



Kingdom of Saudi Arabia
Ministry of Higher Education
Majmaah University
College of science at Az-Zulfi
Department of computer science and information



Personal Health Record (PHR)

CSI Dept. Majmaah university.

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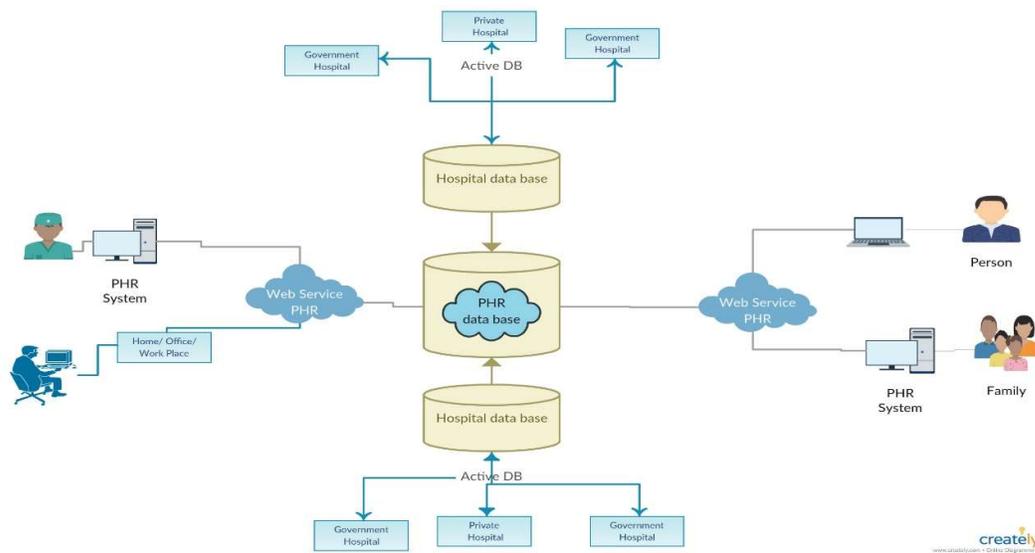
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Chapter 1

1.1 INTRODUCTION:

A personal health record (PHR) is an electronic system through which people can access, manage and track and share past and current information about your health or the health of someone in your care. PHR tools enable an individual to play a more active role in their health. Sometimes this information can save you the money and inconvenience of repeating routine medical tests. Even when routine procedures do need to be repeated, your PHR can give medical care providers more insight into your personal health story. This stands in contrast to the more widely used electronic medical record, which is operated by institutions (such as hospitals) and contains data entered by clinicians or billing data to support insurance claims. The intention of a PHR is to provide a complete and accurate summary of an individual's medical history which is accessible online. The health data on a PHR might include patient-reported outcome data, lab results.



One of the prime advantages of PHR is that it provides a continuous relationship between patient and the physician whereby any encountered changes can be addressed in less amount of time. Another advantage of PHR is that it provides patients with credible health information and enables them to manage their own diseases in a customized way. PHR inculcates a sense of involvement and self-

monitoring which is an important aspect of modern day health management. PHR can also be used by proxies of patients i.e. their friends and relatives (only if authorized by patients) thus enabling them to manage the health of their loved ones.

PHR systems are also beneficial for doctors and clinicians. The patients may enter additional data in their PHR including their personal observations and details symptoms which are helpful for clinicians to make better decisions. The clinicians can also use PHR systems to share medical records in an efficient way. Moreover, the continuous electronic communication via PHR helps in saving time of clinician by reducing the number of telephonic conversation and face to face meetings.

1.2 Problem Statement

The localized data storage of patient's health data restricts the access of health records in case of emergency or travel by other authorized parties such as doctors or nurses. As the health record remains locally in hospitals, if the patient travels to another city in KSA and he needs a medical assistant, then the medical staff in that city knows nothing about his/ her medical history. That's why; this work comes to integrate the medical records into single personal health record that can be accessed globally by the authorized users only.

1.3 Research Goals:

This study aims to develop a personal health record in KSA that allowed authorized users to participate in health care services improvement. To achieve this aim, the following objectives should be met:

1. To develop a PHR system that accumulate and integrate all medical health records into one centralized database
2. To examine the challenges of moving patient's data into a PHR system
3. To evaluate and test the proposed system

1.4 Importance of the study:

The current healthcare industry has several different types of systems for managing patient and health data, ranging from traditional paper-and-pencil methods to electronic record keeping. However, few of these systems are interoperable, and all consider the records to be the property of the maintaining institution rather than the patient. The PHR system solution will put health records back in the hands of the patient and allow for improved communication and flexibility between parties and health care providers.

1.5 Scope of the study:

This study will cover some local hospitals in Saudi Arabia and will be extended in the future to cover all governmental hospitals in the kingdom.

1.6 Questionnaire summary:

1. Were you familiar with the PHR concept before taking this survey?							Response Percent	Response Total
1	Yes					37.50%	3	
2	No					37.50%	3	
3	I'm not sure					25.00%	2	
Analysis	Mean:	1.88	Std. Deviation:	0.78	Satisfaction Rate:	43.75	answered	8
	Variance:	0.61	Std. Error:	0.28			skipped	0

2. Does your health provider or insurance company provide you with a PHR?							Response Percent	Response Total
1	Yes					37.50%	3	
2	No					12.50%	1	
3	I'm not sure					50.00%	4	
Analysis	Mean:	2.12	Std. Deviation:	0.93	Satisfaction Rate:	56.25	answered	8
	Variance:	0.86	Std. Error:	0.33			skipped	0

3. Is the system will be benefit for patients?							Response Percent	Response Total
1	1. Strongly agree					37.50%	3	
2	2. Agree					50.00%	4	
3	3. Agree to some extend					0.00%	0	
4	4. Don't agree					12.50%	1	

3. Is the system will be benefit for patients?							Response Percent	Response Total
Analysis	Mean:	1.88	Std. Deviation:	0.93	Satisfaction Rate:	29.17	answered	8
	Variance:	0.86	Std. Error:	0.33			skipped	0
4. Have you ever used one of the medical records sites ?							Response Percent	Response Total
1	1. Yes						50.00%	4
2	2. No						50.00%	4
Analysis	Mean:	1.5	Std. Deviation:	0.5	Satisfaction Rate:	50	answered	8
	Variance:	0.25	Std. Error:	0.18			skipped	0
5. Do you think evaluation helps improve service quality?							Response Percent	Response Total
1	1. Yes						62.50%	5
2	2. No						37.50%	3
Analysis	Mean:	1.38	Std. Deviation:	0.48	Satisfaction Rate:	37.5	answered	8
	Variance:	0.23	Std. Error:	0.17			skipped	0

1.7 Project scheduling:

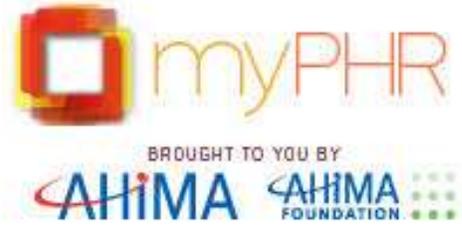


Fig.1.0 Gantt chart

Chapter 2

2.1 Literature reviews:

The American Health Information Management Association (AHIMA) is a national non-profit professional association, founded in 1928, dedicated to the effective management of personal health information needed to deliver quality healthcare to the public.



AHIMA's 71,000+ members are health information management professionals who specialize in managing and protecting your personal health information and medical records in hospitals, doctors' offices, and other healthcare settings.

Health information management professionals care for your health by caring for your health information. Their job is to make sure that all the medical information collected about you is complete, accurate, and protected, yet, readily available for your healthcare providers when it's needed.

AHIMA's vision and values have always been people-centered. After all, the goal of effective HIM is to provide quality healthcare to the public. As part of our mission to serve as a resource for the public, AHIMA is working to help individuals become better managers of their own personal health information by sponsoring a public service initiative that draws upon the unique expertise of AHIMA and its members.

Personal health information is a valuable resource to individuals, their families, and the doctors, nurses, and other healthcare professionals who provide treatment and care. HIM professionals are reaching out—at the community level—to share their knowledge of health information and medical records directly with the public in order to help them better understand and manage their personal health information and thus improve the quality of care they receive.

Chapter 3

3.1 Research methodology:

3.2 Agile methodology:

In software application development, Agile is a methodology that anticipates the need for flexibility and applies a level of pragmatism into the delivery of the finished product. Agile requires a cultural shift in many companies because it focuses on the clean delivery of individual pieces or parts of the software and not on the entire application.

Agile has replaced Waterfall as the development methodology of choice in most companies.

