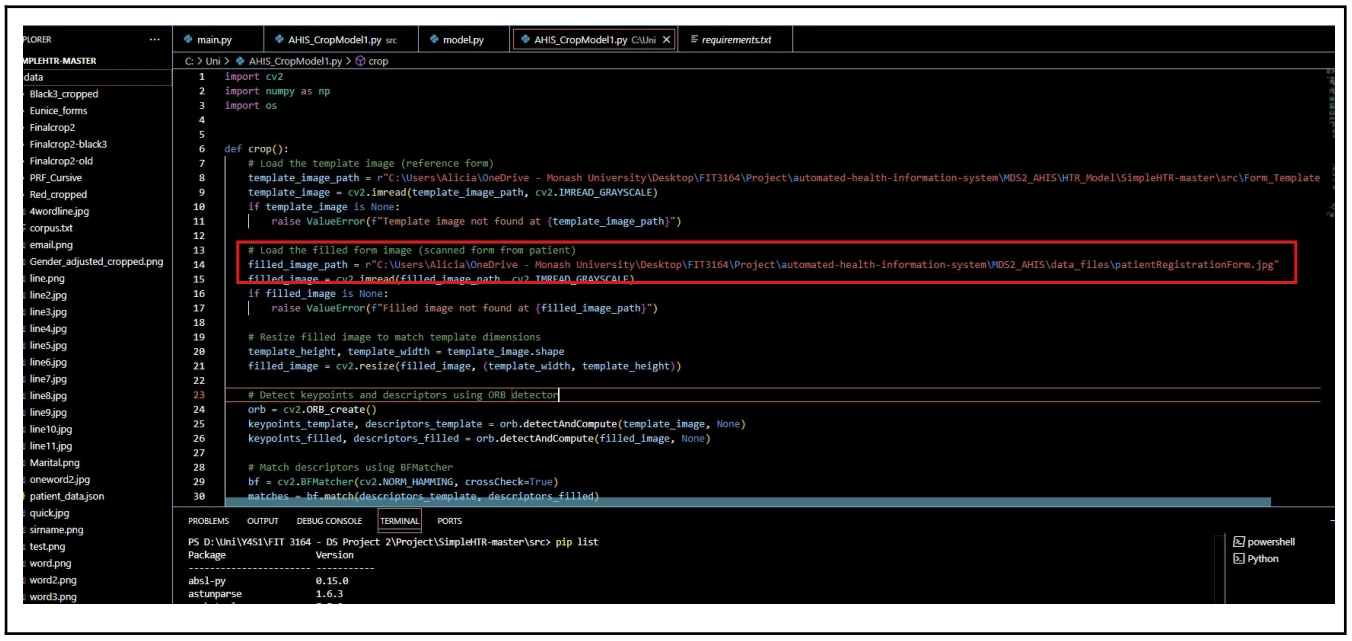


Table 2.2.2.3. Screenshots of crop_images path for the ICROP model.

6. Run the AHIS_CroppedModel1.py file.
7. A number of jpg files will be stored in the crop_images folder.

Table 2.2.2.4. Screenshots of cropped images with their respective names in crop_images folder

2.2.3. Run HTR Model

The HTR is already integrated into the web-based system allowing seamless interaction through the web interface. However, if you wish to run the HTR model independently, follow the steps below:

1. Open Visual Studio Code (VSC)
2. Navigate to the folder where the HTR model is stored.
3. Open the “data files” folder. Ensure that the image you want the HTR to run is present in the crop_images folder.

