Developing an Online Integrated Health Information Management System a Case Study of Makerere University Business School (MUBS)

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Abstract: The most recent technological advancements have opened up fresh opportunities for a comprehensive E-Health system. In order to improve the delivery of services in health care administration, this allows modules for pharmacists, laboratories, the accounting profession, and many more to be integrated into one system. The study's only objective was to improve the way that health services were provided to the MUBS Fraternity by creating a comprehensive health care data administration system. Upkeep of the system: Programmers can use objects for expressing real-world circumstances thanks to the practice of object-oriented programming. The term object is anything that has contends and actions, which means characteristics or data of an object as well as actions of an object. For instance, the system that was suggested enables feedback by allowing individuals to interact with healthcare providers by setting up appointments associate pastor. It is advised that the associate pastor's technical staff do system upkeep by updating and upgrading the system to ensure ongoing and effective operation.

Keywords: **online integrated, health information and management system**

Background of Study:

An electronic health data management system is a computerized system created for the betterment of medical treatment for individuals, healthcare providers, and the complete medical team, as defined (Azeemet-al, 2019). It can be utilized to oversee patients, healthcare professionals, and provide a full range of services for hospitals and medical centers. According to Tivani et al. (2019), the healthcare industry is falling behind in the age of technological advancements. However, (Husnain et al., 2019) note that using an E-health administration system to provide outstanding medical treatment is neither cheap nor simple. According to the qualitative investigation, using the Electronic Administration Record instead of paper for daily chores by doctors is crucial for the enhancement of quality.

The need to investigate the use of an E-health management database for the evaluation and management of non-communicable as well as communicable illnesses has grown significantly in many nations around the world, according to Thokozani et al. (2019).Additionally, the corona virus disease 2019 (COVID-19) pandemic's emergence in nations with low or middle incomes with significant illness burdens increases the requirement for a reliable E-health management data system to enable effective epidemiological monitoring. E-health management software may make it possible to give illness evaluations at the point of care more effectively while also lowering medical errors.

Statement of the problem:

The health center services at MUBS are provided using a manual system. These individuals expect immediate access to healthcare facilities at the healthcare facility as well as the ability to obtain medical information quickly. However, the manual process has created many difficulties for both patients and medical professionals at the health center, including: traffic, loss of patient medical information, excessive paperwork that drives up operating costs, delays in providing health services to patients, and many more.

Specific Objectives:
1. To determine the requirements for designing an Online Integrated Health Management Information system for Makerere University Business School
2. To analyze the requirement for designing the proposed system for MUBS.
3. To design an online health management information system for Makerere University Business School.
4. To develop an Online Health Management Information System for Makerere University Business School.
5. To test and implement the developed Online Health Information Management System for Makerere University Business School.

Research questions

1. What are the requirements for designing an Online Integrated Health Management Information system for Makerere University Business School?
2. What is the requirement for designing the proposed system for MUBS?
3. How is an online health management information system for Makerere University Business School?

Methodology

Research Design/ Approach

We employed the planning science method in our study. The design scientific strategy, which offers particular recommendations for assessment within research endeavors, is an outcome-based technological research technique (JHBeinke, 2019). The investigator was able to determine the company's demands that were utilized to construct a straightforward model (prototype) outlining how the system was to be constructed because this method of development focused on the study's overall objectives.

Study Population

MUBS has a population of 22000 students according to the Registrar at Nakawa campus and this acted as our population study.

Study Sample

Orodho and Kambo (2002) define sampling as the procedure a researcher uses to gather people, places, or things to study about during the research.

We employed Taro Yamane Formula (Yamane, 1973) to determine the sample size and this is given by

$n = N/1 + N(e)^2$

Where;

n is the required sample size from the population under study,

N is the whole population under study.

e is the precision sampling error which is usually 0.10, 0.05, or 0.01.

Since our population under study was 22000, therefore;

N = 22000 and taking e = 0.05.

Applying the above formula,

$n = 22000/ (1 + 22000(0.05)^2)$

n = 392.857

Therefore, the sample size will be 392.857 approximately 393.

Sampling Design/ Sampling Technique

Simple Random Sampling Technique

The investigator wrote names down and chose randomly which of the 393 participants were to be questioned during collection considering this method gave each qualified the participant a chance to be chosen. This is known as eliciting requirements (data collection) techniques.
Observation

Monitoring is a method of acquiring information by keeping an eye on behavior, events, or recording physical traits in their natural environment, as defined by Duke University (2021). Using this technique, we watched as students registered for health services at the health center while it was happening at MUBS.

