Software Requirements Specification

Version 1.0

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Interactive Patient Information management System (IPIMS)

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CSE 360 Introduction to Software Engineering

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1.0 Introduction

1.1 Purpose

The purpose of this document is to present a detailed description of the Medical Information System. It will explain the purpose, features, interfaces, constraints, and specifications of the system. Also the required reaction to external input will be documented. This document is intended for developers and stakeholders of the system for their understanding and awareness of the project.

1.2 Scope of Project

The software system will be a Medical Information System for patients and healthcare staff. The system will be designed to minimize the time needed to access, update, and create information regarding medical treatment and care. The system will replace manual tasks of data entry and maximize the efficiency of healthcare staff and increase ease of use for patients.

More specifically, this system will allow healthcare staff to access the medical records of patients and make changes to existing data or create new data entries while bolstering

comprehensibility and organization. The system will offer easy-to-use services to patients that

will increase accessibility to healthcare services without creating unnecessary work loads for

healthcare staff. The system has two main components to implement these functionalities. The

first is a Medical Information Database that holds the medical records and information. The

second is a Medical Information Portal to allow input, update, and creation from multiple

terminals and multiple types of users.

1.3 Glossary

Term	Definition
Actor	Someone who interacts with the software.
Appointment	A scheduled meeting of the Patient and Doctor or Nurse to discuss and address medical issues.
Database	A collection of data that is stored in a central location that can be accessed by this software.
Doctor	A staff member that has the highest qualifications to take care of the patient.
Field	A text box or editable data section that serves as input from a user.
Healthcare Service Provider	An organization of Doctors, Nurses, and other medical staff that provide healthcare services to patients. (HSP)
Healthcare Statistical Report	A report that compiles all the patient information to track various statistics including patient admission rates and patient populations.
Interactive Patient Information Management System	The product this document describes. (IPIMS)
Lab Staff	A member of the lab team that can perform tests and upload results to the lab test database.
Labwork	The documentation of a test performed by the lab staff.
Labwork Request	A document that requests the lab staff perform a test.
Labwork Results	A report that includes the result of a test that has been performed on a patient.
Medical History	The previous medical conditions that are relevant to a patient.
Nurse	A staff member who has most qualifications and can perform most medical functions.

Patient	A member of the general public that is seeking medical care.
Prescription	A document issued by a Doctor as a request for medicine.
Staff	Members who work for the HSP like Doctors and Nurses.
User	The current individual who is using the software. A user can be a Patient, Doctor, Nurse, or Lab Staff at any one given point in time.

1.4 References

Code School, 'Rails for Zombies by Code School', 2015. [Online]. Available:

http://railsforzombies.org/. [Accessed: 17- Sep- 2015].

S. Schach, *Object-oriented and classical software engineering*. New York: McGraw-Hill, 2011.

T. Academy, 'Tealeaf Academy Blog', *Gotealeaf.com*, 2015. [Online]. Available:

http://www.gotealeaf.com/blog/. [Accessed: 17- Sep- 2015].

1.5 Overview of Document

The second chapter of this document, the Overall Description chapter, briefly describes the specifications and functions of the software. The section will provide a general context of the application's requirements. It is useful for a quick glance into the specifications and does not go into extensive detail as to not cloud the functions of the product.

The following chapter of this document, the Requirements Specifications section, goes into great detail of the product functions. This section is mostly for the developers to serve as a guide for production. The terms and language used in this section will be more verbose in order to be specific and detail exactly what needs to be done in the development and usage of the software.

2.0 Overall Description

2.1 System Environment
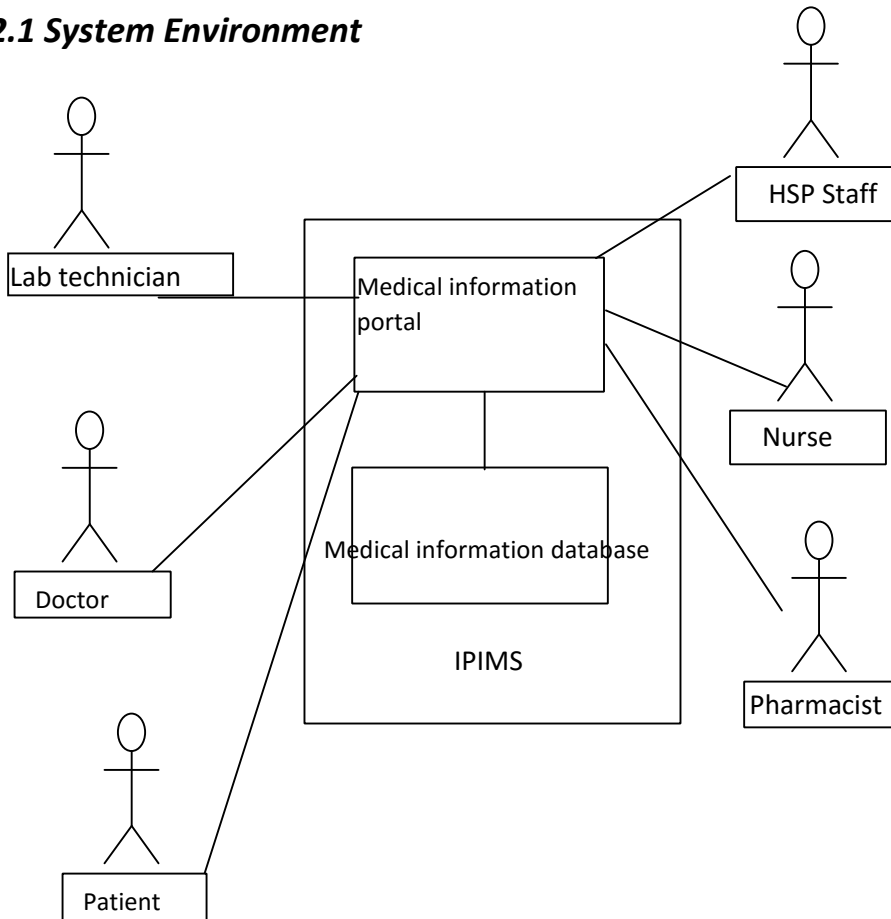
Figure 1 - System Environment

2.2 Functional Requirements Specification

IPIMS has six active actors, and one cooperating system. All actors will be able to access the medical information portal directly. Access to the medical information database will be granted to different degrees depending on the permission level of each actor.

2.2.1 Doctor Use cases
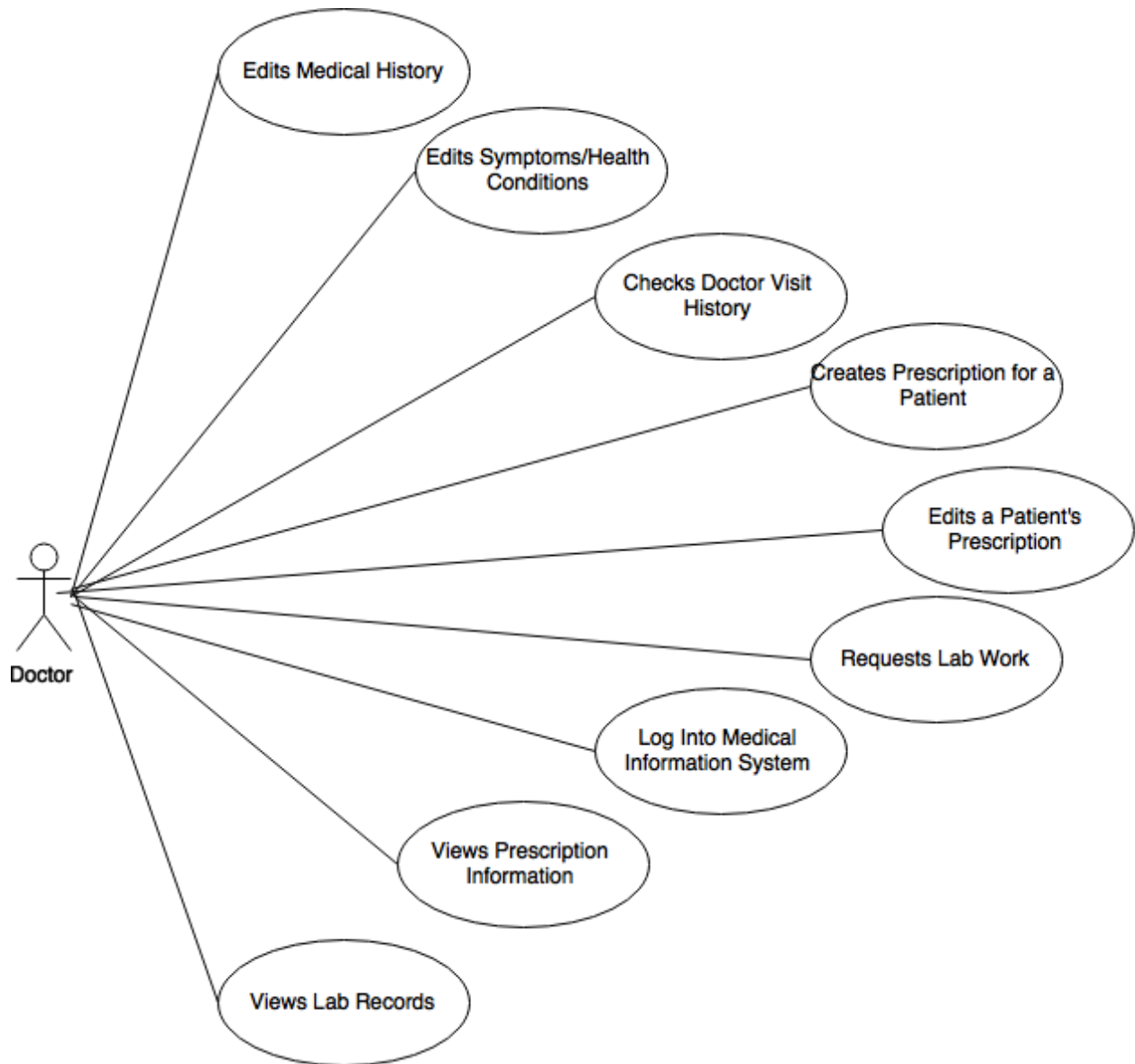
2.2.1.1 User Edits Medical History
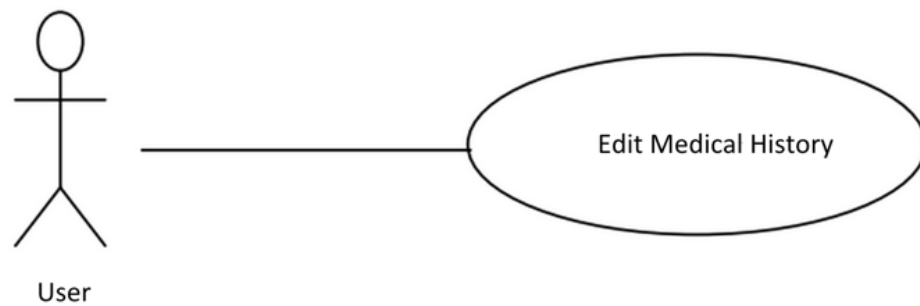
Diagram:

Brief Description: A user edits a medical history record

Initial Step-By-Step Description Before this use case can be initiated, the user must be logged in to the medical information portal with the correct login credentials.