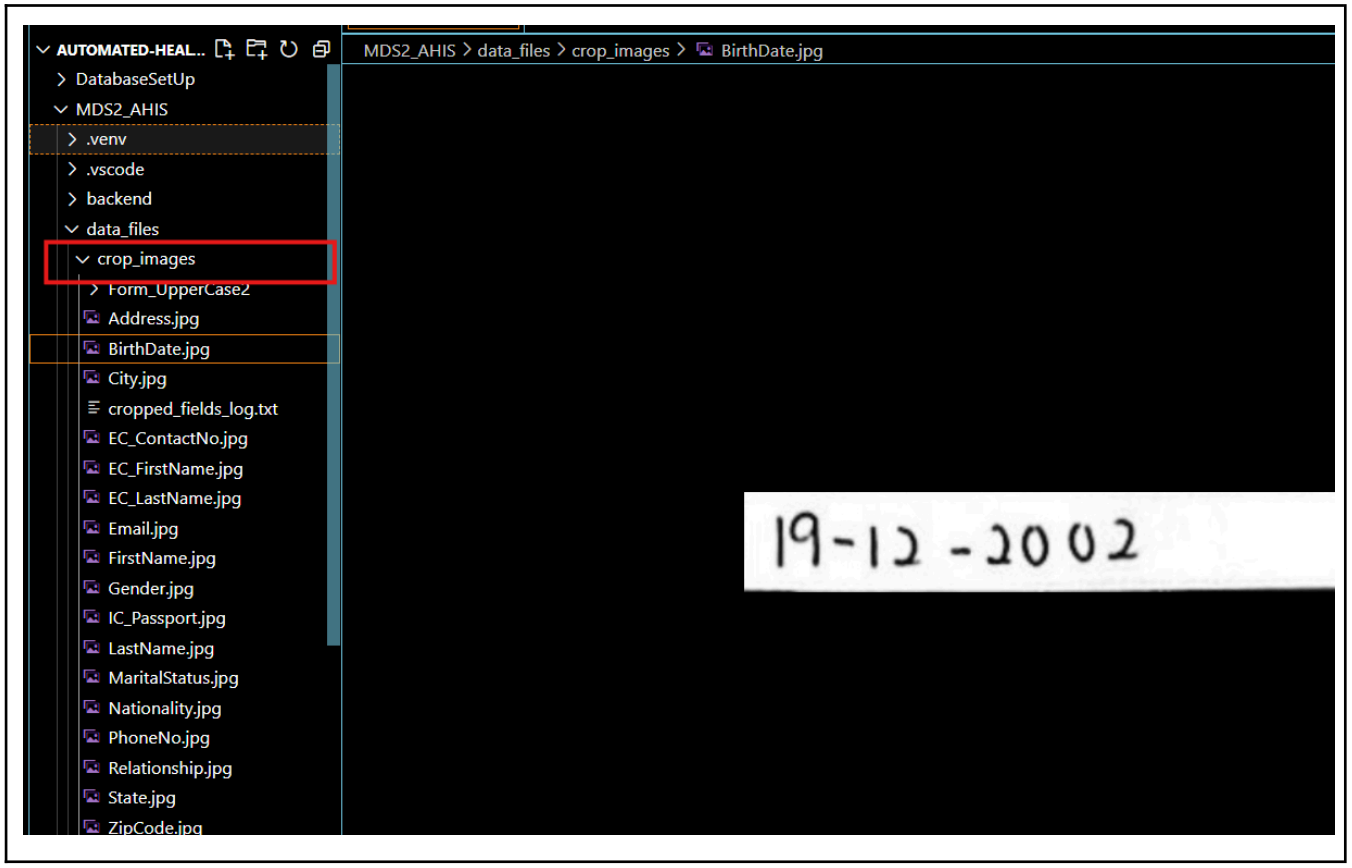


Table 2.2.3.1. Screenshots of the crop_images folder containing images for the HTR model.