Interviews

According to Cresswell, (2012), an interview is typically a face to face conversation between a researcher and a participant involving the transfer of information to the interviewer. We collected data by asking random students regarding their views on MUBS manual health registration process, the manual procedures used in getting medication, the challenges faced during registration and getting medication.

System Analysis and Design

System Analysis

System assessment is the procedure by which a person studies a system so that a computer system may be examined, modeled, and an appropriate substitute can be chosen, as defined by Tonya, 2003. He notes that three factors—problems, possibilities, and directives—are used to launch system analysis studies. Rasmussen, however, emphasizes the fact that system design is a combined engineering effort that makes effective systems possible. He notes that the system could be thought of as a cohesive collection of parts that work together to achieve a specific goal.

System Design Approach

System design refers to designing and finally developing the system needed to solve the problem. An Iterative design approach was used because it allows to roll changes out quickly after testing, issues can easily be identified and these are collected to get better insights. This design approach helped to identify design issues per stage and therefore correcting them until the full system was completed.

RESULTS

System Investigation/ Feasibility Study

While the present structure has the major advantage of being obtainable to everyone, according to students, staff, and health individuals at the MUBS health center, it also has numerous shortcomings, including the drawn-out processes a patient must go through to be confirmed and hazardous manually operated record keeping.

The system that was suggested allows consumers to sign up by adding their private data like name, electronic mail address, cellphone number, and the location to allow these individuals to enroll as contributors to the medical facility's services, of which in case of anybody descending sick he or the woman just passwords into the website to book a visit with the doctor. This is based on the shortcomings and difficulties that we discovered with the present system, which is primarily manual.

We carried out feasibility study where we assessed the viability and liability of the project. We looked at it in terms of;

- ❖ **Technical feasibility** where we developed a web- based Electronic Health Management Information System for MUBS where we used programming languages such as C sharp, MySQL and so many more.
- ❖ **Legal feasibility;** we followed the standards of health and development.
- ❖ **Schedule feasibility**; we had a time lag while carrying out research study, carrying out literature review because access to particular places was limited for non-university students.
- ❖ **Economic feasibility**; we experienced costs in terms of data, transport, hardware that is to say laptop, materials used like pens, papers and so on.
- ❖ **Operational feasibility**; where the current work procedures and practices adequate to support the new system, social factors impact on users

Requirements

The working, ineffective, user, and system-wide requirements for the system that is being considered are included in the technological health information system's necessities specifications, which outlines what the computerized healthcare system is to do and how it performs.

- ❖ Functional specifications
- ❖ These represent the system's fundamental functions, or what the system should accomplish, whereby an operation is defined as a description of how its inputs and outputs should behave. Users can engage in a wide variety of operations with the system we have suggested, all of which determine the behavior of the system and are therefore required. With those specifications, for instance, our system need to enable users to perform the follow actions.
- ❖ The system should allow users to register with the health center.
- ❖ It allows patients to login for appointment booking.
- ❖ It allows patients to book appointments with the health professionals.
- ❖ It allows health professionals to give feedback to the patient.

Non –functional Requirements

These describe how the system works and are to include any features that improve the system to function better that is to say they are used to judge the performance of the system in order to address the issues of correctness in the system for the case of the proposed system, it has the following nonfunctional requirements

- ❖ **Speed**; the electronic health management information system allows users to get health services in real time through the automated registration and booking.
- ❖ **Ability to store data**; the system has a database to enable storage and retrieval of user's information. It allows patients to access their health records in case of desire to be diagnosed
- ❖ **Maintainability**; the system is easy to maintain since it has an admin dashboard
- ❖ **Security features;** the system is secure due to the fact that it enables the user to initiate his or her login details to access health services so as to ensure privacy.
- ❖ **User friendliness**; the system is easy to navigate through using the clear and iconic user interface that enables the user to easily gain access to health records.
- ❖ **Portability;** the electronic health management system is very light and easily runs on every device even those with low memory resources

User Requirements

User requirements explain what users expect the system to do for them once it has been developed for example, for the case of the proposed system, users are expected to access health services in real time by use of just login details to book appointments with health professionals.

System Requirements

Structural/Procedural Design

Structured design breaks the system down into functional modules that is to say it is a top down decomposition of a system functionality for example, the proposed system contains the users of the database such as the students, staff, health professionals and administrators. The system contains various data types and entity attributes such as student information, staff information, administration information in form of strings, numbers, date and time to enable the user input his or her name, password, age, contact details among others.