1. System displays option to view medical history for a patient.
2. User selects specific record and views original content
3. System displays option to edit the record
4. User edits medical record
5. System asks user to double check accuracy of changes
6. Medical Information Database changes based on user's input

2.2.1.2 User Checks Doctor Visit History
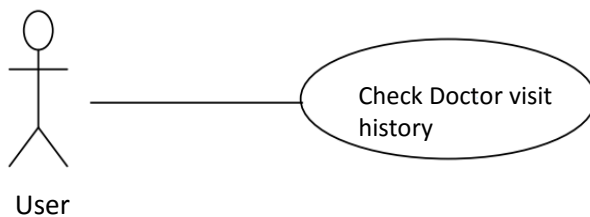
Diagram:

Brief Description: The user can view the date, practitioner and the reason for their previous doctor visits.

Initial Step-By-Step Description

Before carrying out this action, the user(Patient) has to log in to the IPIMS system.

- The patient selects the option to view the doctor visit history present in the home page of the patient.

2.2.1.3 User Views Prescription Information
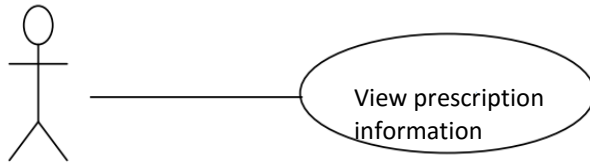
Diagram:

Pharmacist

Brief Description: Pharmacist can view the prescription information uploaded by the doctor for a particular patient so as to provide the patient with drugs as prescribed by the doctor.

Initial Step-By-Step Description

Before carrying out this action, the user(Pharmacist) has to log in to the IPIMS system.

- The pharmacist selects the option to view the prescription present in his/her home page.
- The pharmacist then enters the patient ID to retrieve the prescription information of a particular patient.

2.2.1.4 User Edits Symptoms/Health Conditions
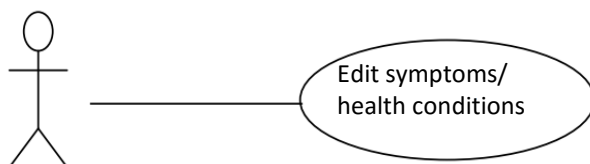
User

Brief Description: User can view and edits patient's symptoms or health conditions

Initial Step-By-Step Description

Before accessing this case, the user should have already listed some of the symptoms in the system database

1. The system displays user login

2. The user logs into the system

3. The system shows "edit symptoms/health conditions" option on the menu

4. The user selects it.

5. System displays user symptoms/health conditions with cursor bilking

   The system also displays "Save and return"

6. User edits symptoms

7. The user performs step 5 until the user clicks save and return to the main menu

2.2.1.5 User Requests lab Work

Diagram:
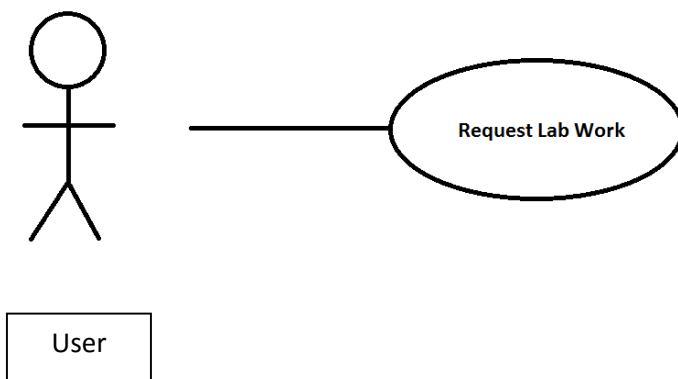
Brief Description:
The user, either a Doctor or a Nurse, requests that the Lab Staff do Lab Work on a patient.

Initial Step-By-Step Description:
Before this case can be initiated, the user must be connected to the system

1. The user chooses the "Request Lab Work" button.
2. The user fills the required information regarding who will be tested and how.
3. The user clicks the "Submit Request" button
4. The system stores the request for viewing by the Lab Staff
5. The system notifies the Lab Staff of the Lab Work Request.
6. The system navigates back to the main page.

2.2.1.6 User Views Lab Records
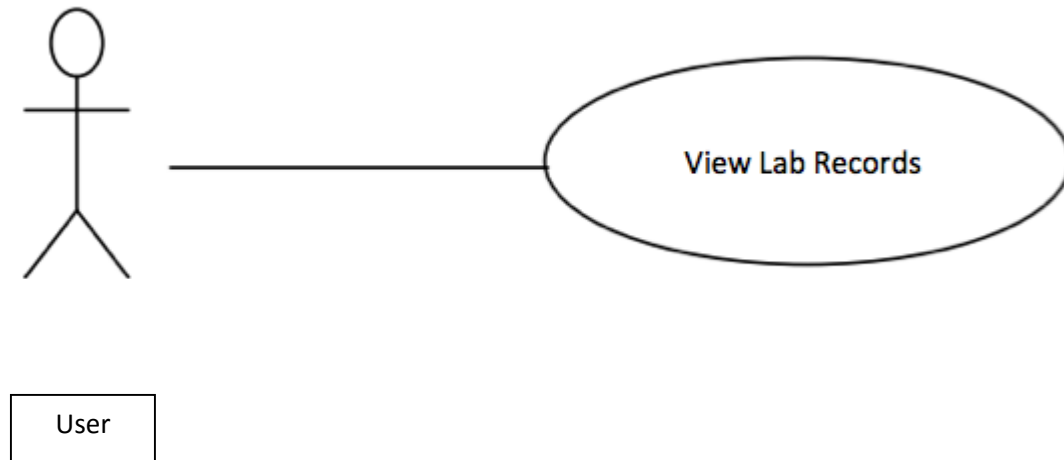
Diagram:

Brief Description: Doctor or nurse views lab records.

Initial Step-By-Step Description Before this use case can be initiated, the user has already connected to the medical information system and login.
1.System displays option to chose different patients' lab data.
2.User selects to view patient's lab data
3.System displays option to get back to last page or logout
4.User selects to get back to the last page(goto step1) or logout

2.2.1.7 User Creates prescription for patient

Diagram:

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┌─────────────┐
│    User     │
└─────────────┘
```
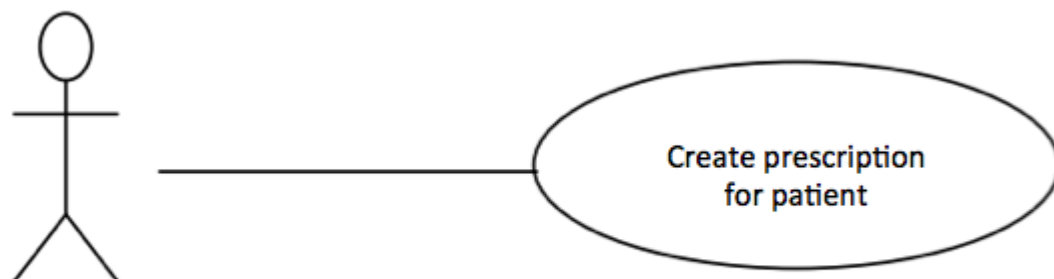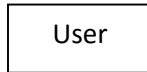
Brief Description: Doctor or nurse creates prescription for patient.

Initial Step-By-Step Description Before this use case can be initiated, the user has already connected to the medical information system and login.

1.System displays option to create a new prescription for a patient
2.User selects to type prescription for a patient
3.System displays options to submit the prescription for a patient
4.User submit the prescription to the information system database

2.2.1.8 User Edits a patient's Prescription

Diagram:

```
   O
  /|\  ──────────(  Edit prescription  )
  / \
  User
```
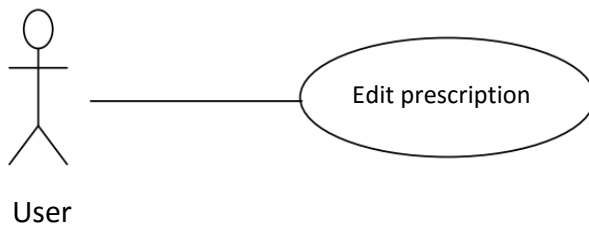
Brief Description: User can edit the prescription of a patient

Pre-Conditions

Before carrying out this action, the user must be logged into IPIMS with the correct login credentials.

1. System displays list of options for user to select
2. User selects option to view a patients info
3. System retrieves prescription information from Medical Information System database
4. System displays prescription information to the user

5. User edits prescription to correct prescription

6. New prescription saves to Medical Information System

2.2.1.9 User Logs Into Medical Information System
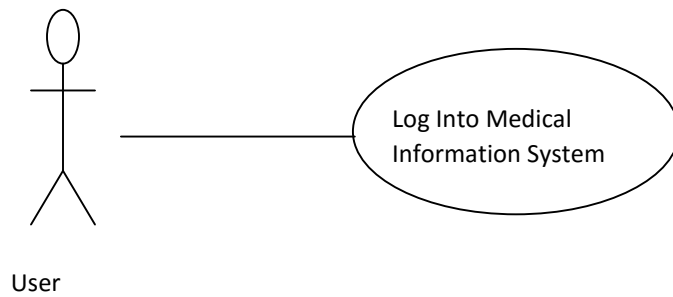
Diagram:

Brief Description

User logs into IPIMS system to perform various functions

Initial Step-By-Step Description

Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.2.2 Patient Use cases

2.2.2.1 User Edits Medical History
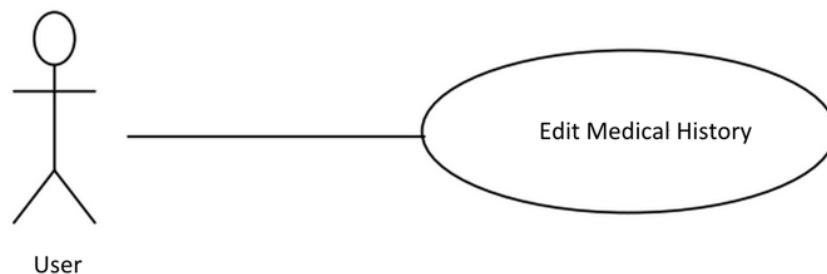
Diagram:

Brief Description: A user edits a medical history record

Initial Step-By-Step Description Before this use case can be initiated, the user must be logged in to the medical information portal with the correct login credentials.

1. System displays option to view medical history for a patient.
2. User selects specific record and views original content
3. System displays option to edit the record
4. User edits medical record
5. System asks user to double check accuracy of changes

6. Medical Information Database changes based on user's input

2.2.2.2 Patient Requests Appointment

Diagram:

Patient — Request Appointment
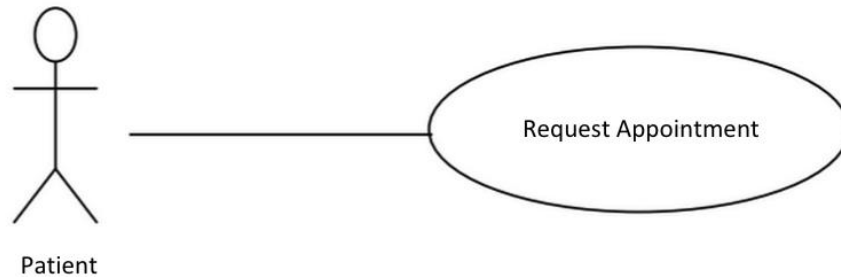
Brief Description: The patient requests an appointment

Initial Step-By-Step Description Before this use case can be initiated, the patient must be logged in to the medical information portal with the correct login credentials.

1. System displays option to request an appointment
2. System presents user with potential appointment times and dates
3. User selects one potential time and date
4. System asks user to double check choice of time and date
5. System changes medical information appointment database to reflect the new appointment

2.2.2.3 User Views Prescription Information

Diagram:

Patient — View prescription information
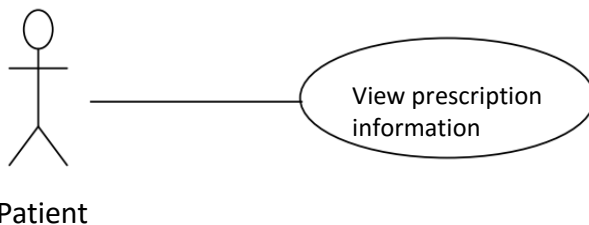
Brief Description: Patient can view the prescription information uploaded by the doctor.

Initial Step-By-Step Description

Before carrying out this action, the user(Patient) has to log in to the IPIMS system.

- The patient selects the option to view the prescription present in the home page of the patient.
- The patient can save a copy of this prescription for future use.

2.2.2.4 User Checks Doctor Visit History

Diagram:

Brief Description: The user can view the date, practitioner and the reason for their previous doctor visits.

Initial Step-By-Step Description

Before carrying out this action, the user(Patient) has to log in to the IPIMS system.

- The patient selects the option to view the doctor visit history present in the home page of the patient.

2.2.2.5 User Edits Symptoms/Health Conditions

Brief Description: User can view and edits patient's symptoms or health conditions

Initial Step-By-Step Description

Before accessing this case, the user should have already listed some of the symptoms in the system database

1. The system displays user login
2. The user logs into the system
3. The system shows "edit symptoms/health conditions" option on the menu
4. The user selects it.
5. System displays user symptoms/health conditions with cursor bilking

   The system also displays "Save and return"
6. User edits symptoms
7. The user performs step 5 until the user clicks save and return to the main menu

2.2.2.6 User Logs Into Medical Information System

Diagram:
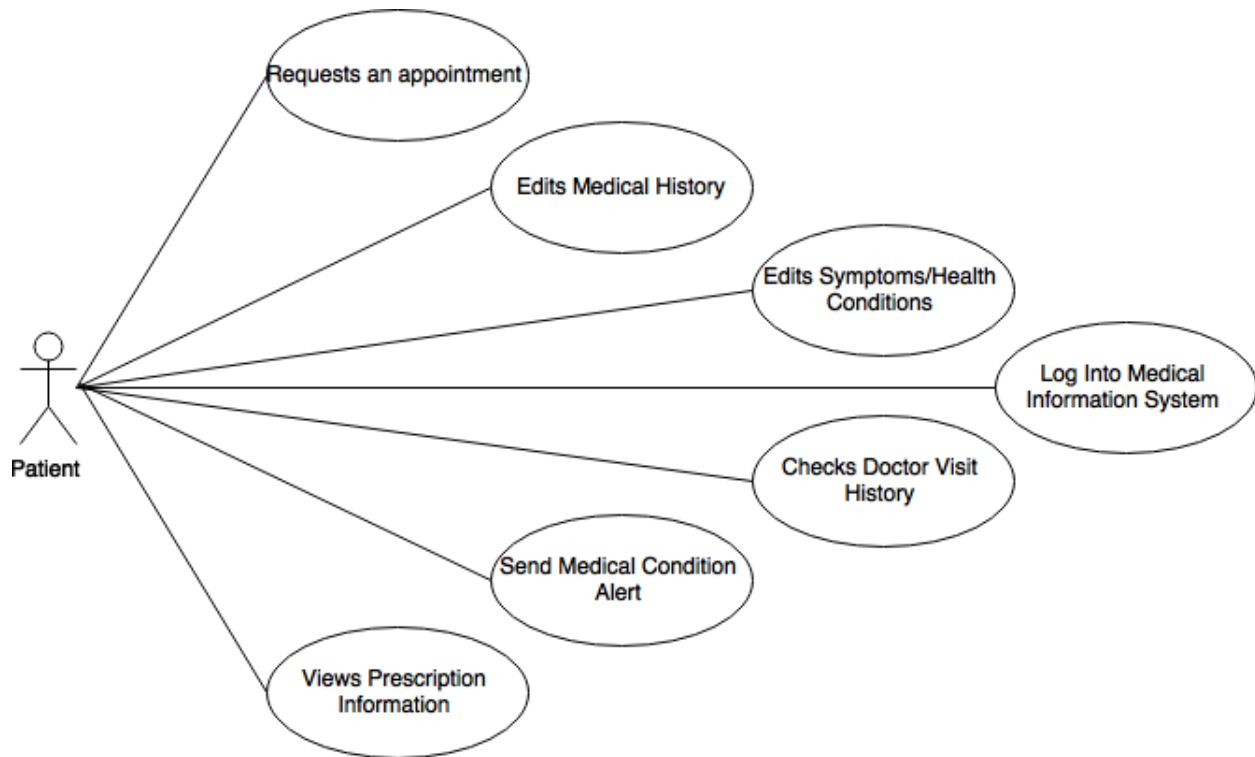

User

Brief Description
User logs into IPIMS system to perform various functions

Initial Step-By-Step Description
Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.2.2.7 Send Alert

Diagram:
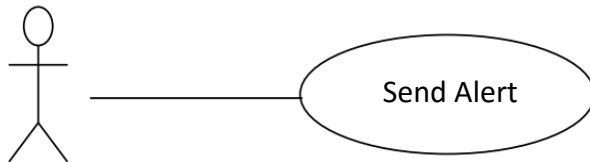
Patient

Brief Description: The patient can alert the IPIMS about severity of his/her present condition. Depending on the severity, IPIMS will alert doctors or HSP staff.

Initial Step-By-Step Description

Before carrying out this action, the patient has to log in to the IPIMS system.

- The patient selects the option to alert the system present in the home page of the patient.
- The patient enters his/her current symptoms in the text box and click submit to alert the system about the patient's current medical status.

2.2.3 Nurse Use cases
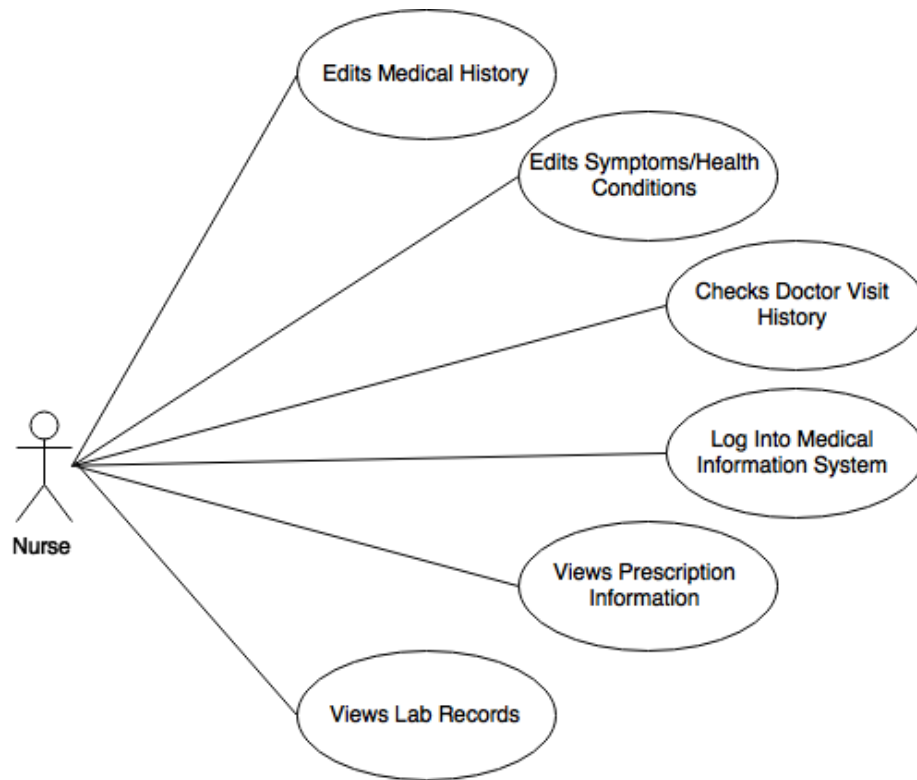
2.2.3.1 User Edits Medical history
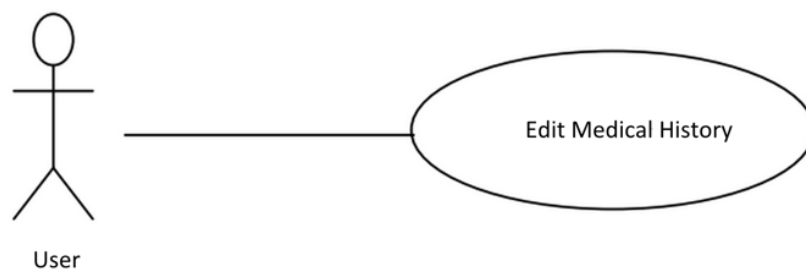
Diagram:

Brief Description: A user edits a medical history record

Initial Step-By-Step Description Before this use case can be initiated, the user must be logged in to the medical information portal with the correct login credentials.

1. System displays option to view medical history for a patient.
2. User selects specific record and views original content

3. System displays option to edit the record
4. User edits medical record
5. System asks user to double check accuracy of changes
6. Medical Information Database changes based on user's input

2.2.3.2 User Checks Doctor Visit History
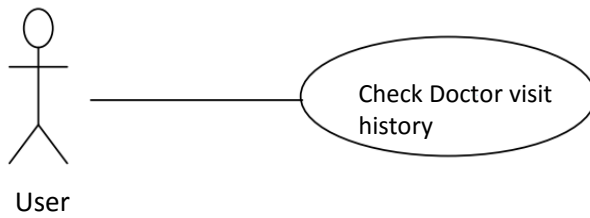
Diagram:

User

Brief Description: The user can view the date, practitioner and the reason for their previous doctor visits.
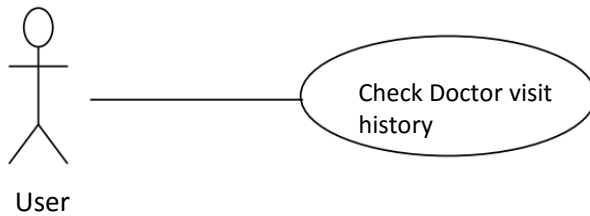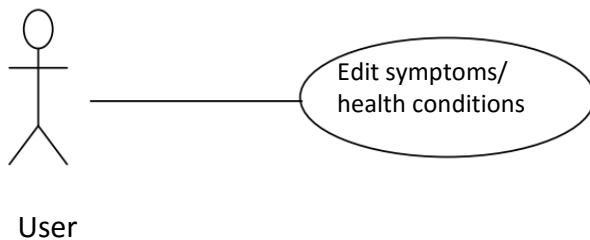
Initial Step-By-Step Description

Before carrying out this action, the user(Patient) has to log in to the IPIMS system.

- The patient selects the option to view the doctor visit history present in the home page of the patient.

2.2.3.3 User Views Prescription Information

Diagram:

Pharmacist

Brief Description: Pharmacist can view the prescription information uploaded by the doctor for a particular patient so as to provide the patient with drugs as prescribed by the doctor.