4. Run the python file either by terminal or pressing the run button on the top right in VSC.

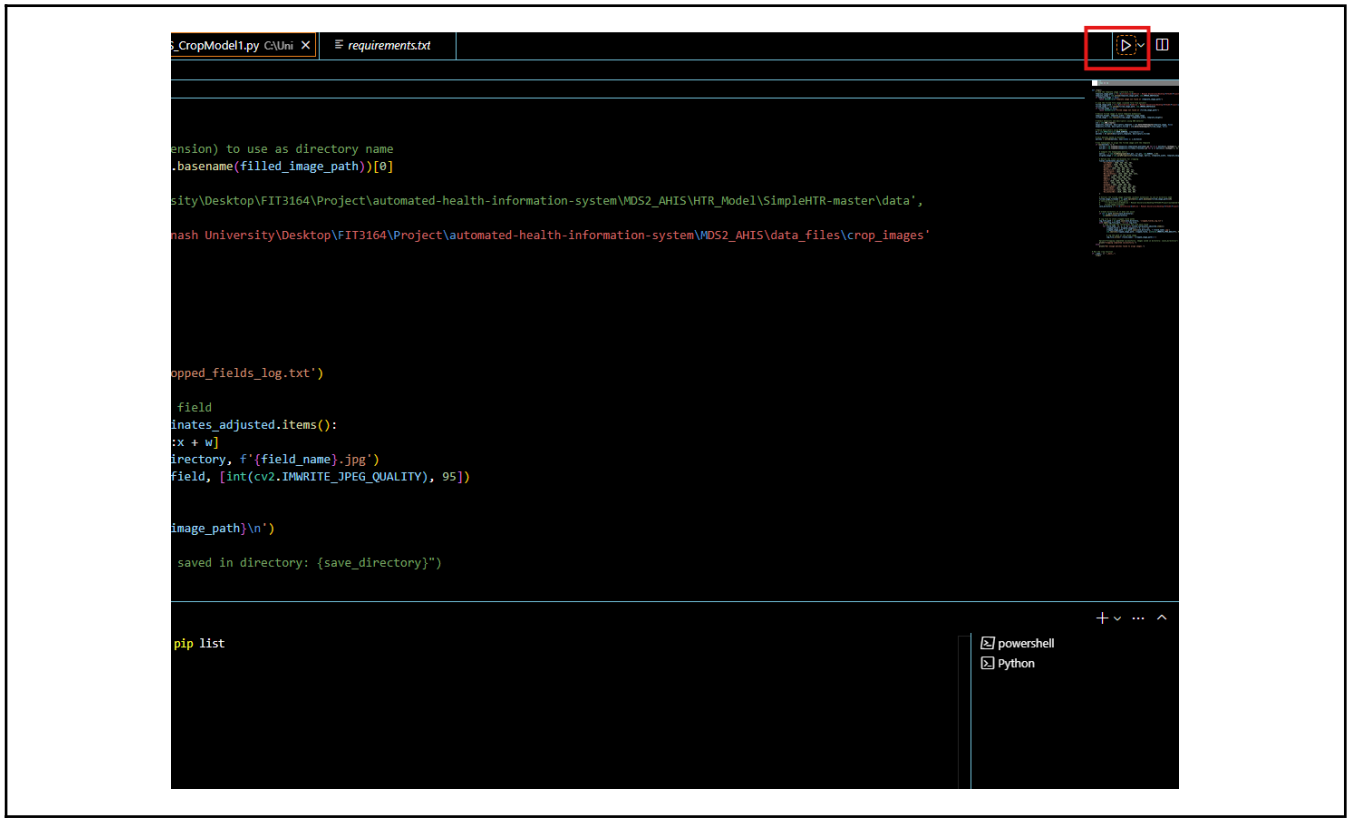


Table 2.2.3.2. Screenshots of the run button in VSC.

5. A “patient_data.json” file is created to store the patient data of the HTR model results. Open the json file to see the results.