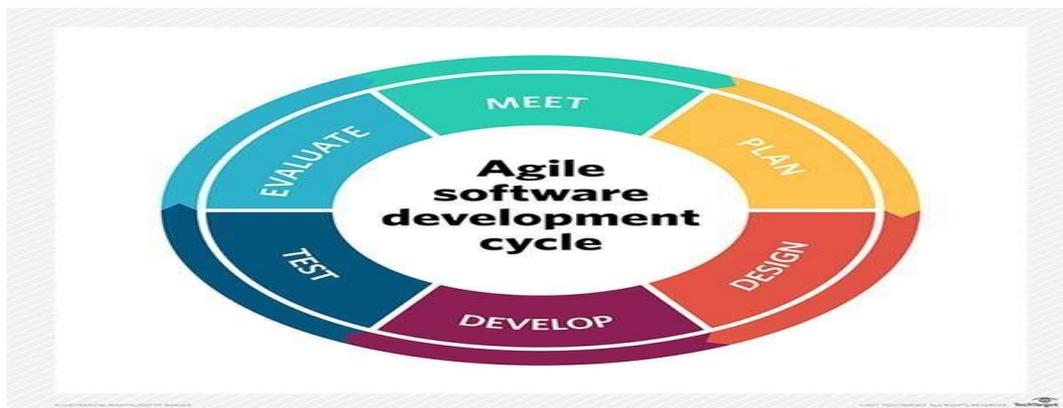
3.3 Twelve principles of the Agile Manifesto

In 2001, 17 software development professionals gathered to discuss concepts around the idea of lightweight software development and ended up creating the Agile Manifesto. The Manifesto outlines the core values of Agile, and although there has been debate about whether the Manifesto has outlived its usefulness, it continues at the core of the Agile movement.

Included in the Manifesto are concepts that were revolutionary at the time, including the emphasis on people and communication, rather than on processes and tools. Other key parts of the Manifesto include working directly with and satisfying customers, breaking all work down into small chunks, meeting daily to ensure work is on track and being open to changes even at the very end of the process.

3.4 Types of Agile methodologies

In any Agile environment, it is likely there are several Agile methodologies being used. One of the oldest of these is extreme programming, which is based on the idea that for successful development to happen quickly, testing must be done regularly. In many cases, the tests must be written even before the code.



Another Agile methodology that is widely used is Scrum. Scrum brings everyone on the team, including the business stakeholders, together to agree on features. Then, specific goals are set for a 30-day sprint, at which point the agreed-upon software is delivered.

Some Agile proponents emphasize Lean development, or Lean Programming, which strips software development down to the basics. Feature-driven, test-driven or behaviour-driven can also be used in an agile environment, depending on the needs of the organization.

3.5 Advantages of Agile:

Much has been compared over the years with Agile versus Waterfall approaches.

In the Waterfall era of software development, coders worked alone, with little to no input before handing the software to testers and then on to production.

Bugs complications and feature changes either weren't handled well, or were dealt with so late in the process that projects were seriously delayed or even scrapped.

The idea behind Agile model, in which everyone -- including the business side -- stayed involved and informed in the development process, represented a profound change in both the culture and a company's ability to get better software to market more quickly.

Collaboration and communication became as important as technology, and because the Agile Manifesto is open to interpretation, Agile has been adapted and modified to fit organizations of all sizes and types. The Agile cultural shift also paved the way for the latest software development evolution, Davos.

3.6 Disadvantages of Agile:

Many would say the biggest disadvantage of Agile is the fact it has been modified -- some would say diluted -- by many organizations. This phenomenon is so widespread that the "Agile my way" practitioners are known as "Scrum butts," as in, "We do Scrum in our organization, but...".

Although Agile opens up the lines of communication among developers and the business side, it's been less successful bringing testing and operations into that mix -- an omission that may have helped the idea of Davos gain traction.

Another potential concern about Agile is its lack of emphasis on technology, which can make it difficult to sell the concept to upper managers who don't understand the role that culture plays in software development.

Chapter 4

System Requirements:

4.1 Functional Requirement :

- The system must maintain basic patient information and permissions on the central server.
- The system should allow patients to create new accounts.
- The system should allow users to store important information such as sensitivity and conditions On the central server.
- The system should allow approved emergency medical facilities access to important information Such as allergies and conditions as needed.
- The system must maintain medical records of patients in full.
- The system must provide a common API for health information systems to update and Read records.
- The system should allow authorized health providers to attach information to the system.
- The system should allow patients to view all records stored in the system.

4.2 Data requirements:

- Patient contact information.
- Emergency patient information.
- Medical records of patients.
- Medical records permissions for patients.
- Records of access to medical records of patients.

4.3 Rules of work and logic:

- Only the patient has the right to modify contact information and billing information.
- Accredited medical facilities may only attach medical records to the system.
- Medical records are appended only and are never modified.

4.4 System Design:

4.5 Use Case Model:

4.5.1 Actors and Their Goals:

Actor	Goal
Patient	<ul style="list-style-type: none">• Manage your personal account• Manage data on the system• Manage personal records information
Medical Staff	<ul style="list-style-type: none">• Display medical information for the patient• Add medical information to the patient• Upload medical records to the patient
Follow up the medical condition of friends	<ul style="list-style-type: none">• Display medical information for the patient

4.5.2 Use case diagram:

4.5.2.1 Medical Staff Use case

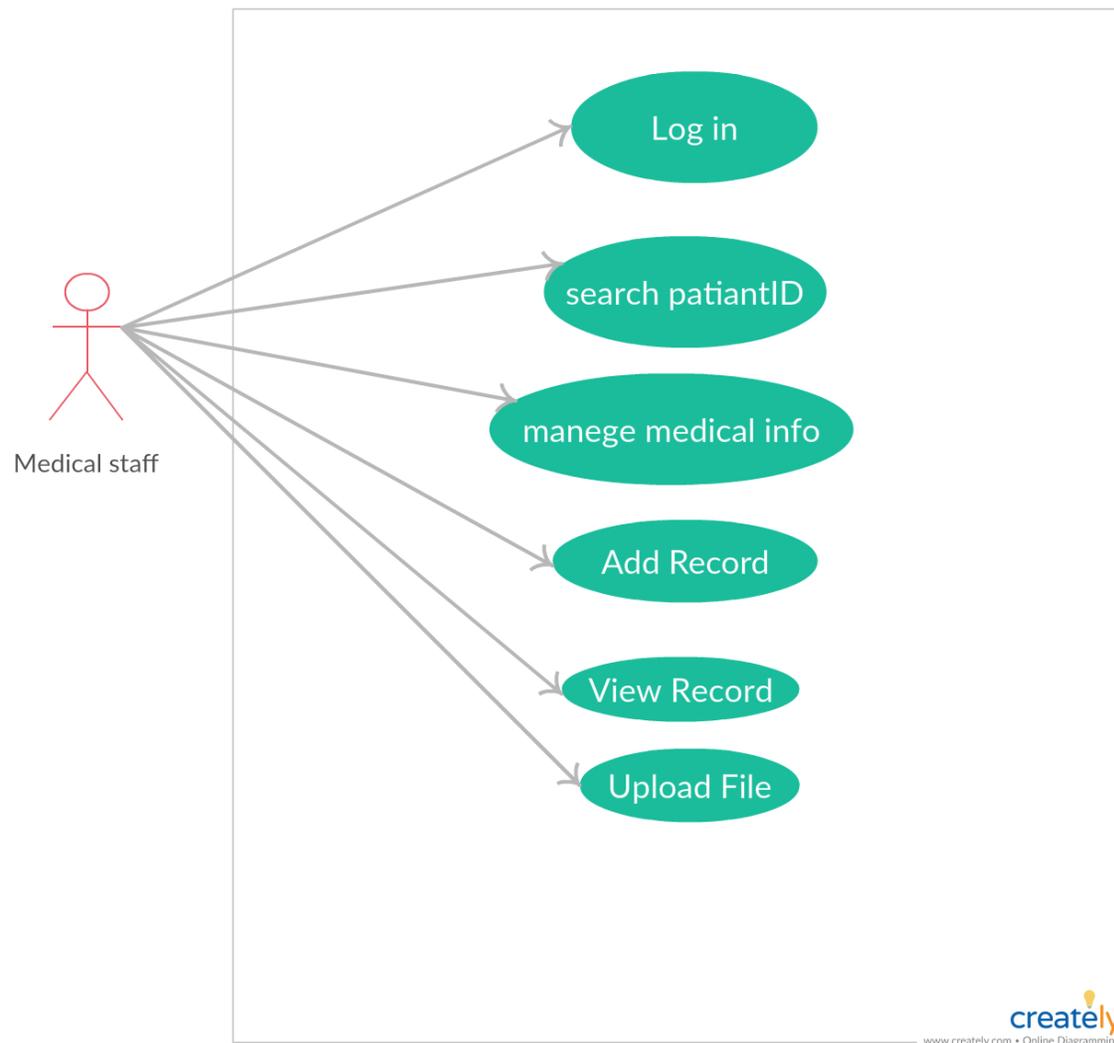


Fig.2.0 Medical Staff (Use-case diagram)