Data Dictionary

Patient Registration

Name	Type	Size	Description
RegNo(pk)	Vachar()	30	Id for Patient
Name	Vachar()	30	Name for Patient
Address	Vachar()	30	Patient Address
Contact	int	11	Patient contact
Email	Vachar()	30	email for Patient
NOKName	Vachar()	30	Next Of Keen
NOKAddress	Vachar()	30	// address
PayMode	Vachar()	30	Payment method

Fig. 1

Staff Registration

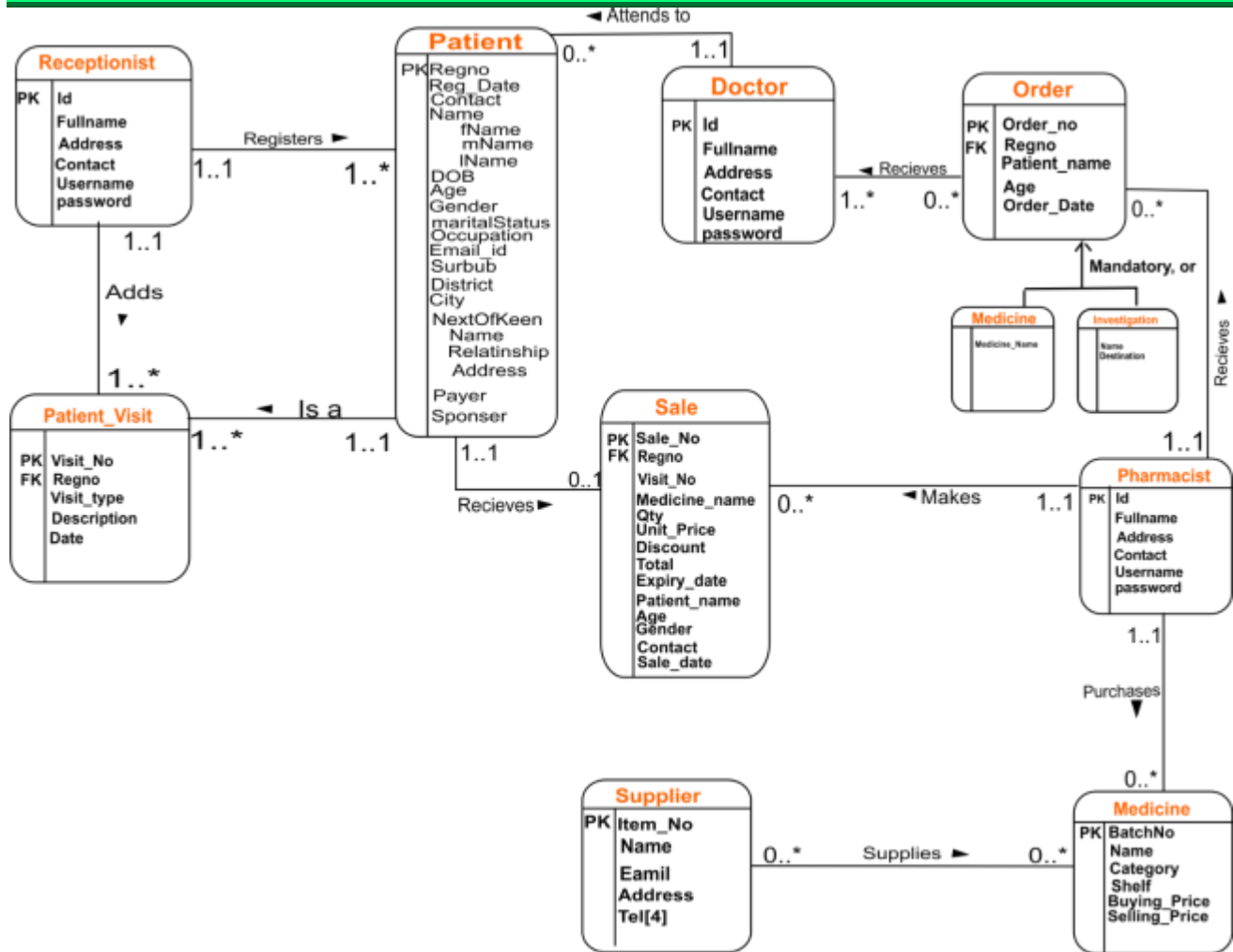| Name	Type	Size	Description
StaffNo(pk)	Vachar()	30	Id for Staff
Name	Vachar()	30	Name for Staff
Address	Vachar()	30	Staff Address
Contact	int	11	Staff contact
Department	Vachar()	30	Department