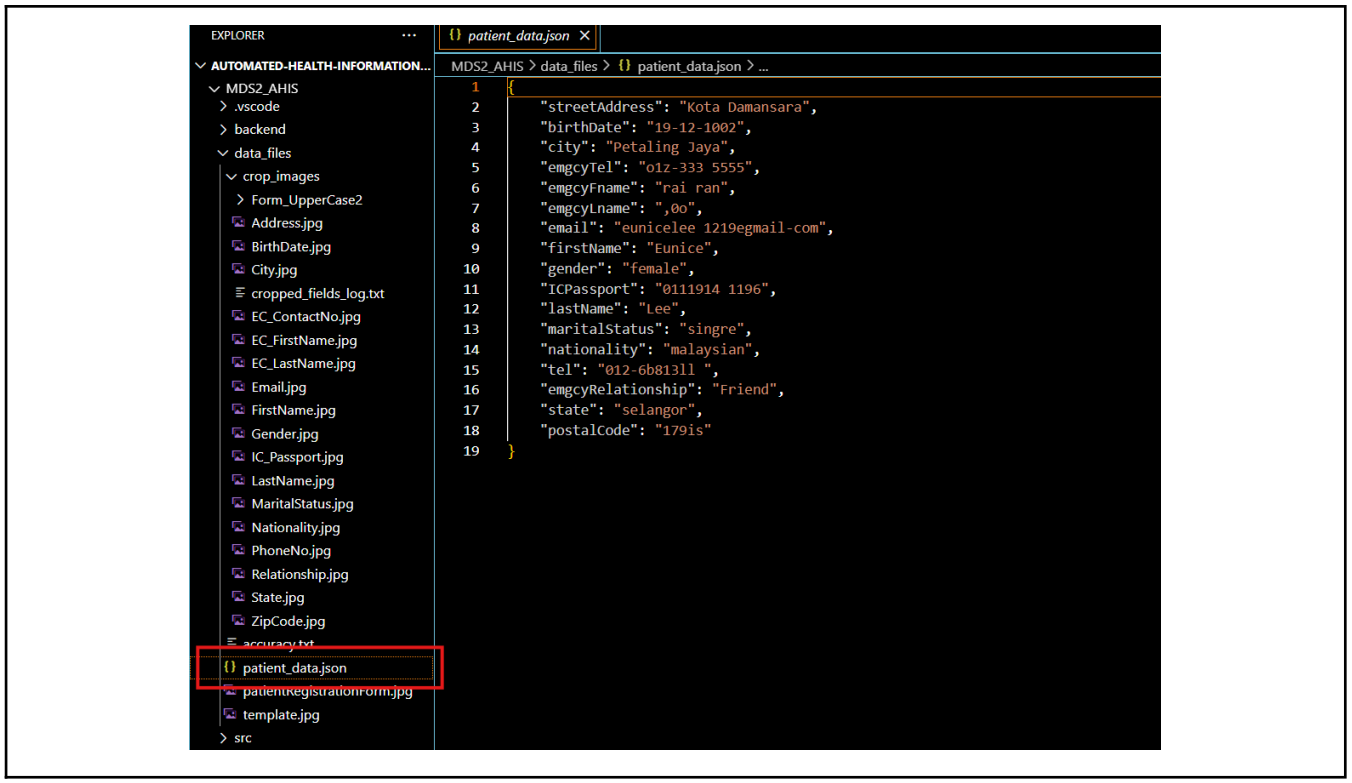


Table 2.2.3.3. Screenshots of the patient_data.json file containing results recognized by the HTR model.

2.2.4. Software Limitations and Restriction

1. **Performance Variation:**

   The performance of the HTR and ICROP models can vary significantly based on the quality and clarity of the input images. If the images are poorly lit, blurred or have low resolution, the models may struggle to accurately recognize text or execute cropping tasks. Therefore, users should ensure that the images fed into the system are of high quality to achieve optimal results. Additionally, users should consider factors such as background noise or distracting elements in the image as these can further complicate the models' ability to deliver accurate outputs.

2. **System Configuration Requirements:**

   Both the HTR and ICROP models require specific system configurations and dependencies to function correctly. Any deviations or changes made to the environment such as updates to operating systems, libraries or frameworks may adversely affect the models' performance. Users must ensure that their systems are properly configured and maintain the specified dependencies to prevent any disruptions in functionality. Additionally, it is advisable for users to document their configuration settings and maintain a backup of previous versions to facilitate troubleshooting in case of any issues that may arise.

3. **Complex Layout Limitations:**

   The HTR and ICROP models may encounter difficulties when dealing with highly complex layouts or forms that feature overlapping text. In scenarios where text is densely packed or arranged in unconventional patterns, the models may not perform as effectively resulting in potential inaccuracies. Users should be cautious when using the models for documents with intricate layouts, as they might not achieve the desired output in such cases. Furthermore, the presence of graphical elements or non-textual components in the layout can further complicate the recognition process and lead to degraded performance.

4. **Resource Limitations**:

The software's performance can be significantly influenced by the hardware specifications of the machine on which it runs. This makes resource limitations a critical consideration for users. Those operating on machines with limited system resources may encounter slower processing times or reduced responsiveness particularly when handling large amounts of image files. This performance degradation can impact user experience and hinder the efficiency of workflows especially in scenarios where quick data retrieval and processing are essential.

5. **Limited Input Formats**:

   The HTR model is specifically designed to work primarily with certain image formats such as JPG, JPEG and PNG which are widely used for their compatibility and quality. Users should ensure that their input images conform to these formats to prevent errors during processing as unsupported formats can lead to failed operations or inaccurate results. In addition to adhering to the required image formats, users must also ensure that the ICROP model receives forms that are properly formatted. If the input forms do not meet the expected formatting standards, the cropping results may not align with user intentions that leads to potential inaccuracies or omissions in the final output.