4.5.2.2 Patient Use case

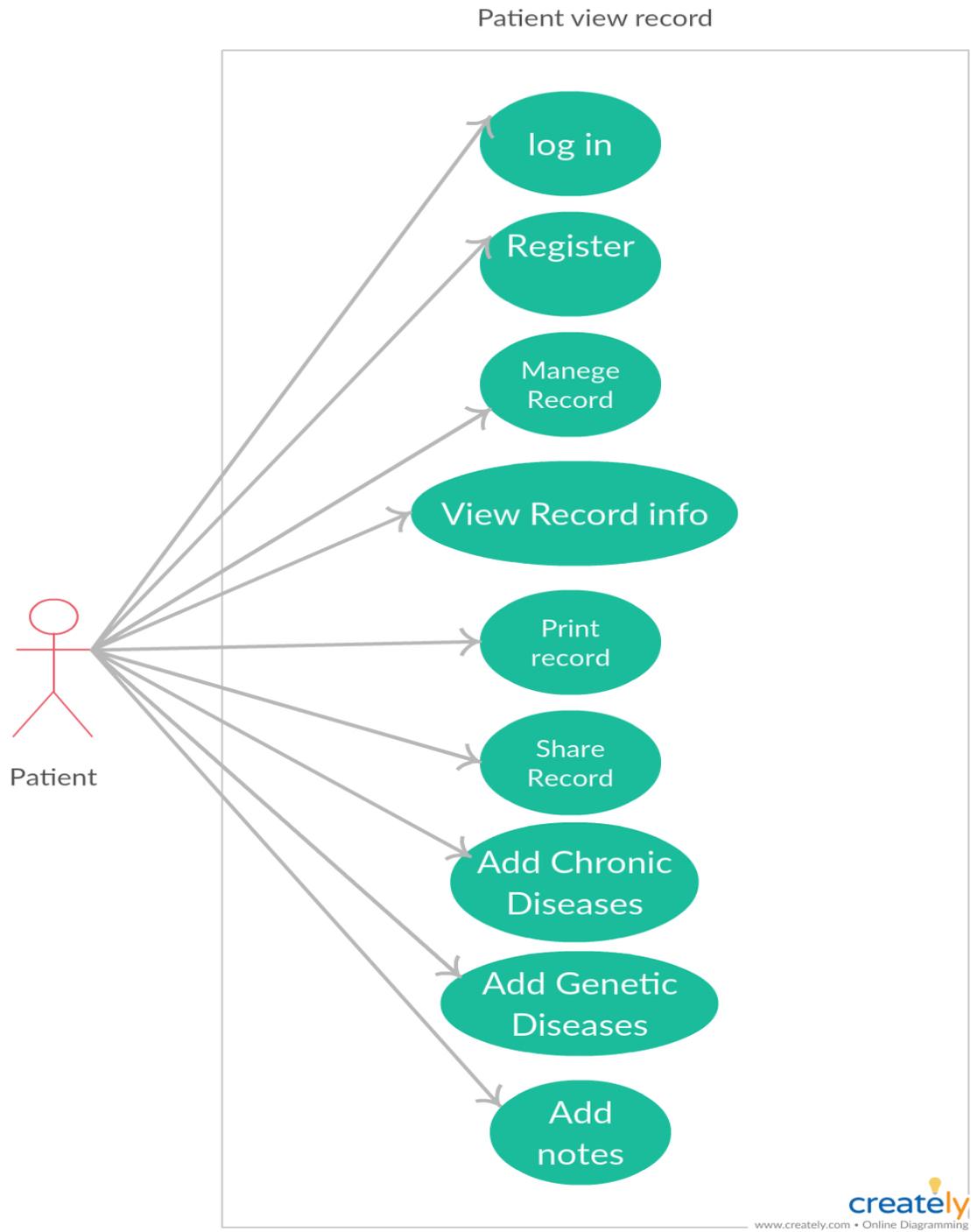


Fig.2.1 Patient (Use-case diagram)

4.5.2.3 system environment Use case

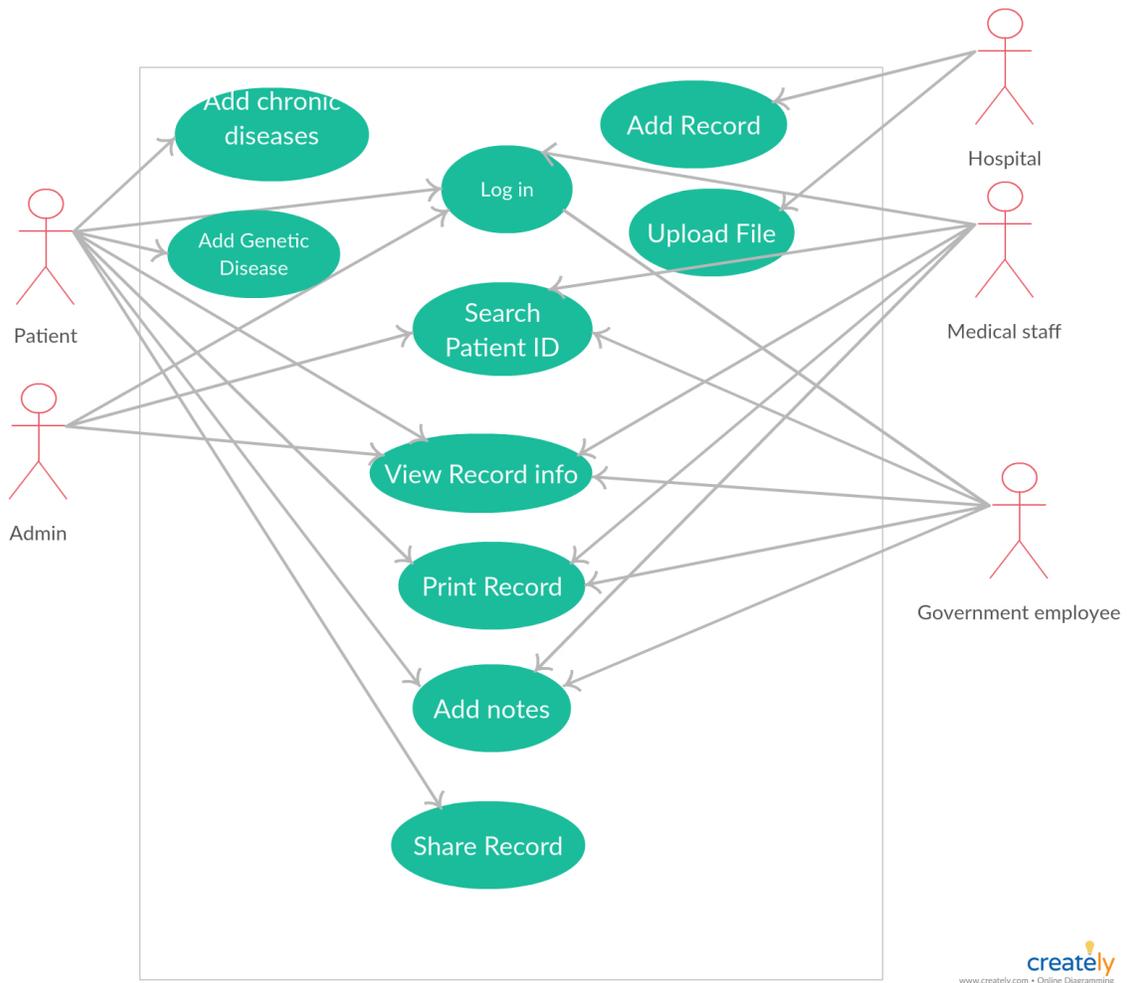


Fig.2.3 system environment (Use-case diagram)

4.6 Use case description:

4.6.1 Update Emergency Info:

USE CASE #		
JSE CASE Name	Update Record Info	
ACTOR	Medical Staff	
Goal	<p>To update the patient’s emergency information for view and use by medical Establishments, doctors, emergency workers.</p> <p>To view the patient’s emergency medical information from the system in the Event of an emergency.</p>	
Overview and scope	<p>Shows the process that the doctor undertakes in order to update his or her Emergency information on the central server. This information is what emergency workers and medical workers and facilities use in the event of an urgent situation, when the patient is injured or unable to speak for him or herself.</p>	
Preconditions	<p>Patient has created an account for use with the Personal Health Record System and has logged into the associated web service. Patient has obtained information in another medium about his or her emergency information, including drug prescriptions, allergies, family history, contact persons, and pre-existing conditions.</p>	
MAIN SUCCESSFUL SCENARIO	Actor Action	System Action
	1- Medical facility employee clicks “Update Record Info” option on PHR page.	2- System displays record medical Types to view or update.
	3- Medical facility employee chooses a record type by clicking on the Appropriately labelled button.	4- System displays any current emergency records on the screen for That record type.
	5- Medical facility employee chooses option to update listing for that type of record medical	6- System displays form entry page for Subscriber to enter information.

	7- Medical facility employee enters appropriate information for the selected Record type.	
	8- Medical facility employee clicks "Save" to Finalize the record.	9- System adds the record that has just been finalized Medical facility employee to the existing list of records for that record.
		10- System displays updated record Listing for the selected record type.
	11- Medical facility employee reviews updated listing to check that Information is correct.	
	Medical facility employee disconnects from System.	
Other non-functional requirements	The confirmation page for the updated record will be shown to the patient Immediately after the "Save" button is clicked. The record listing should Propagate to all involved servers within 24 hours of a record being updated.	

