
HOSPITAL MANAGEMENT SYSTEM: CASE STUDY OF NAGGALAMA HOSPITAL MUKONO DISTRICT.**Nabachwa Mwamin¹, Namuyonga Rebecca²****1,2 Metropolitan International University****ABSTRACT**

A Hospital is a health care facility that provides medical treatment to the sick or injured people. Management of hospital records can be manually in which the files are stored in file cabinets and in different locations/rooms which makes it hard for them to be found and updated or using a computer system that is time saving and cost effective. The aim of this study was to design a hospital management system of Naggalama Hospital in Mukono district. The researcher described system analysis and design for a hospital management system, detailing both hardware and software requirements. The hardware requirements included an Intel dual-core 2 T5750 processor, 4 GB RAM, and a 64-bit operating system. Software requirements encompassed Windows 10 as the operating system, along with HTML, CSS, PHP, JavaScript for the front end, and MySQL for the database. Functional requirements covered processes such as registration, checkout, report generation, and database management. Non-functional requirements included aspects like security, performance, maintainability, and reliability. The user requirements emphasized a user-friendly graphical interface and immediate data feedback. The systems design incorporates the Unified Modeling Language (UML) for visualizing, specifying, constructing, and documenting the software system and its components. The document also discussed unit testing, integration testing, functional testing, and system testing. Systems development involves inputs, processing, and outputs, considering professional boundaries and feedback. The implementation stage is highlighted as critical for turning the theoretical design into a functional system, ensuring its success and user confidence. In conclusion, hospital administrators would be able to improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information. This product eliminated any such complexity.

The researcher however recommended that hospitals currently practicing the manual system hospital management should switch to the electronic system because it is more efficient and easier to use.

Key word: Hospital Management System.**Background of the study**

(Kazaara & Nicholas, n.d.) specify that before the use of automated hospital management systems, it was difficult to keep and track records of daily hospital activities, patient information, maintenance schedule of hospital equipment, as well as allocation and use of funds. Hippocrates in 400 BC attempted to explain the occurrence of disease from a rational rather than a supernatural point of view, based on information from the study of patterns.

As early as the 17th century, health information was considered to play an important role in planning, management, and decision-making (Kevin et al., n.d.). In 1662, John Graunt published a landmark analysis of mortality data, the first publication to quantify patterns of births, deaths, and disease incidence, noting male-female differences, high infant mortality, urban-rural differences, and seasonal differences. In 1800, William Farr followed up on Graunt's work by systematically collecting and analyzing British mortality statistics. Farr introduced many of the basic procedures used today in biostatistics and disease classification. He focused his efforts on collecting important

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statistics and evaluating these data and reporting to the responsible health authorities and the general public (Jolly et al., n.d.)

In the mid-1800s, John Snow, after careful analysis of epidemiological data on the location of water sources in relation to households with cases during the 1854 London cholera outbreak, succeeded in persuading local politicians to remove the pump handle, interrupting the devastating outbreak. His book 'On the Mode of Communication of Cholera', republished in 1936, is a public health classic because it demonstrated how hospital information could help solve public health problems (Snow, 1936). During the 1960s and early 1970s, hospital workers applied hospital information methods to eradicate smallpox worldwide, one of the greatest hospital information successes of all time (Samuel et al., 2023).

It took some time to come up with technology close to current information systems (Alice et al., 2023). Initially, computer-aided hospital management systems were largely intended to support hospital staff, particularly doctors, nurses and also administrative staff in hospitals (Branch et al., 2023), however we recognize that hospital management systems will now also have a role in direct support patients, their relatives and all people with health questions and problems, otherwise known as health consumers (Charles, 2023).

Problem statement.

It is very important to maintain efficient hospital information processing software. This application provides a way to record and easily access this information (Raymon et al., 2023). In the existing manual system, all patient details, doctor availability details and details regarding tests performed on patients prescribed by the doctor are maintained manually by the receptionist. It is a very difficult task to maintain all the financial records and records that contain hospital staff details, lack of immediate storage of information, more prone to errors and lack of immediate retrieval (Brian & Kalinaki, n.d.).