Fig. 2

ER DIAGRAM
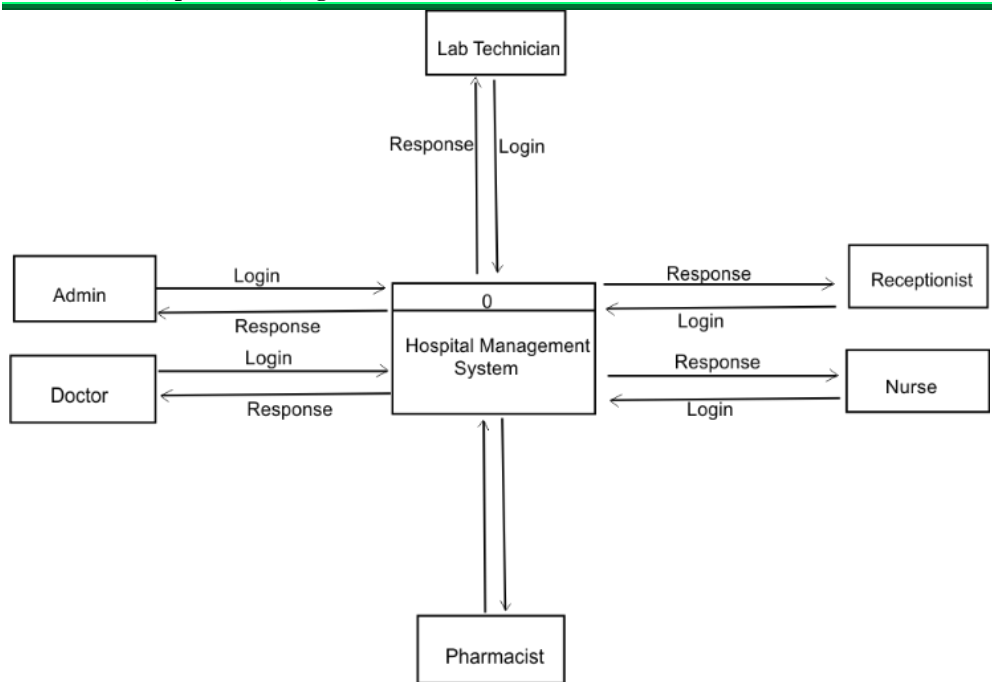
Fig. 3

Context Diagram

Fig. 4

Level 1 Diagram

Fig. 5

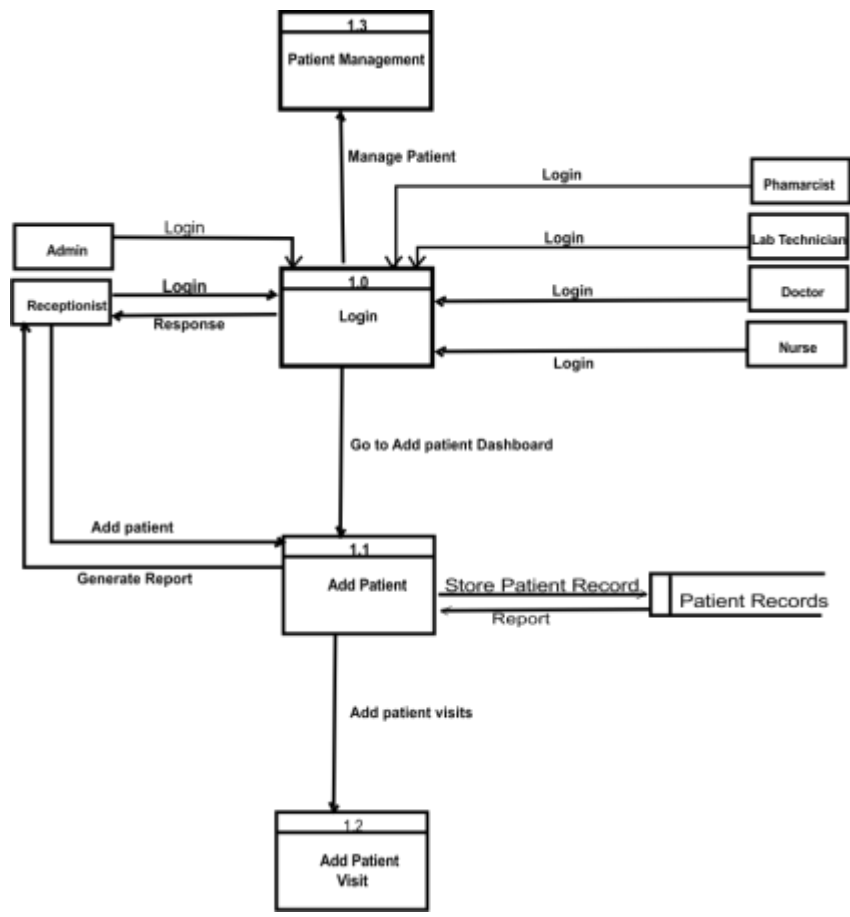## Object Oriented Design

Object oriented programming allows the programmer to represent real world scenarios using objects. An object is any entity that has states and behaviors that is to say attributes or data of an object as well as behaviors of an object for example, the proposed system allows patients to interact with health