USE CASE #		
USE CASE Name	View Record Info	
ACTOR	Medical facility & Patient	
Goal	To view the patent emergency medical information from the system.	
Overview and scope	Shows the process of viewing a patient's emergency medical information for use by emergency workers when the patient is unconsciousness or similarly Impaired. This information may be used by the facility to contact the emergency contacts listed by the patient for urgent decision making or Information.	
Preconditions	<ul style="list-style-type: none"> • Patient has created an account for use with the Personal Health Record System and updated his or her emergency contact information via the Update Emergency Info on Server use case • medical facility employee is associated with an Emergency Medical Facility with permissions to access Medical Records 	
MAIN SUCCESSFUL SCENARIO	Actor Action	System Action
	1- Employee logs in with username, password, facility ID	2- Verifies the username and password and access permissions
		3- Display patient search window
	4- Employee enters patient's ID in search screen	5- Searches for patients by ID number and displays list of possible matches
	6- Employee selects a patient	7- System displays patient summary information
	8- Employee selects record type for viewing	9- System logs access and displays records
	10- Employee requests to close Window.	11- System Closes

4.7 Activity diagrams:

4.7.1 Update medical record Info:

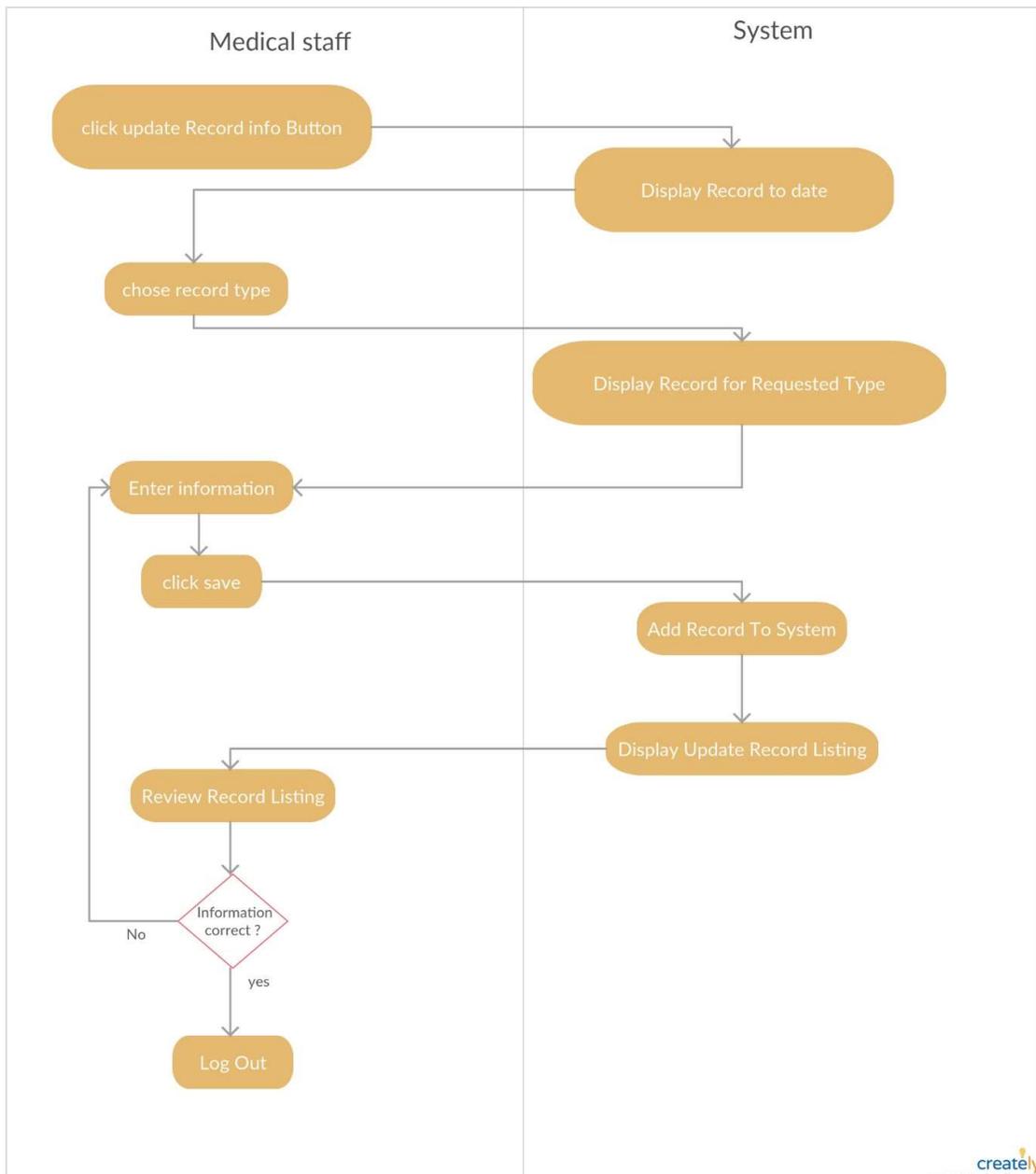


Fig. 3.0 Update medical record (Activity diagram)

4.7.2 View medical record Info (Medical staff):

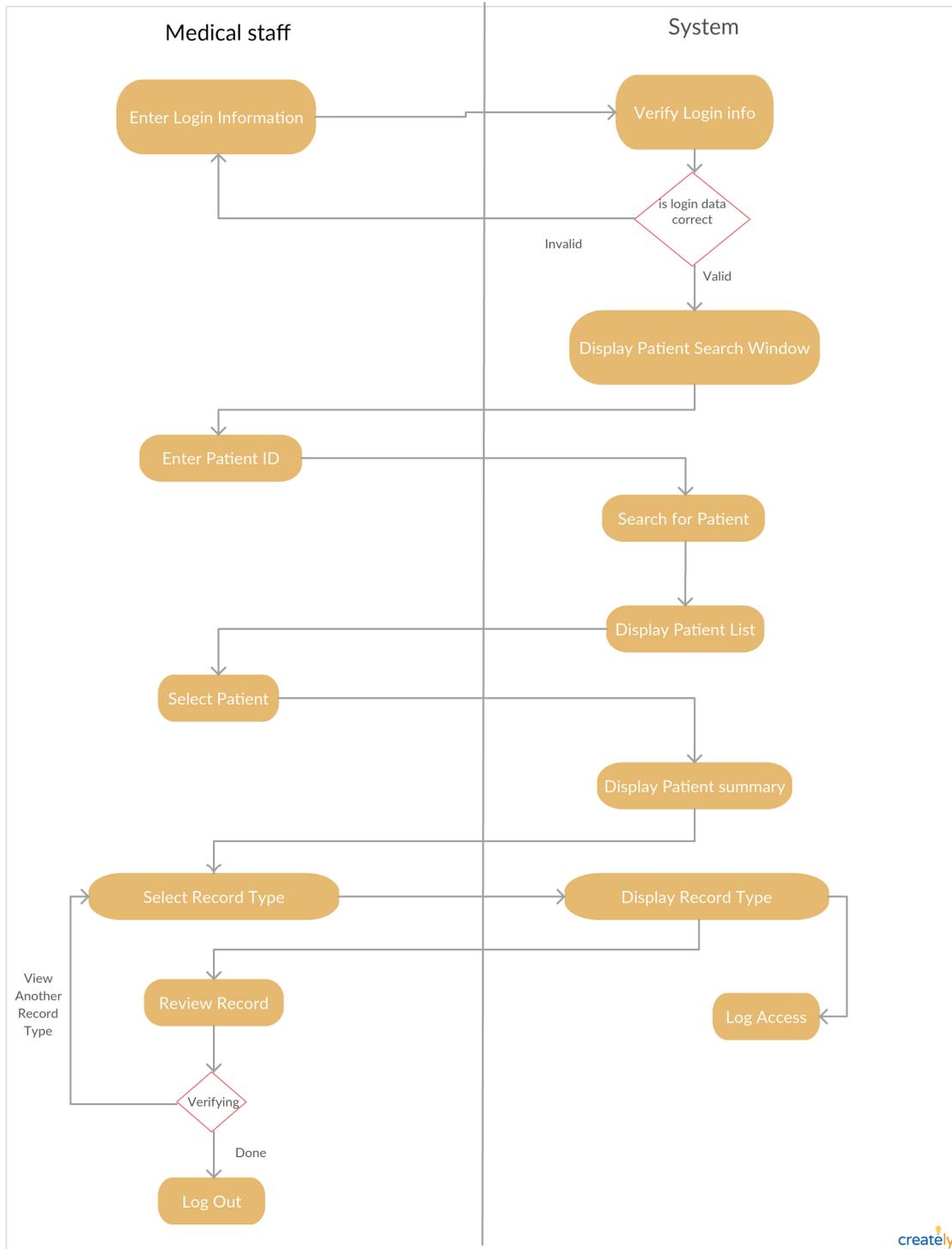


Fig. 3.1 View medical record Medical Staff(Activity diagram)