Initial Step-By-Step Description

Before carrying out this action, the user(Pharmacist) has to log in to the IPIMS system.

- The pharmacist selects the option to view the prescription present in his/her home page.
- The pharmacist then enters the patient ID to retrieve the prescription information of a particular patient.

2.2.3.4 User Edits Symptoms/Health Conditions
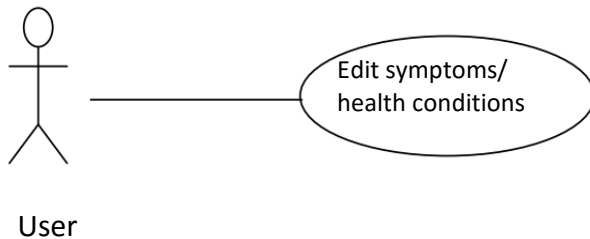
User

Brief Description: User can view and edits patient's symptoms or health conditions
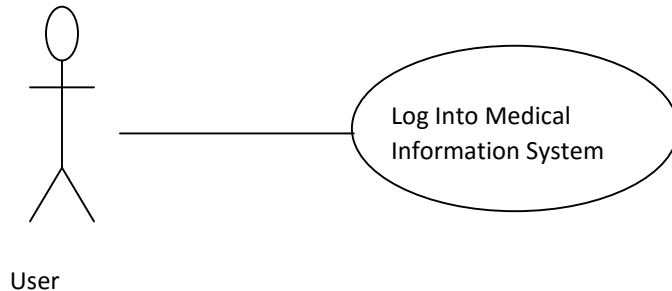
Initial Step-By-Step Description

Before accessing this case, the user should have already listed some of the symptoms in the system database

1. The system displays user login

2. The user logs into the system

3. The system shows "edit symptoms/health conditions" option on the menu

4. The user selects it.

5. System displays user symptoms/health conditions with cursor bilking

   The system also displays "Save and return"

6. User edits symptoms

7. The user performs step 5 until the user clicks save and return to the main menu

2.2.3.5 User Views Lab Records
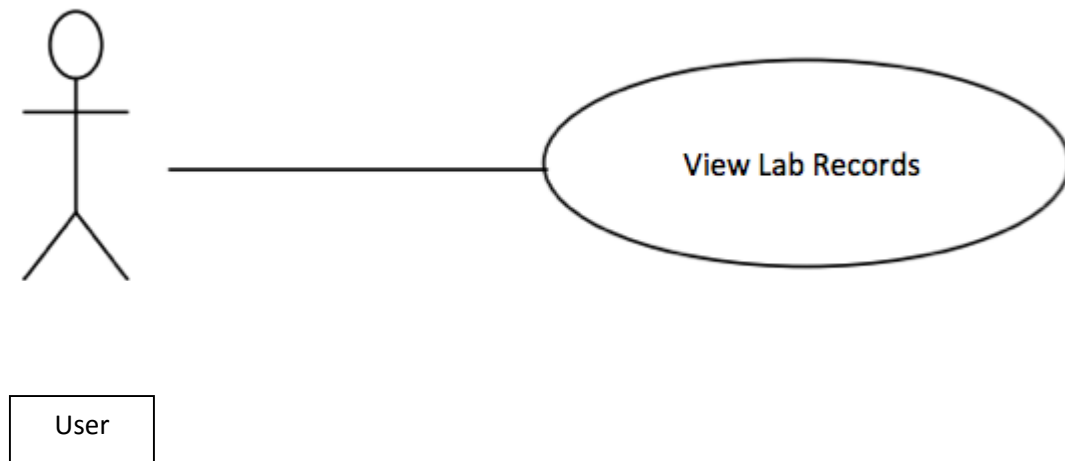
Diagram:

Brief Description: Doctor or nurse views lab records.

Initial Step-By-Step Description Before this use case can be initiated, the user has already connected to the medical information system and login.
1.System displays option to chose different patients' lab data.
2.User selects to view patient's lab data
3.System displays option to get back to last page or logout
4.User selects to get back to the last page(goto step1) or logout

2.2.3.6 User Logs Into Medical Information System
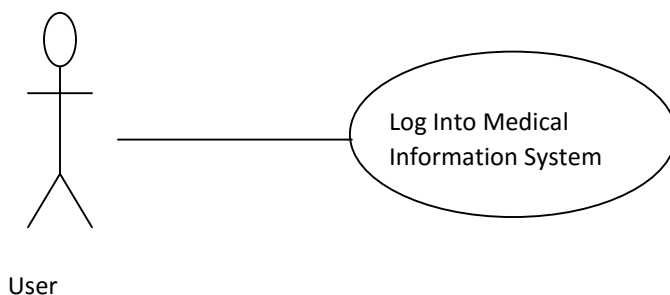
Diagram:

Brief Description
User logs into IPIMS system to perform various functions

Initial Step-By-Step Description

Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.2.4 Pharmacist Use cases

## 2.2.4.1 User Views Prescription Information
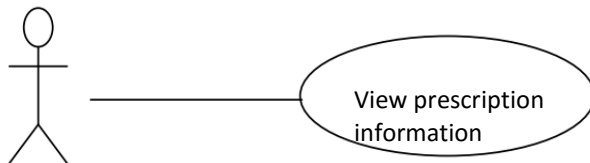
Diagram:

Pharmacist

Brief Description: Pharmacist can view the prescription information uploaded by the doctor for a particular patient so as to provide the patient with drugs as prescribed by the doctor.

Initial Step-By-Step Description

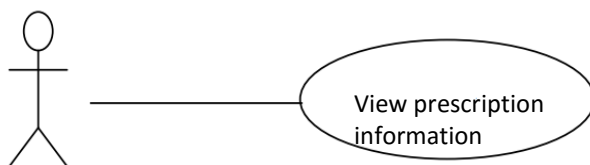Before carrying out this action, the user(Pharmacist) has to log in to the IPIMS system.

- The pharmacist selects the option to view the prescription present in his/her home page.
- The pharmacist then enters the patient ID to retrieve the prescription information of a particular patient.

2.2.4.2 User Logs Into Medical Information System

Diagram:

User

Brief Description
User logs into IPIMS system to perform various functions

Initial Step-By-Step Description
Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.2.5 Lab Staff Use Cases
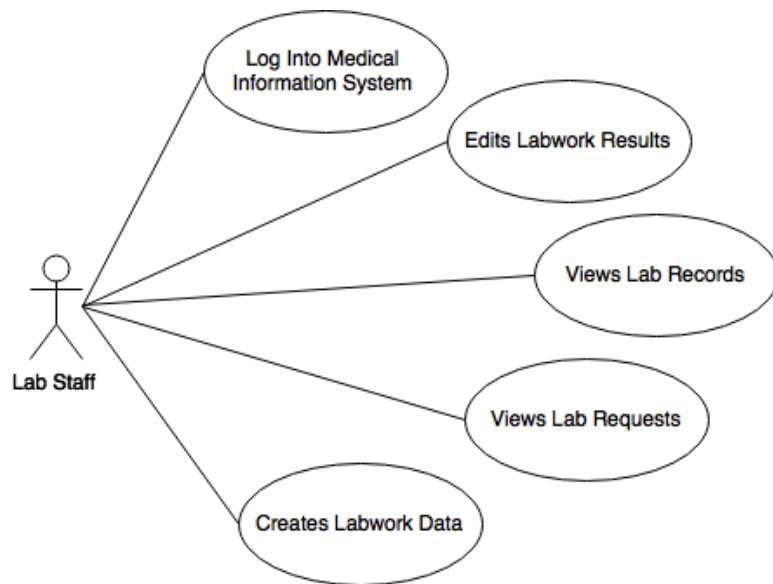
2.2.5.1 User Views Lab Records
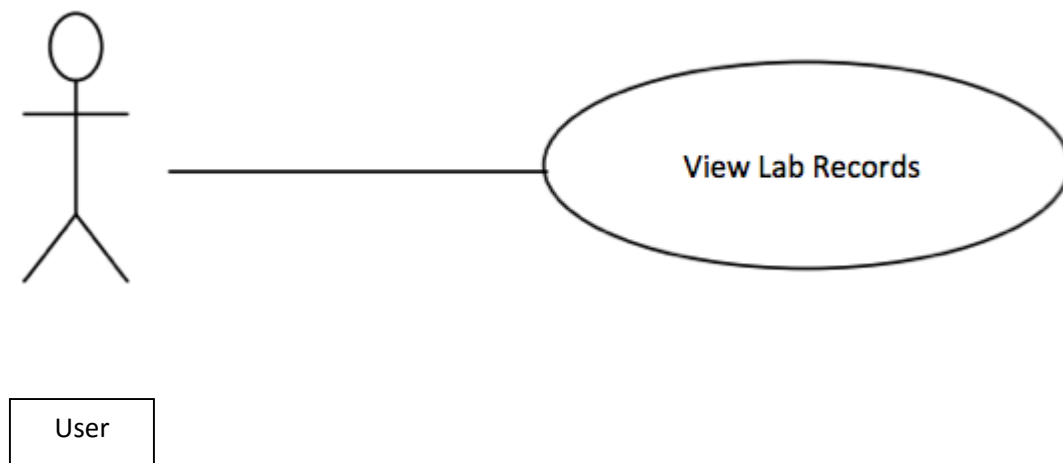
Diagram:

Brief Description: Doctor or nurse views lab records.

Initial Step-By-Step Description Before this use case can be initiated, the user has already connected to the medical information system and login.
1.System displays option to chose different patients' lab data.
2.User selects to view patient's lab data

3.System displays option to get back to last page or logout
4.User selects to get back to the last page(goto step1) or logout

2.2.5.2 User Creates Labwork Data

Diagram:

Lab technician
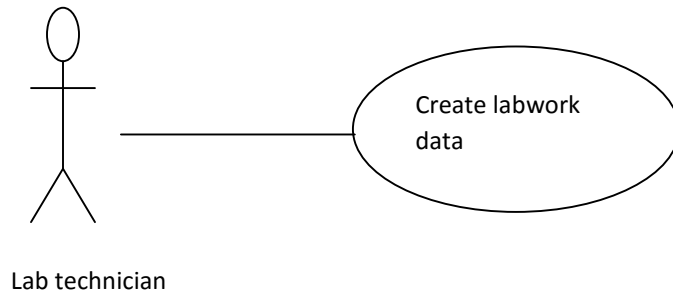
Brief Description
User creates labwork data from any labs conducted on patients

Initial Step-By-Step Description
Before this use case can be initiated user registered on the Medical Information System and the Lab is completed

1. System display option to create new lab for a patient
2. User selects to create new lab data
3. User inputs information of the lab data
4. User uploads lab to the information system database

2.2.5.3 User Edits Labwork Results

Diagram:

Lab technician
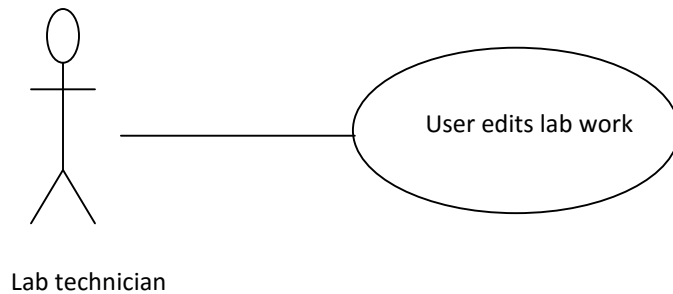
Brief Description

User edits current labwork data from any medical information already in the system database

Initial Step-By-Step Description

Before this use case can be initiated user registered on the Medical Information System and the Lab is completed

1. System display option to edit current lab
2. User selects to edit lab
3. User inputs information to the lab
4. User uploads updated lab to the information system database

2.2.5.4 User Views Lab Records

Diagram:

Patient
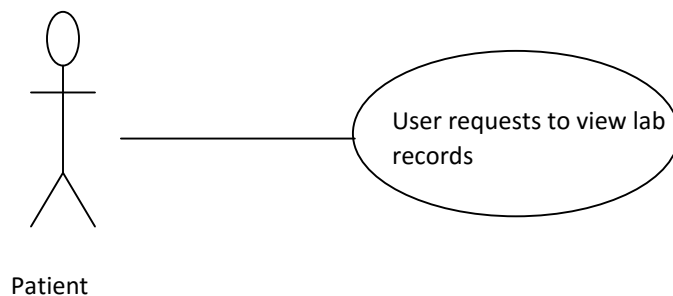
Brief Description

User checks their lab work results

Initial Step-By-Step Description

Before this use case can be initiated user registered on the Medical Information System and the Lab is completed

5. System displays results from lab
6. User selects option to view their lab
7. System retrieves the results from the lab
8. System displays information about the lab

2.2.5.5 User Logs Into Medical Information System
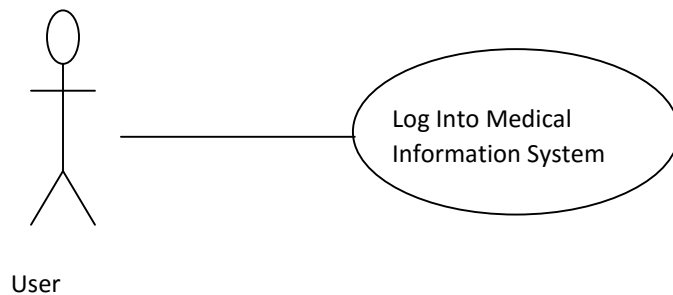
Diagram:
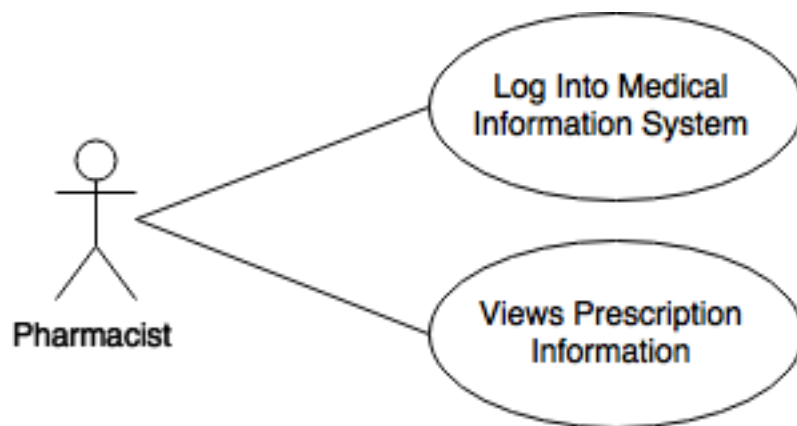

User

Brief Description
User logs into IPIMS system to perform various functions

Initial Step-By-Step Description
Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.2.6 HSP Staff Use Cases

2.2.6.1 User Edits Medical History
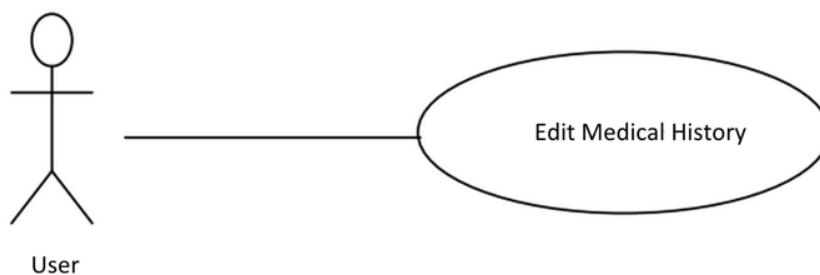
Diagram:

Brief Description: A user edits a medical history record

Initial Step-By-Step Description Before this use case can be initiated, the user must be logged in to the medical information portal with the correct login credentials.

1. System displays option to view medical history for a patient.
2. User selects specific record and views original content

3. System displays option to edit the record
4. User edits medical record
5. System asks user to double check accuracy of changes
6. Medical Information Database changes based on user's input

2.2.6.2 User Checks Doctor Visit History
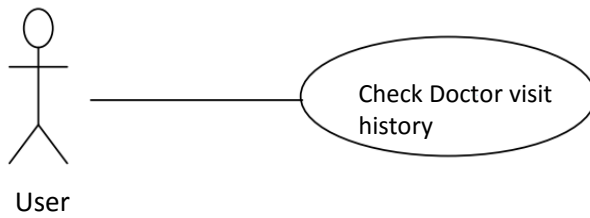
Diagram:

User

Brief Description: The user can view the date, practitioner and the reason for their previous doctor visits.

Initial Step-By-Step Description