professionals automatically by making appointments as a way of passing a message and enabling feedback.

Decision tree or problem tree

For this system, I used a decision tree to help me come up with an alternative course of action that could solve the problem of the lengthy procedures related to manual health management information system at Makerere university business school. This helps to visually display the decision and their potential outcomes.
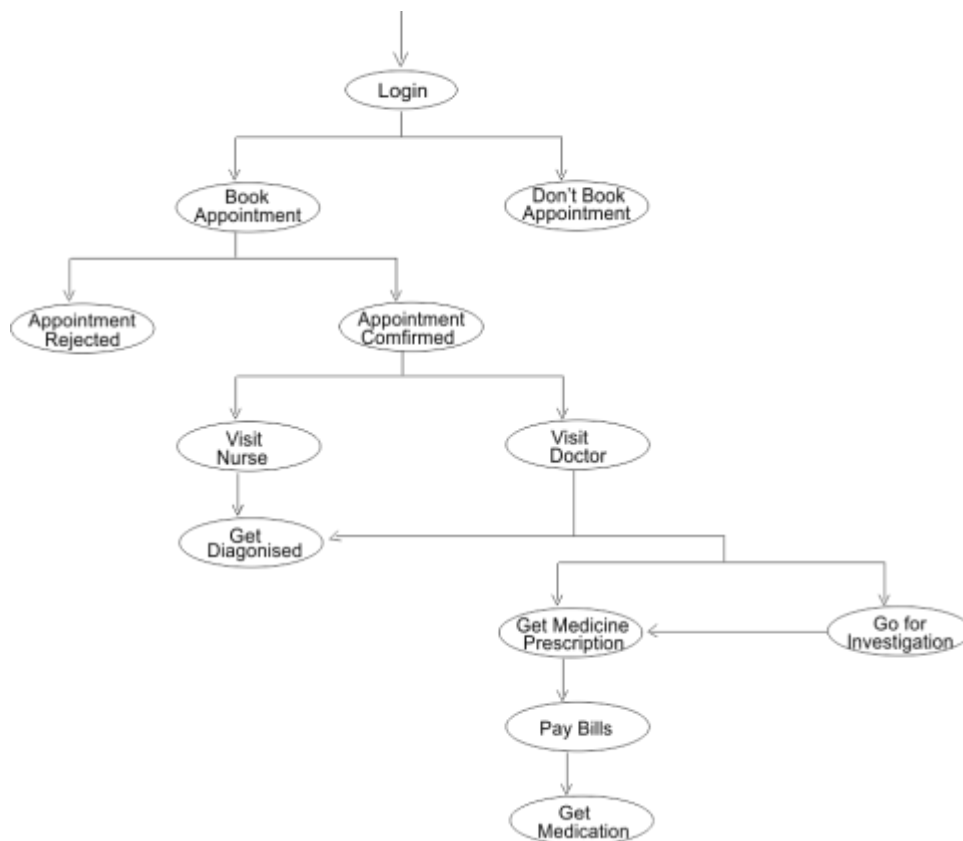