4.7.3 View medical record Info(Patient)

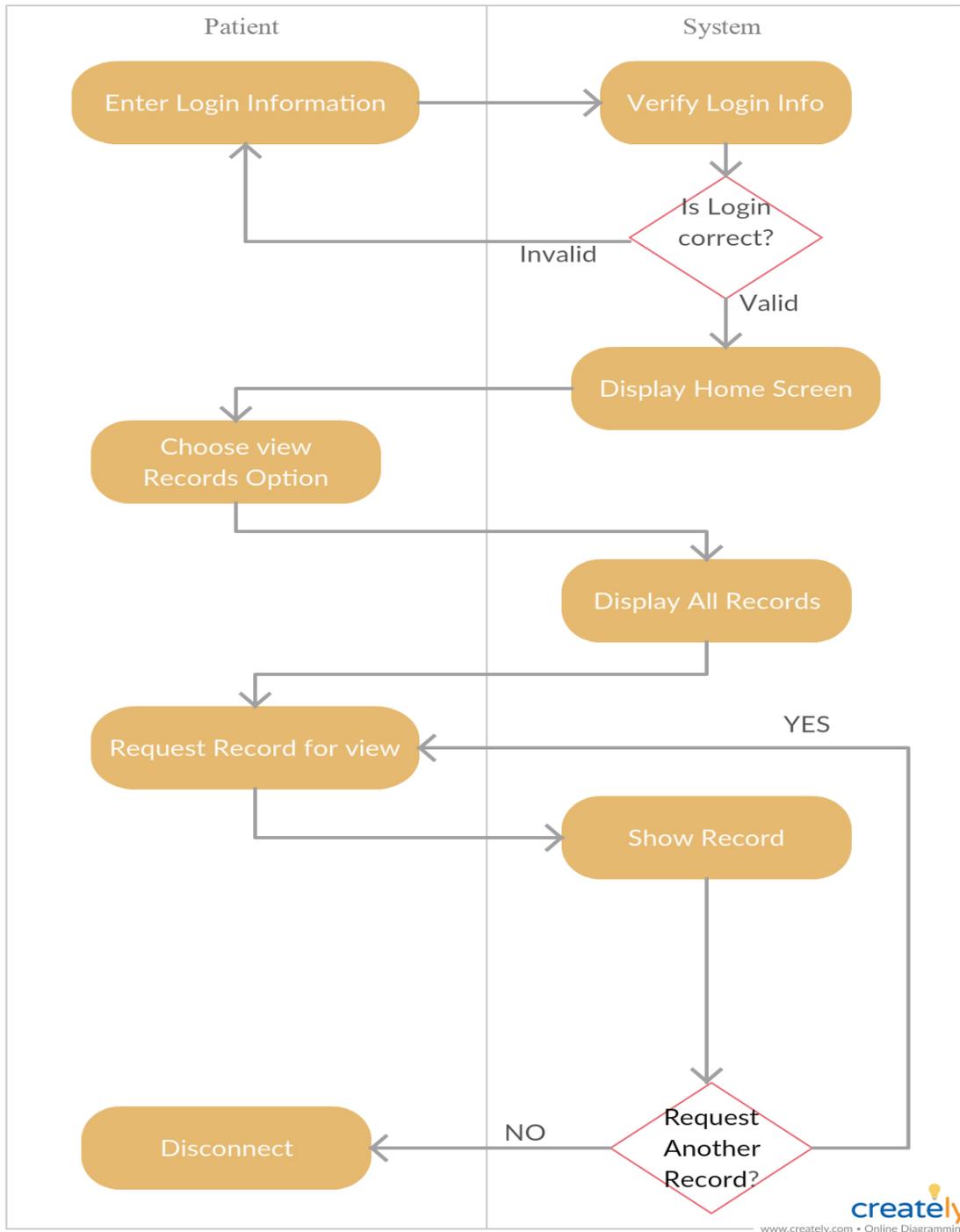


Fig. 3.1 View medical record Patient (Activity diagram)

4.8 System Sequence Diagrams:

4.8.1 Update medical record Info:

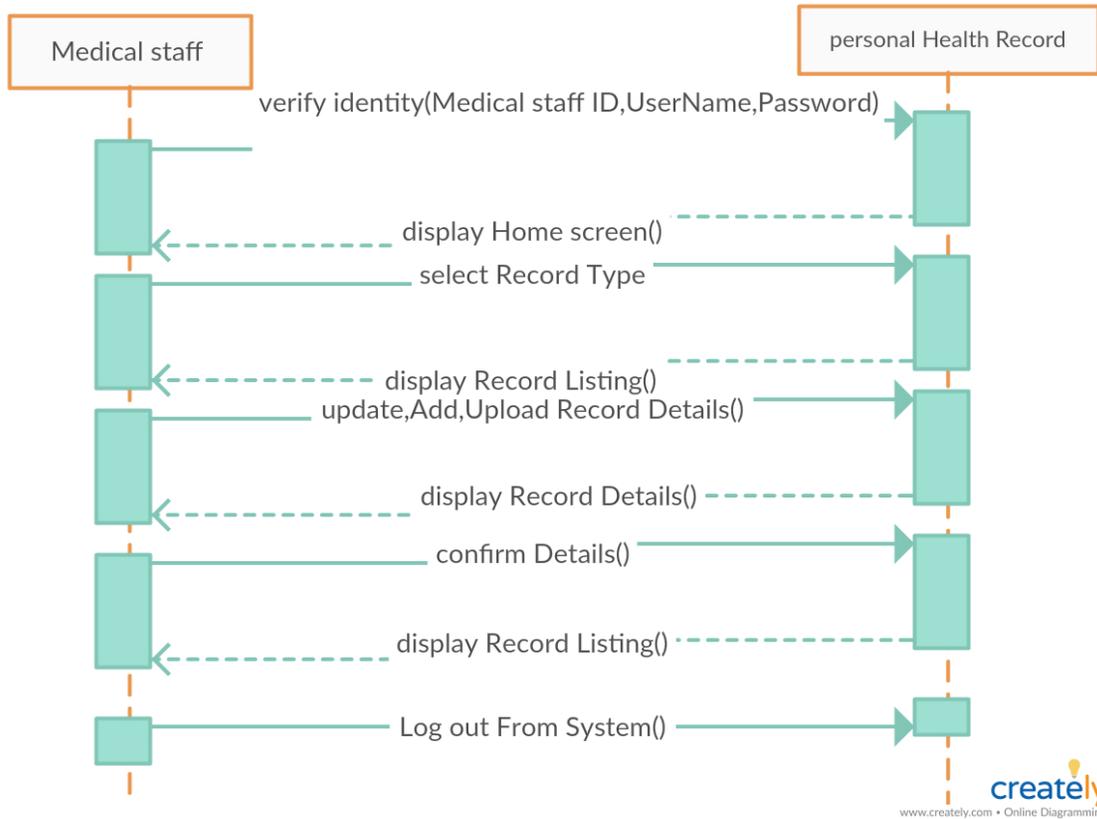


Fig. 4.0 Sequence diagram Medical Staff (Update medical record)

4.8.2 View medical record Info(Medical Staff):

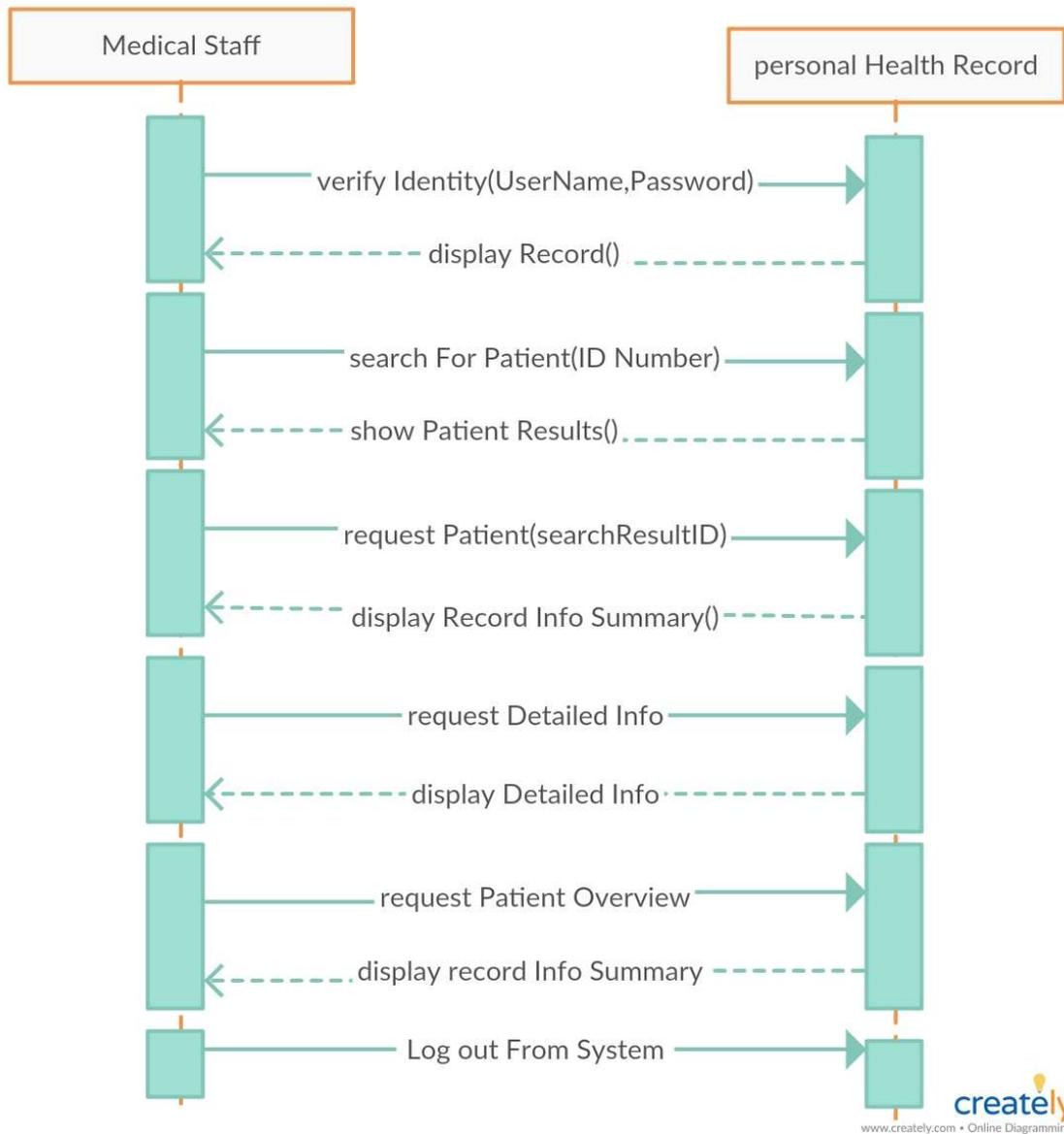


Fig. 4.1 Sequence diagram Medical Staff (view medical record)