Before carrying out this action, the user(Patient) has to log in to the IPIMS system.

- The patient selects the option to view the doctor visit history present in the home page of the patient.

2.2.6.3 User Views Prescription Information
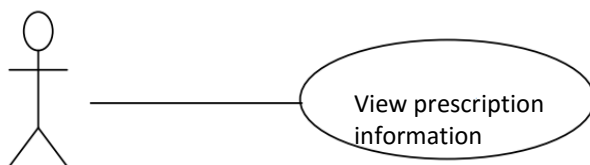
Diagram:

Pharmacist

Brief Description: Pharmacist can view the prescription information uploaded by the doctor for a particular patient so as to provide the patient with drugs as prescribed by the doctor.
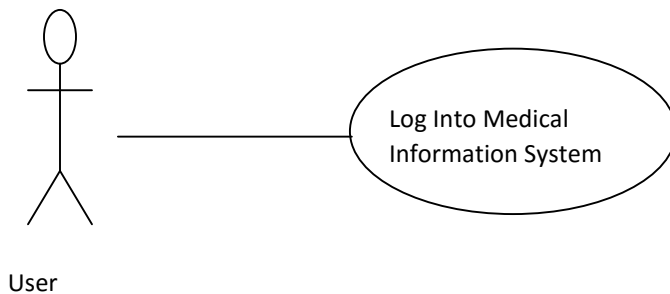
Initial Step-By-Step Description

Before carrying out this action, the user(Pharmacist) has to log in to the IPIMS system.

- The pharmacist selects the option to view the prescription present in his/her home page.
- The pharmacist then enters the patient ID to retrieve the prescription information of a particular patient.

2.2.6.4 User Edits Symptoms/Health Conditions
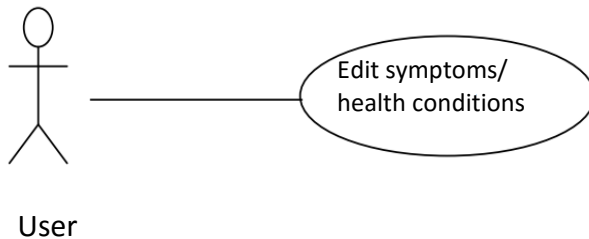
User

Brief Description: User can view and edits patient's symptoms or health conditions

Initial Step-By-Step Description

Before accessing this case, the user should have already listed some of the symptoms in the system database

1. The system displays user login

2. The user logs into the system

3. The system shows "edit symptoms/health conditions" option on the menu

4. The user selects it.

5. System displays user symptoms/health conditions with cursor bilking

    The system also displays "Save and return"

6. User edits symptoms

7. The user performs step 5 until the user clicks save and return to the main menu

2.2.6.5 User Edits Patient Information

Diagram:
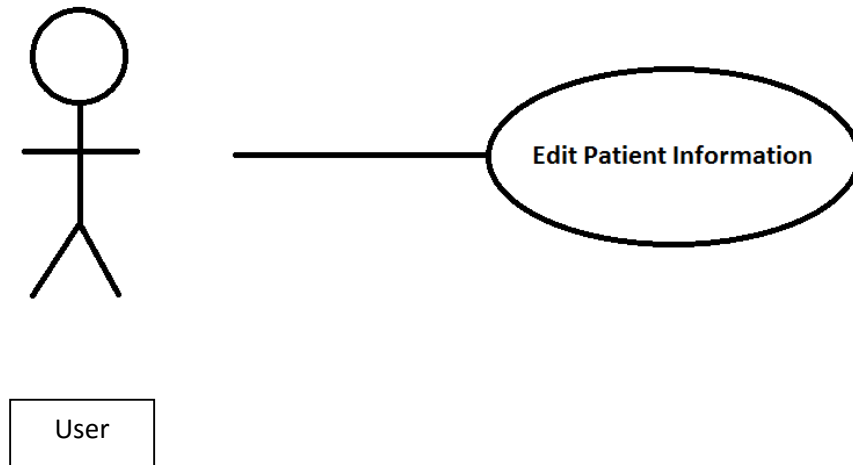
User

Brief Description:
The user, either a Doctor or Nurse, edits a patient's information.

Initial Step-By-Step Description:
Before this case can be initiated, the user must be connected to the system

7. The user chooses the "Edit Patient Information" button.
8. The user searches for the desired patient and selects the name.
9. The system fetches the current patient information in the patient database.
10. The user edits any fields that need changing.
11. The user finishes desired changes and selects the "Save Changes" Button.
12. The system stores all changes and updates the file in the patient database.
13. The user clicks the "Exit" button and the system returns to the main menu.

2.2.6.6 User Generates Healthcare Statistical Report

Diagram:
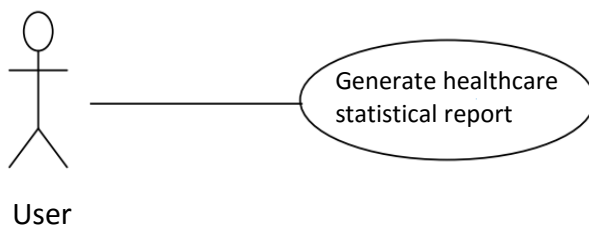
User

Brief Description: User can generate a report containing various breakdowns of information stored within the IPIMS database.

Pre-Conditions

Before carrying out this action, the user must be logged into IPIMS with the correct login credentials.

1. System displays list of options for user to select
2. User selects option to create a report
3. System retrieves information from Medical Information System database
4. System displays information in the form of a report

2.2.6.7 User Logs Into Medical Information System
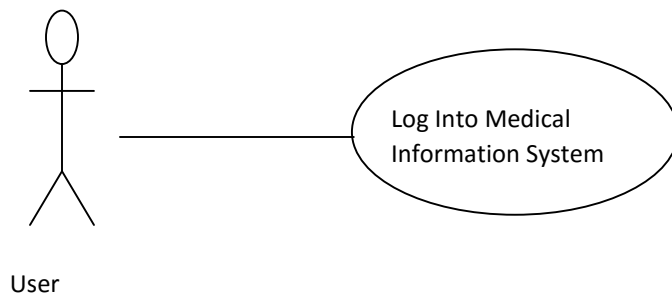
Diagram:
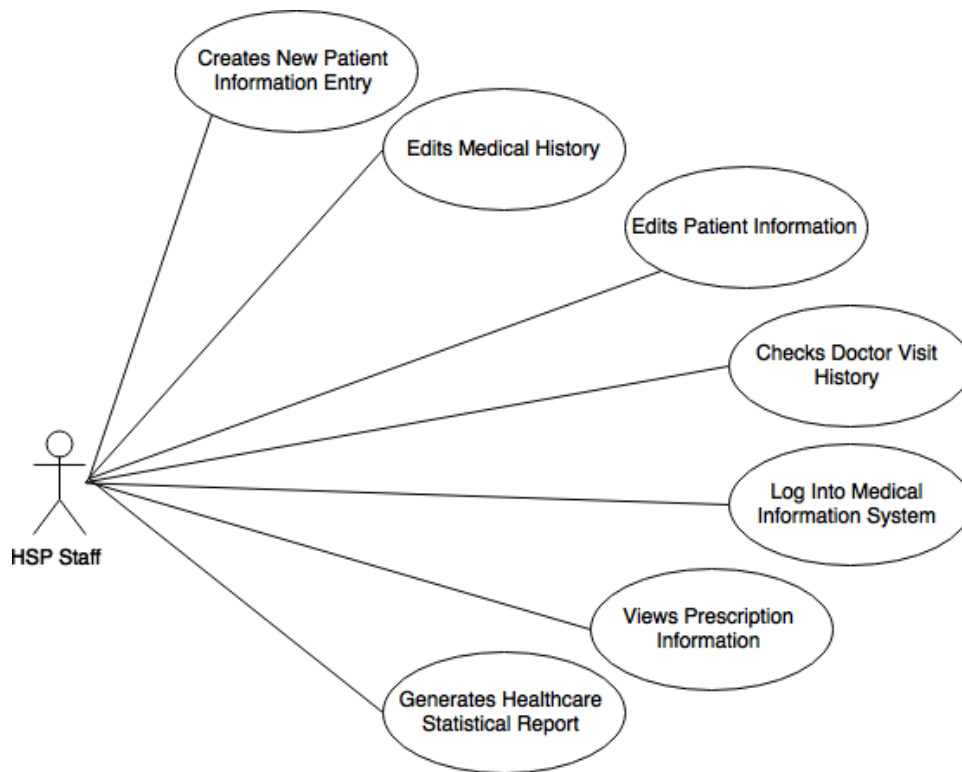

User

Brief Description
User logs into IPIMS system to perform various functions

Initial Step-By-Step Description
Before this use case can be initiated user must have an active internet connection, capable of browsing to the IPIMS hosting location.

1. System displays login screen
2. User enters username and password
3. User clicks "login"
4. System displays information relevant to the user

2.3 User Characteristics

All of the users of medical information system are expected to be Internet literate, able to use

computer with mouse and keyboard.

2.3.1 Doctor Characteristics

Doctors are expected to have enough medical background knowledge and own a doctor certificate.

2.3.2 Patient Characteristics

Patients are expected to have either smartphone, computer or tablet to access the website of medical information system from their home.

2.3.3 HSP Staff Characteristics

HSP staffs are expected to have enough medical and statistical background knowledge.

2.3.4 Pharmacist Characteristics

Pharmacists are expected to have a computer in the pharmacy and enough medical background knowledge.

2.3.5 Lab Staff Characteristics

Lab staffs are expected to have enough background knowledge and related experience.

2.3.6 Nurse Characteristics

Nurses are expected to have professional credentials that certify them for the job.

2.4 Non-Functional Requirements

The medical information system will be on a server with high speed Internet capability and a stable power source (Electricity). The software developed will use ruby on rails to establish a connection

between web pages and the database. The speed of user's connection to the system depends on the

hardware used rather than the characteristics of the medical information system.

The system requires the patient to identify himself/herself with a valid identification. Generally,

any user who uses the system should have a valid login ID and password.

3.0 Requirements Specification

3.1 External Interface Requirements

This software will not need to make any external references, for everything will be

contained within the program. The lab work will be stored on the program's hosting server, as

well as the patient information.

3.2 Functional Requirements

3.2.1 Edit Medical History

Use Case Name	User Edits Medical History
XRef	2.2.1.1
Trigger	The user selects the desired patient. The user clicks the "View Medical HIstory" button displayed in the medical information portal.
Precondition	The user must be logged in to the medical information portal.
Basic Path	1. The medical information system shows the medical history of the specified patient in a three column section. Each column specifies the date, details, and HSP staff involved. 2. The user is prompted to edit any of these columns. 3. The user is asked to double-check accuracy of changes. 4. The medical information database changes the existing medical history entry to reflect the user's changes.

Alternative Paths	1. In step 3, the patient can select "re-enter update" if they have selected an incorrect time to which the process will be reverted to step 1.