Fig. 6

Use case analysis

Use case analysis is the primary form for gathering usage requirements for a new software

system from the user's perspective, communicating system behavior in the user's terms, and specifying all externally behaviors.
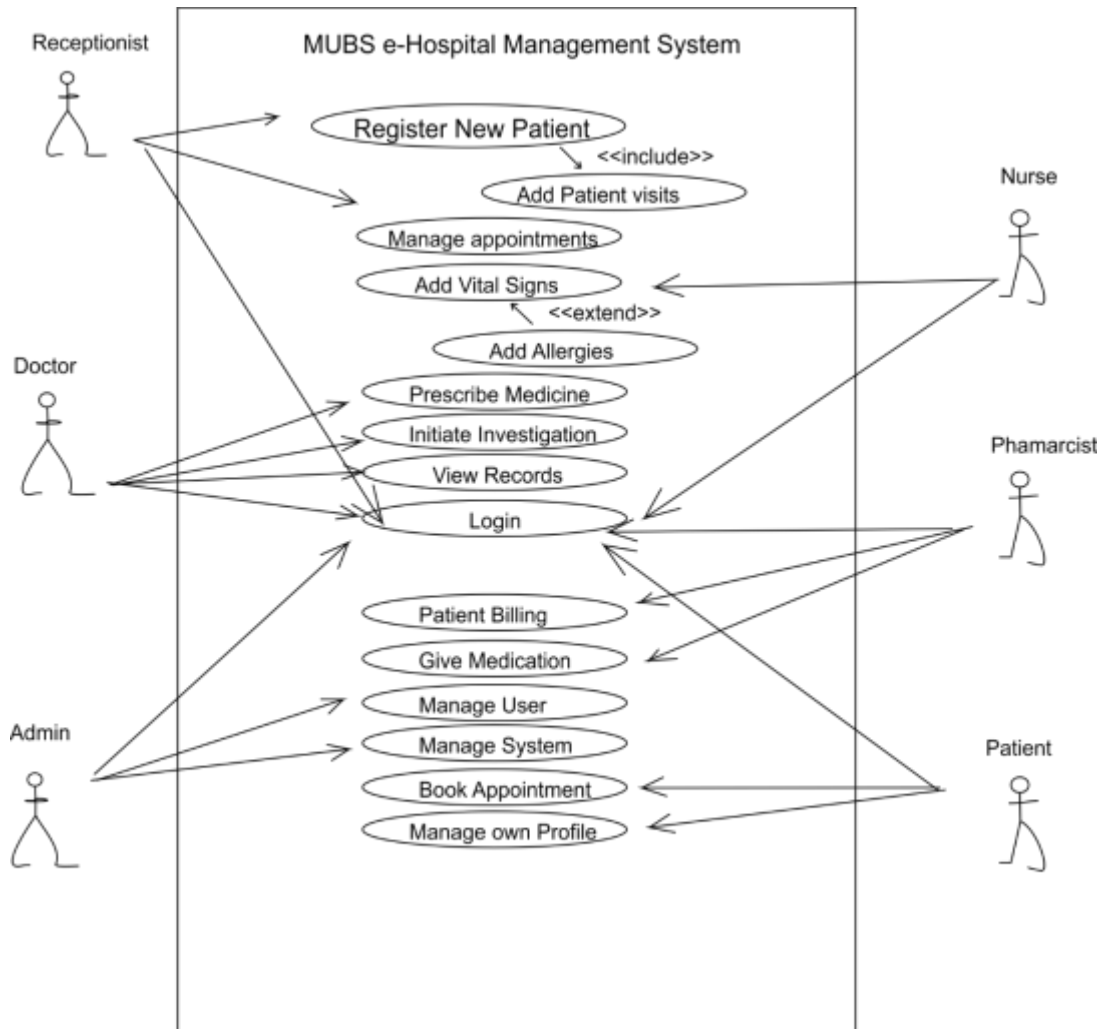

Fig. 7

System Testing

System Testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. The developed system undergone different tests as follows;

Unit Testing

This is performed on each module or block of code during development. At every stage of development, the developed system was tested before proceeding to the next stage.**Integration Testing**

This is done before, during and after integration of a new module into the main System. Every new module created was first tested before integrating it or adding to the main System being developed.

Volume Testing

This is done to test whether the system can hold the intended amount of data.

Conclusions

These provide an overview of the project as a whole in accordance with the goals. Each goal should be described together with the approach taken to accomplish it and, in a summary, the outcomes.

As a result of my analysis of the present setup, which revealed a number of problems users were consistently expressing disappointment about, I had to create a web-based health data management system to address the aforementioned problems. This would allow users to access health services in real time with the least amount of effort and time commitment.

Recommendations

User education: It is advised that the technical experts of the MUBS fraternity teach the system's users how to use it effectively.

System Upgrading and Updates: To maintain the institution's continued and effective functioning, maintenance on the system is advised to be carried out by the technical group.

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