4.8.3 View medical record Info(Patient):

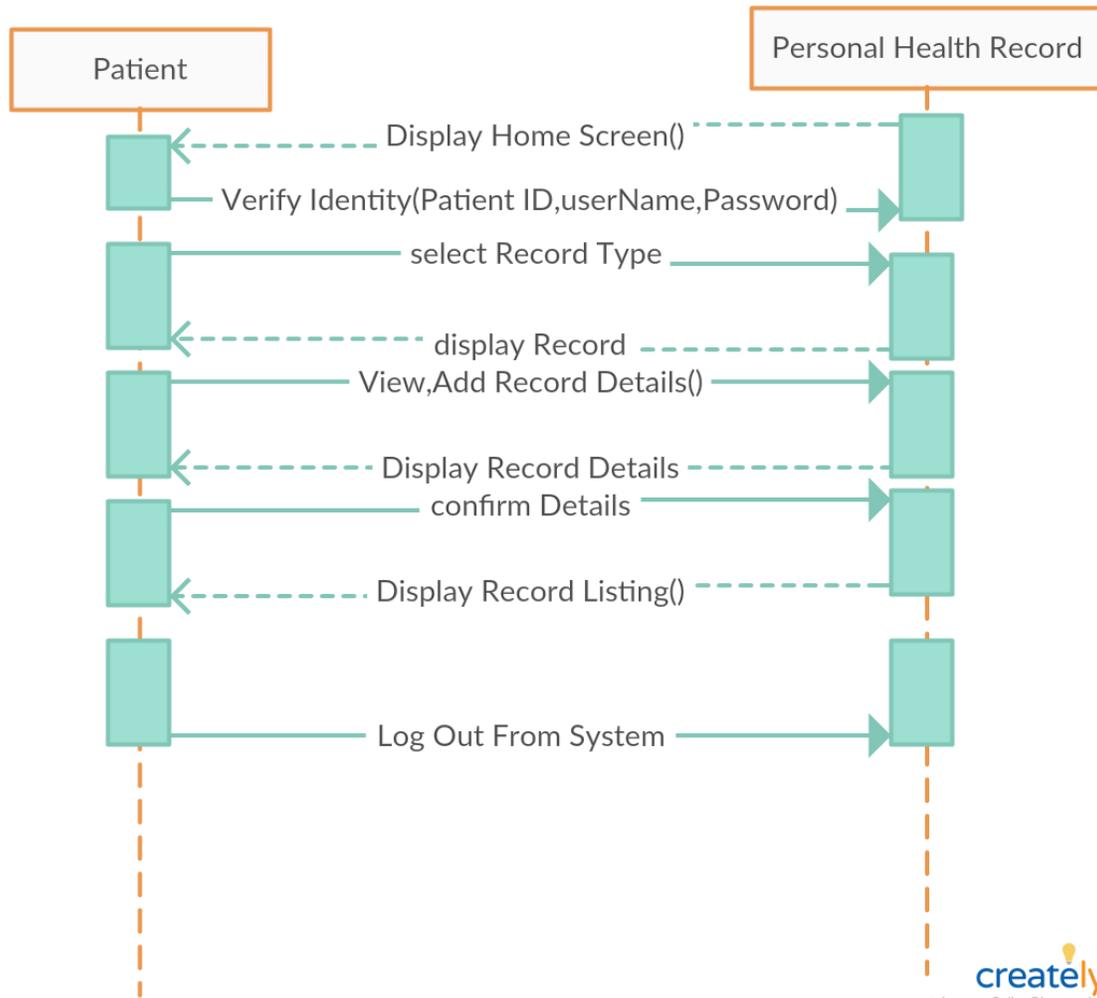


Fig. 4.2 Sequence diagram Patient (view medical record)

4.9 Sequence Diagrams:

4.9.1 Update medical record Info:

The “Update medical record Info” use case sequence diagram depicts the underpinnings of the system’s relationship with the medical Staff. The medical Staff first logins into the system and has his/her identity verified by the information tied to his/her account. Once verified, the system displays a list of services to the patient, who then chooses to modify the emergency records associated with the account

The system pulls up all pre-existing emergency records for all the different record types, allowing the medical Staff to drill down and select the exact record type they wish to update.

Once selected, the system displays all of the records stored for that record type, with the option to add a new one. Once the medical Staff has updated a particular record, the system will display a confirmation page to the medical facility employee in order to ensure that any information entered .

4.9.2 View Medical Record Info(medical Staff):

In the View Medical Record Info detailed system use case we can see the process the system uses to access and display these records.

the system asks for a list of patients matching a first and last name and ID number from a generic patient account object.

Once the user selects the appropriate user the system gets that particular patient object from the system.

This object is then asked for all of its Medical Record.

4.9.3 View Medical Record Info(patient):

In the View Medical Record Info detailed system use case we can see the process the system.

The system shows the patient's medical records, and the patient makes notes or the like.

4.10 Design Class Diagram:

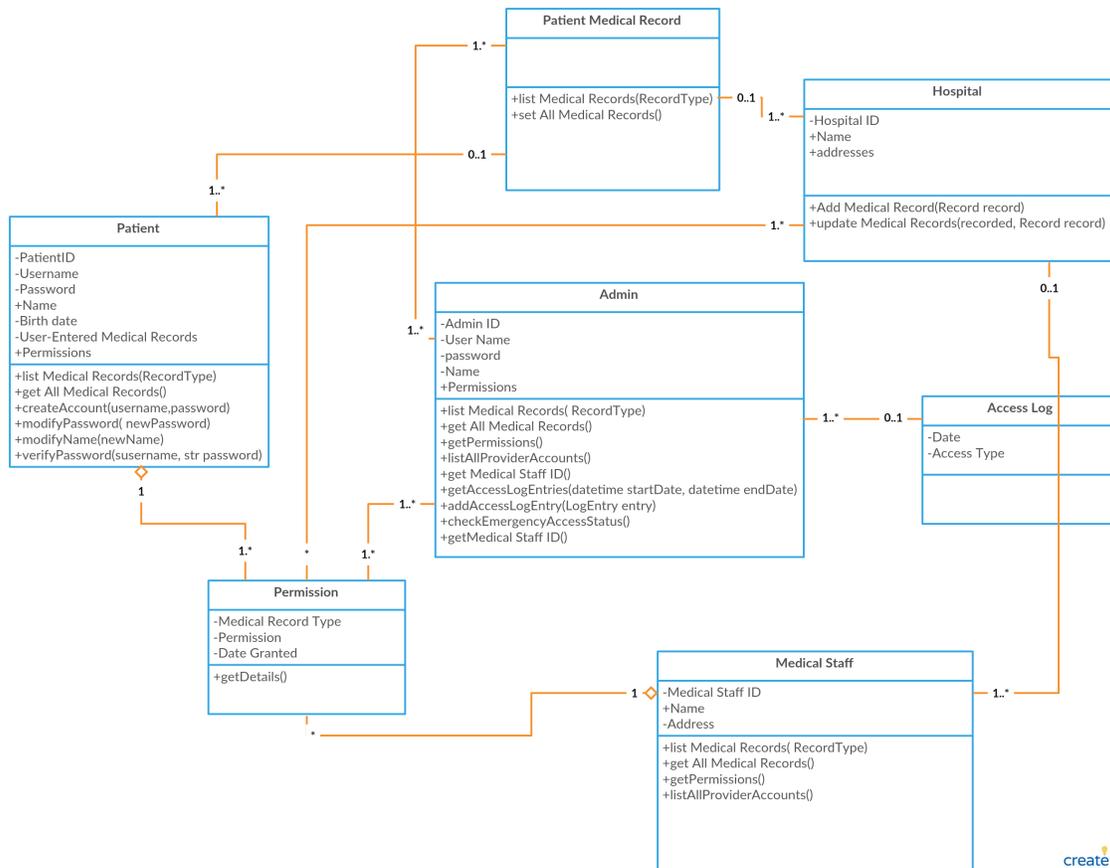


Fig. 5.0 Class diagram

4.10.1 Design Class Diagram:

The design class diagram, while seemingly complex at first sight class diagram. All of the same classes are there, and thus, the same logic and cardinality between the classes is applied. However, reference attributes and operations were added to many of the classes for the purpose of making the diagram more abstraction friendly when it comes time to actually construct the system.