Postcondition	N/A
Exception Paths	The user logout during viewing medical history. Internet connection timeout
Other	N/A

3.2.2 Request an Appointment

Use Case Name	User requests an appointment
XRef	2.2.2.2
Trigger	The user can click the "Request an Appointment" button in the medical information portal.
Precondition	The patient must be logged in to the medical information portal.
Basic Path	1.The medical information system displays a weekly calendar starting at the current date. Available appointment times are listed in the calendar. 2. The patient can select an available appointment time. 3.The medical information system asks the patient to double-check accuracy of their selection. 4.The medical information appointment database is changed to reflect the unavailability of the previously available time slot.
Alternative Paths	1. In step 3, the patient can select "re-select time" if they have selected an incorrect time to which the process will be reverted to step 1.
Postcondition	A new patient prescription is created.
Exception Paths	Patient logs out while requesting an appointment. Internet connection timeout.
Other	N/A

3.2.3 Send Alert

Use Case Name	Send Alert

XRef	2.2.2.7
Trigger	The patient clicks the "Send Alert" button on the homepage of medical information system.
Precondition	The patient has to login and connect to the medical information system.
Basic Path	1. The medical information system displays a list of options for the patient to choose. 2. The patient then selects the "Send Alert" option. 3. The patient will be provided with a text box in which he/she can enter their present symptoms. 4. The patient then clicks "Submit" button to add his/her data into the system, which automatically triggers an alert to the patient's doctor.
Alternative Paths	N/A
Postcondition	Depending on the severity of the patient's condition, an alert is created and forwarded to the corresponding health service staff.(Doctors etc.)
Exception Paths	The user logs out before submitting. Internet connection timeout.
Other	N/A

3.2.4 Check Doctor Visit History

Use Case Name	Check doctor visit history
XRef	2.2.1.2
Trigger	The patient clicks the "View doctor visit history" button on the homepage of medical information system.
Precondition	The patient has to login and connect to the medical information system.
Basic Path	1. The medical information system displays a list of options for the patient to choose. 2. The patient then selects the "View doctor visit history" option. 3. System retrieves previous doctor visit information from Medical Information System database 4. The system then displays the data to the patient.
Alternative Paths	N/A

Postcondition	The user knows the date, practitioner, and reason for their previous doctor visits.
Exception Paths	The user logs out before the history is displayed. Internet connection timeout.
Other	N/A

3.2.5 View Prescription Information

Use Case Name	View prescription information
XRef	2.2.1.3
Trigger	The patient clicks the "View prescription" button on the homepage of medical information system.
Precondition	1.The patient has to login and connect to the medical information system. 2. The Doctor must have uploaded the prescription to the medical information system.
Basic Path	1. The medical information system displays a list of options for the patient to choose. 2. The patient then selects the "View prescription" option. 3. If the doctor has uploaded the prescription previously, then that prescription will be displayed to the patient.
Alternative Paths	1. In Step 3, the patient can click the download button to download the prescription. 2. In Step 3, the patient can also select the back button and navigate to the home page.
Postcondition	The patient can use the prescription information to get the required drugs from the pharmacy.
Exception Paths	The user logs out before the prescription is displayed. Internet connection timeout
Other	N/A

3.2.6 Create patient Information Entry

Use Case Name	Create patient Information Entry
XRef	2.2.6.5

Trigger	The patient clicks the "add patient" button on the homepage of medical information system.
Precondition	1.The user has to login and connect to the medical information system. 2. The user must have relevant information to be entered
Basic Path	1. The medical information system displays a list of options for the user to choose. 2. The patient then selects the "add patient" option. 3. User enters relevant patient information 4. IPIMS stores information in its database
Alternative Paths	1. In Step 3, the patient can click the "cancel" button to return to the main screen.
Postcondition	The patient information is stored in the system and can be accessed by other actors.
Exception Paths	The user logs out before the information is entered. Internet connection timeout
Other	N/A

3.2.7 Edit Symptoms

Use Case Name	Edit Symptoms
XRef	2.2.1.4
Trigger	The patient clicks the "edit symptoms" button on the panel of a patient
Precondition	1.The user has to login and connect to the medical information system. 2. The user must have relevant symptoms to be entered for the patient
Basic Path	1. The medical information system displays a list of options for the user to choose. 2. The patient then selects the "edit symptoms" option. 3. User enters relevant symptoms and clicks "save" 4. IPIMS stores symptoms in its database
Alternative Paths	1. In Step 3, user can click "cancel" to return to previous screen
Postcondition	The patient symptom information is stored in IPIMS and can be accessed by other actors with sufficient authorization.
Exception Paths	The user logs out before the prescription is displayed. Internet connection timeout

Other	N/A

3.2.8 Edit patient Information

Use Case Name	Edit Patient Information
XRef	2.2.6.5
Trigger	The user selects the option to edit a patients information
Precondition	The user is connected to the Patient Database, a patient has already been selected.
Basic Path	1. The system presents the user with the patient information. 2. The user edits or fills in any information 3. The user saves changes and exits.