4.11 Physical Design:

4.11.1 ER-DIAGRAM FOR PHR SYSTEM:

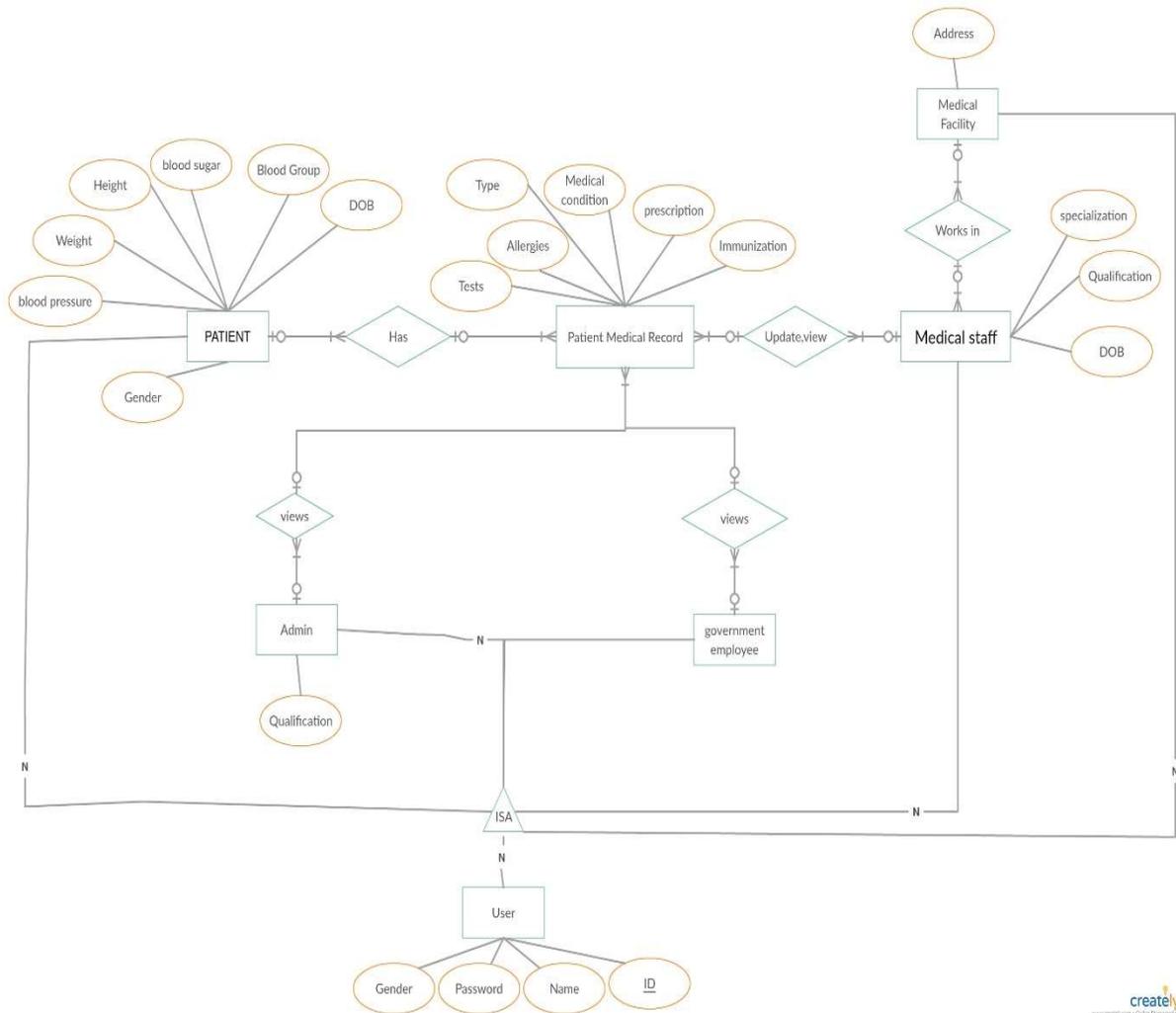


Fig. 6.0 ER diagram

Interaction representation for PHR System has several entities such as PHR, Patient, Registration, Hospital, Tests, Identities, Reports and Treatment. Each entity has several attributes with the relationship in a flow manner. Hospital or Institution contains the In-patient medical module which contains the Patient ID, Patient name and membership date on which the treatment process has been started. They process various tests for several diseases and surgical problems and provide the prescription and drugs which need to be console.

Patient or user details are been registered in PHR it contains information such as Name, Date of birth, Age, Gender, Address, Contact number, Email address and Blood group. PHR also stores several Identities such as Height, Weight, personal identification and other problems.

4.12 Interface:

4.12.1 Home Page :

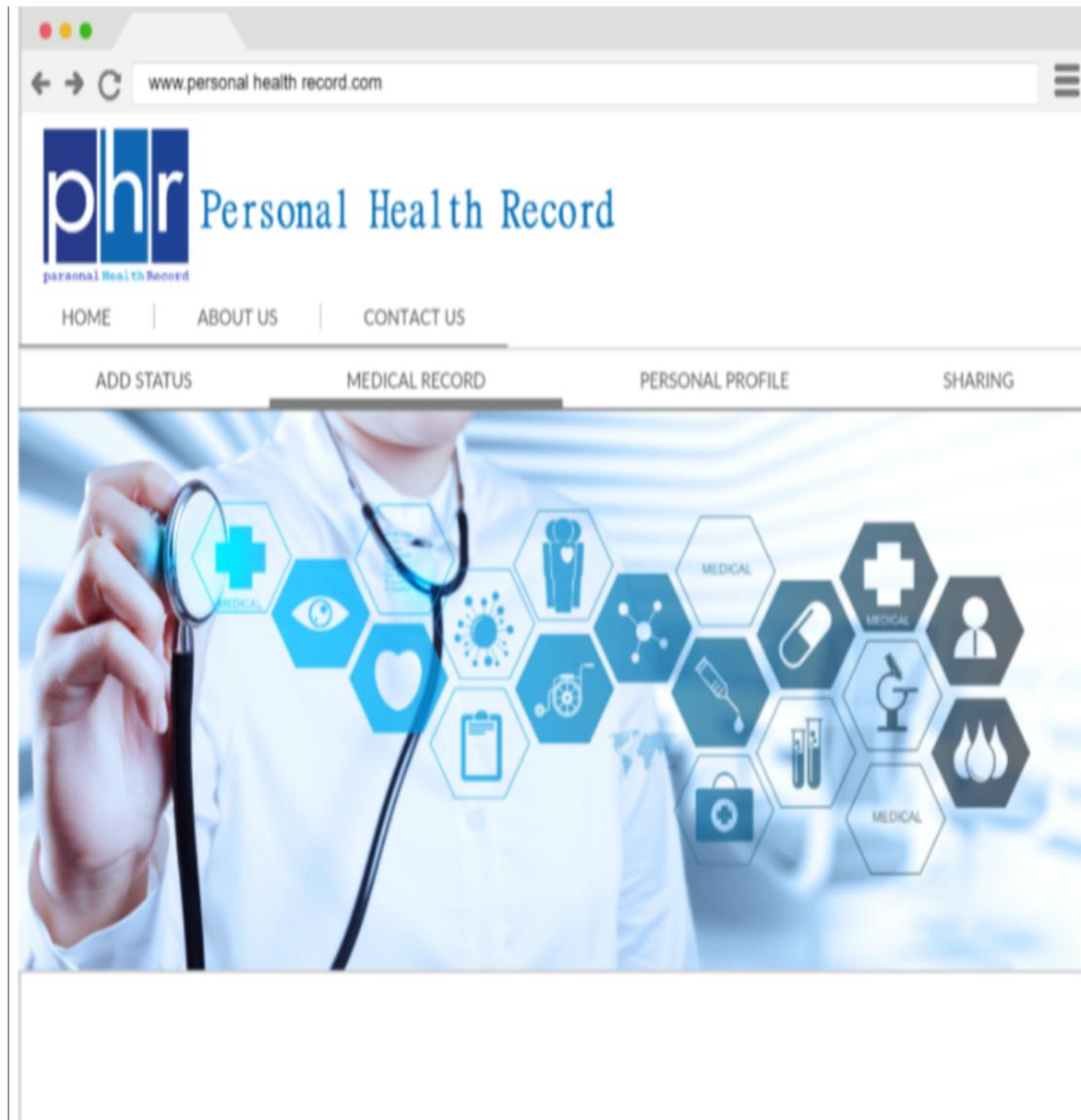


Fig. 7.0 Home page

4.12.2 Login Page:

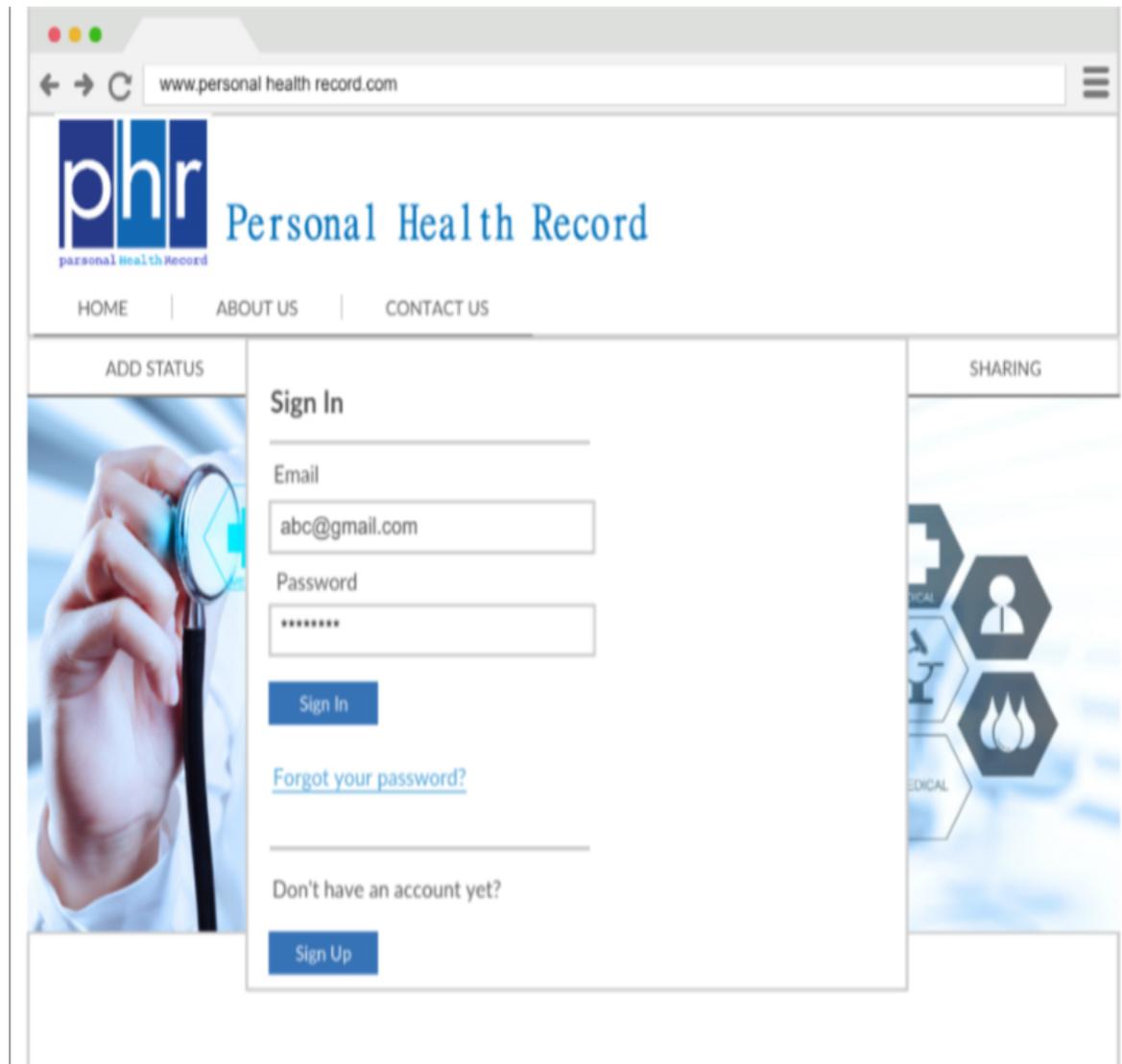


Fig. 7.1 Login Page

4.12.3 Patient Add Status:



Fig. 7.2 Add Status

4.12.4 Patient View Record:

The screenshot displays a web application for a Personal Health Record (PHR). The header includes the logo 'phr Personal Health Record' and a welcome message 'Welcome : abc'. The navigation menu consists of 'HOME', 'ABOUT US', and 'CONTACT US'. Below this, there are four main sections: 'ADD STATUS', 'MEDICAL RECORD' (which is underlined), 'PERSONAL PROFILE', and 'SHARING'. Under 'MEDICAL RECORD', there are three sub-sections: 'chronic diseases' (underlined) listing 'Diabetes wellitus , Hypertension , Bronchial Asthma'; 'Genetic Disease' (underlined) listing 'Hemophilia , G6Pr , Mongolism , Sickle Cell Anemia'; and 'Allergies' (underlined) listing 'Eczema , Allergic'. A sidebar on the left contains a menu with 'prescription' selected, and a list of conditions: 'Diabetes Mellitus', 'Hype Tension', and 'Gastric ulcer'. Other items in the sidebar include 'X-Rays', 'Tests', 'Operations', 'Medication', 'Allergies', and 'Medical condition'. The 'create' logo is visible in the bottom right corner.

Fig. 7.3 View Record (Patient)

4.12.5 Medical Staff view Record:

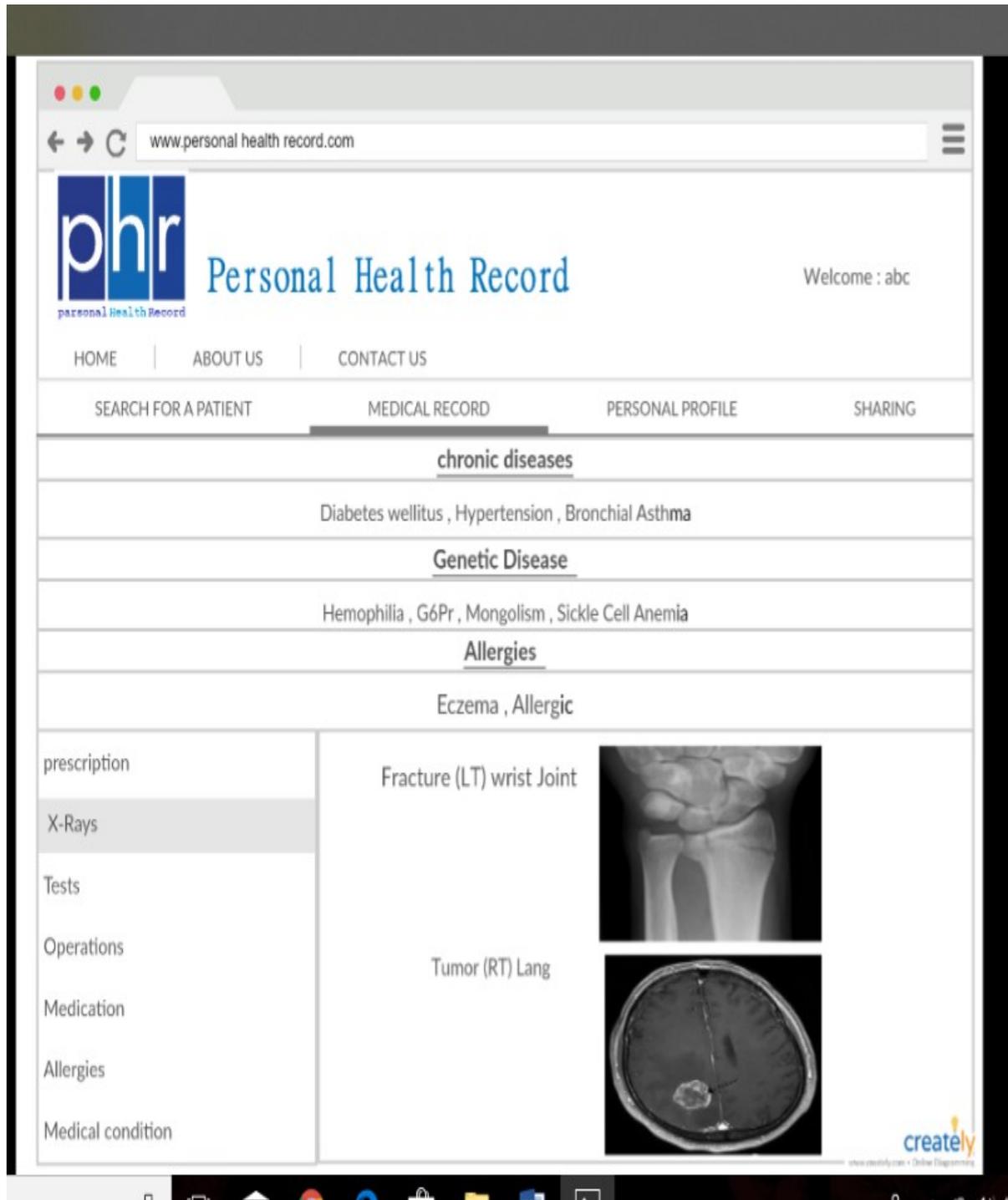


Fig. 7.4 View Record (Medical Staff)

4.13 Reference:

- Dr. Yousef Qawqzeh as supervisor
- https://www.slideshare.net/kelemam/the-adoption-of-personal-health-records-by-consumers?qid=aa80253e-f11e-4ace-aa22-e19084ac1230&v=&b=&from_search=4
- http://www.myphr.com/tools/about_us.aspx
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Mafawez Alharbi , Yousef K. Qawqzeh .
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-