Alternative Paths	None
Postcondition	The patient information has been saved into the Database
Exception Paths	The user may exit at any time.
Other	This use case is included in *3.2.X Create New Patient Information Entry* If the user exits before saving, all changes are discarded.

3.2.9 Request Lab Work

Use Case Name	Request Lab Work
XRef	2.2.1.5
Trigger	The user selects the option to request lab work be performed
Precondition	The user is connected to the system network
Basic Path	1. The system prompts the user for patient information and what test to be done. 2. The user fills in the information. 3. The user submits the request 4. The System notifies the Lab Staff of the new request.
Alternative Paths	None
Postcondition	The Lab Work request has been sent.
Exception Paths	The user may exit at any time.
Other	

3.2.10 View Lab Records

Use Case Name	View Lab Records
XRef	2.2.1.6
Trigger	Doctor or nurse clicks the "View Lab Records" button on the homepage of medical information system.
Precondition	The user login and connect to the medical information system.
Basic Path	1. The medical information system shows a list of patients. There are three columns in each row with patient's name, birthday and age. 2. The user can click one of the patient shown in the list. 3. The medical information system show the patient's lab record. 4. The user can click "Back" button to go back to the list of patient.
Alternative Paths	N/A
Postcondition	N/A
Exception Paths	The user logout during viewing lab records. Internet connection timeout
Other	N/A

3.2.11 Create New Prescription for Patient

Use Case Name	Create New Prescription for Patient
XRef	2.2.1.7
Trigger	Doctor or nurse clicks the "Create New Prescription" button on the homepage of medical information system after login.
Precondition	User login and connect to the medical information system.
Basic Path	1.The medical information system shows a form, allowing user to type patient's information. 2. The user can also click "Submit" button to confirm the patient's information. 3.The medical information system show the patient's prescription after staff submit the form. 4.The user can click "confirm" button to complete creating new prescription.
Alternative Paths	(1). In step 2. User can click "Cancel" button to go back to the homepage of medical information system.

	(2). In step 2. User can click "Save Draft" button to save the information that has been typed. (3). In step 4. User can click "Back" button to the last page to modify the wrong information
Postcondition	A new patient prescription is created.
Exception Paths	User logout during typing the patient's information. Internet connection timeout.
Other	N/A

3.2.12 Edit Patient Prescription

Use Case Name	User Edits Patient's Prescription
XRef	2.2.1.8
Trigger	Doctor clicks the "Edit A Prescription" button after viewing a patient's prescription.
Precondition	The user logs in and connects to the medical information system. The user pulls up an existing prescription.
Basic Path	1. System displays list of patients for user to select. 2. The user can click one of the patient's shown in the list to view info. 3. The medical information system shows the patient's current prescription(s). 4. The user can edit prescription(s). 5. The user can click "Back" button to go back to the list of patient.
Alternative Paths	N/A
Postcondition	N/A
Exception Paths	The user logout during viewing prescriptions. Internet connection timeout
Other	N/A

3.2.13 Generate Healthcare Statistical Report

Use Case Name	User Generates Healthcare Statistical Report
XRef	2.2.6.6

Trigger	HSP Staff clicks "Generate Statistical Report" button on the homepage of medical information system.
Precondition	The user login and connect to the medical information system.
Basic Path	1. The medical information system shows a list of all patients. There are three columns in each row with patient's name, birthday and age. 2. The user can generate statistical report based on different variables. 3. The medical information displays information in form of a report. 4. The user can click "Back" button to go back to the list of patient.
Alternative Paths	N/A
Postcondition	N/A
Exception Paths	The user logout during viewing patients info. Internet connection timeout
Other	N/A

3.2.14 Create Labwork Data

Use Case Name	User creates labwork data
XRef	2.2.5.2
Trigger	The Lab technician selects to add a new lab to the database.
Precondition	The user has accessed the lab main screen.
Basic Path	1. The system accesses the medical information database 2. The user selects to input new labwork data for existing patient 3. The user inputs data information 4. The information is entered into the database.
Alternative Paths	In step 3, if the patient is not in the database the user will be prompted to enter information for new patient.
Postcondition	The patient is added to the database
Exception Paths	The user can then exit when they are done
Other	The lab includes the results, patient name and their doctor

3.2.15 Edit Labwork Data

Use Case Name	User edits labwork data
xRef	2.2.5.3
Trigger	The Lab technician selects to edit existing lab work form the database.
Precondition	The user has accessed the lab main screen.
Basic Path	1. The system accesses the medical information database 2. The user selects to edit labwork data for existing patient 3. The user inputs data information 4. The information is entered into the database.
Alternative Paths	In step 3, if the patient is not in the database the user will be prompted to enter information for new patient.
Postcondition	The patient is added to the database
Exception Paths	The user can then exit when they are done
Other	The lab includes the results, patient name and their doctor

3.2.16 View labwork Data

Use Case Name	User request to view labwork
XRef	2.2.5.1
Trigger	Patient selects to view labwork form database.
Precondition	The user is in their information homepage
Basic Path	1. The system accesses the medical information database 2. The user selects to view labwork 3. The user selects what lab they want to view according to when the lab was done 4. The labwork results are displayed
Alternative Paths	In step 3, if the patient is not in the database the user will be prompted to enter information for new patient.

Postcondition	The patient is added to the database
Exception Paths	The user can then exit when they are done
Other	The lab includes the results, patient name and their doctor

3.2.17 Log In to Medical Information System

Use Case Name	Log Into Medical information System
XRef	2.2.1.9
Trigger	User navigates to IPIMS Website
Precondition	The user has an internet connection
Basic Path	1. User accesses internet 2. User navigates to IPIMS Website 3. System displays login screen 4. User enters username and password 5. System logs user in, displaying relevant information to user
Alternative Paths	At any point, the patient may close the browser window and the operation will cancel
Postcondition	The user is logged into the IPIMS
Exception Paths	N/A
Other	N/A

3.3 Detailed Non-Functional Requirements

3.3.1 Logical Structure of the Data

The logical structure of the data to be stored in the Medical Information System database is presented in the following entity relationship diagram:
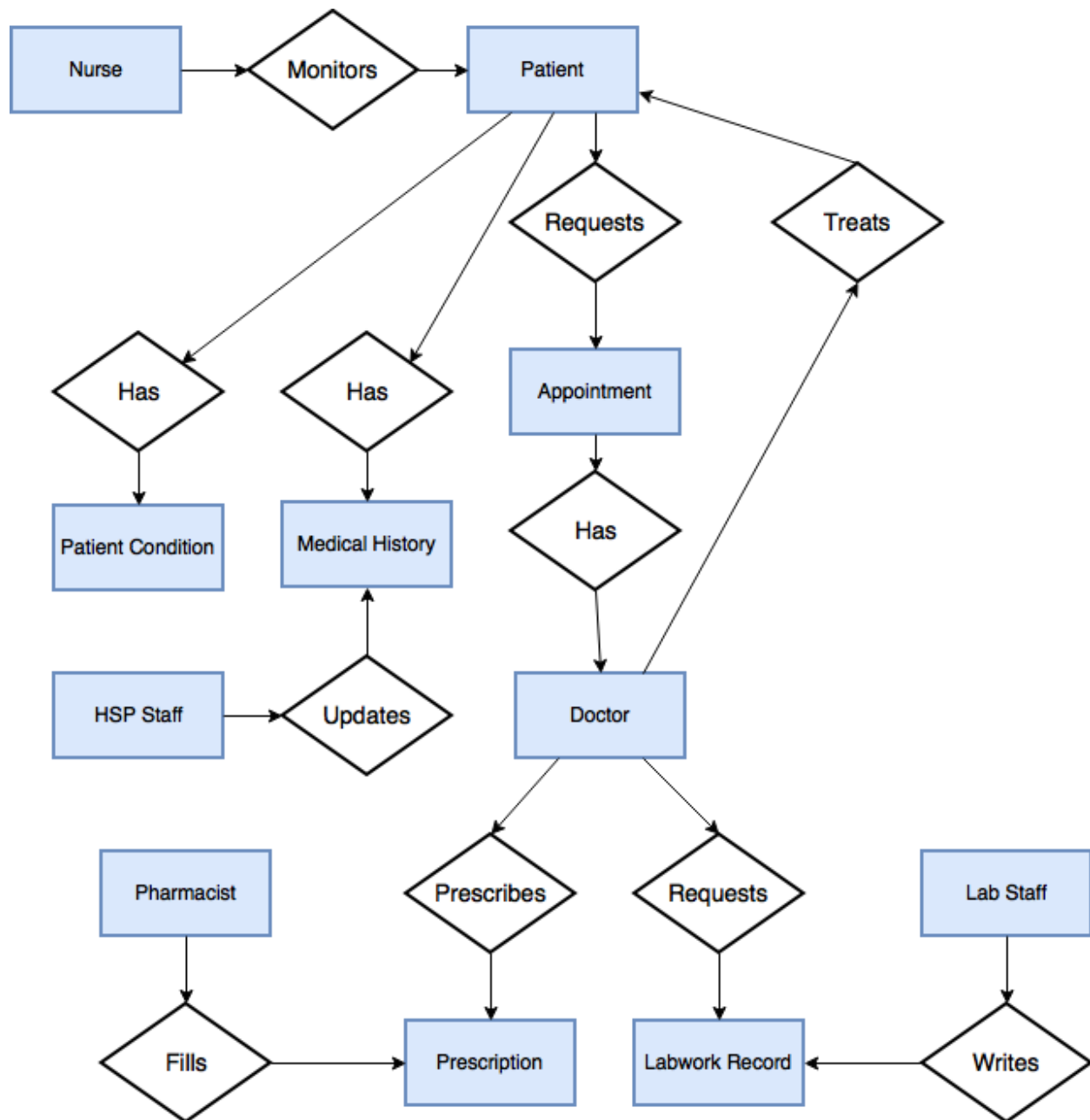
Figure 3.3.1.1 – Logical structure of the Medical Information System data

3.3.2 Entity Descriptions

Patient Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:

id	integer	Unique ID of patient assigned by the system	Used as primary key for patient table
name_first	text	First name of the patient	
name_last	text	Last name of the patient	
gender	text	Gender of patient	Valid values are "m" or "f"
ssn	integer	Patient's Social Security Number	
address	text	Patient's current address	
phone	text	Patient's phone number	
dob	text	Patient's date of birth	Formatted as "YYYY-MM-DD"
weight	real	Weight of patient	Weight in kilograms
height	real	Height of patient	Height in centimeters

Doctor Entity

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of doctor staff member	Used as primary key for doctor table
name_first	text	First name of doctor	
name_last	text	Last name of doctor	
specialty	text	Doctor's area of expertise	Used to filter doctors based on specialty

Nurse Entity

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of nurse staff member	Used as primary key for nurse table
name_first	text	First name of nurse	
name_last	text	Last name of nurse	

HSP Staff Entity

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of HSP staff member	Used as primary key for HSP staff table
name_first	text	First name of HSP staff member	
name_last	text	Last name of HSP staff member	

Lab Staff Entity

Data Item:	Type (SQLite data type):	Description:	Comment:

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of lab staff member	Used as primary key for lab staff table
name_first	text	First name of lab staff member	
name_last	text	Last name of lab staff member	

Pharmacist Entity

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of pharmacist	Used as primary key for pharmacist table
name_first	text	First name of pharmacist	
name_last	text	Last name of pharmacist	

Prescription Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of prescription assigned by the system	Used as primary key for prescription table
patient_id	integer	ID of patient with this prescription	Foreign key used to look up the patient with this prescription in the patient table
name	text	Name of medication	
dosage	integer	Prescribed dosage amount	Dosages are measured in milligrams

Labwork Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:
request_id	integer	Unique ID of labwork request assigned by system	Used as primary key for labwork table
patient_id	integer	ID of patient this lab work applies to	Foreign key used to look up the patient that this lab work applies to in the patient table
description	text	Description of lab work procedure	
complete	integer	Flag indicating if lab work has been completed	Valid values are 0 or 1
data	text	File name of file containing lab work results	Files containing lab results are uploaded to the Medical Information System. These files are saved for retrieval by the system. The filename is saved with the labwork entity for retrieval from storage.

Appointment Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:

id	integer	Unique ID of appointment assigned by system	Used as primary key for appointment table
patient_id	integer	ID of patient with the appointment	Foreign key used to look up the patient with this appointment in the patient table
doctor_id	integer	ID of doctor seen for this appointment	
description	text	Description of the appointment	
datetime	text	Date and time of appointment	Formatted as ISO8601 text string: "YYYY-MM-DD HH:MM:SS.SSS"

Patient Condition Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of condition entry assigned by system	Used as primary key for patient condition table
patient_id	integer	ID of patient with this condition	Foreign key used to look up patient with this condition in the patient table
condition	text	Condition name	User can select condition from a list of predefined conditions and symptoms
notes	text	Notes made by nurse or doctor about patient's condition	This field is only editable and viewable by nurses and doctors

Medical History Entity:

Data Item:	Type (SQLite data type):	Description:	Comment:
id	integer	Unique ID of medical history entry assigned by system	Used as primary key for medical history table
patient_id	integer	ID of patient with this medical history item	Foreign key used to look up patient with this medical history item in the patient table
description	text	Description of medical history item	
date	text	Date relevant to medical history item	This date may be a specific date for a procedure such as a surgery, or it may be a timespan or year for other past conditions.

3.3.3 Security

Client information is stored on the server. The server is protected by up to date security firmware to prevent an unauthorized access to our system. Only authorized persons from our health service facility will have an access to client information.