These are the main disadvantages of the existing system, which are overcome in the proposed model. In the designed system, I have provided solutions to the above problems by automating the control system using integrated software that operates the system (Brian & Kalinaki, n.d.). The developed system provides patients with one integrated view of billing, collection, discharge detail, patient history, efficient search facility to find any type of information related to patient history.

Specific objectives.

1. To investigate how will the software help the hospital to be more efficient in handling the daily activities and registration of the patients.
2. To analyze how the software will help the hospital to be more efficient in handling the daily activities and registration of the patients.
3. To design a hospital management system and implement and test a hospital management system.

METHODOLOGY

Research Design.

The procedure and techniques to be employed to answer the research problem explains the pattern the study intends to follow so as to control variance due to independent variables, eliminate or reduce influence of extraneous variables, minimize error variance and at the same time ensure that the findings can be tested for

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significance. The research design was a comparative study. This study was conducted through descriptive survey research design approach. Survey design describes and explains the events in the real-life context and occurrence. Qualitative and quantitative research design was used in this study. The study was conducted in the selected private hospital that is Naggalama hospital. The study target population was all health care workers working in Naggalama hospital. The study population was based on departments in the hospital. Purpose sampling was used in the study so as to focus on particular characteristics of the population that are of interest. Stratified random sampling and purposive sampling techniques were used to sample the interviewees. The healthcare workers were stratified into different departments according to their operations. This was to provide equal chances to every sample of a given size in the accessible population. The methods that were employed include Questionnaires, document review and interviews. The validity of the instrument quantitatively was established using the Content Validity Index (CVI). The researcher used both qualitative and quantitative methods of data analysis. Data was sorted using the Statistical Package for Social Sciences (SPSS) method (Nelson et al., 2022). The analysis relied on both descriptive and inferential statistics.

RESULTS

SYSTEM ANALYSIS AND DESIGN

Requirement Specification

All computer software needs certain hardware components or the other software resources to be present on a computer so as to be used effectively. These pre-requisites are known as (computer) system requirements and are often used as a guideline as opposed to an absolute rule. Most software defines two sets of system requirements: minimum and recommended.

Hardware requirements:

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware. A hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of operating systems.

Item	Requirement
PROCESSOR	Intel dual Core 2 T5750 @ 2.00GHz
RAM	4 GB HARD DISK
System type	64 bit operating system.

SOFTWARE REQUIREMENTS:

Software Requirements deal with defining software resource requirements and pre-requisites that need to be installed on a computer to provide optimal functioning of an application. These requirements or pre-requisites are generally not included in the software installation package and need to be installed separately before the software is installed.

Item	Requirement
OPERATING SYSTEM	Windows 10
FRONT END	Html, CSS, php, javascript. server-side script

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DATABASE	MySQL
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Functional Requirements

The functional requirements of the hospital management system contain various processes namely, registration, checkout, report generation and database of the software requirement specification. Registration process of the software requirement specification. This includes features like adding patients, assigning an ID for each patient and others. Report generation of software requirement specification. This may include information of the patient and the availability of the bed. Database of the software requirement specification. This may include mandatory patient information and updating information of the patients.

Non-Functional Requirements

These include, security, performance, maintainability and reliability.

Security. This includes patient identification, login ID, modifications are limited to the some groups and the Administrator has all rights for the system.

Performance like the response time, throughput and utilization. Capacity. It refers to the amount of storage it offers.

User interface. It has a friendly user interface. Maintainability. Data back-up can easily be done. Errors can be fixed easily. Reliability. The system is highly reliable.

Availability. The system is available to use by the user at any time.

User Requirements

1. A graphical user interface which is user friendly.
2. A system that stores data and gives the feedback immediately.

Systems Design

The Unified Modeling Language (UML) is a standard language for specifying, visualizing, constructing, and documenting the software system and its components.

It is a graphical language, which provides a vocabulary and set of semantics and rules. The UML focuses on the conceptual and physical representation of the system. It captures the decisions and understandings about systems that must be constructed.

It is used to understand, design, configure, maintain, and control information about the systems.

The UML is a language

1. Visualizing

Through UML I visualize an existing system and ultimately i visualize how the system is going to be after implementation. UML helps to visualize, how the components of the system communicate and interact with each other

2. Specifying

Specifying means building, models that are precise, unambiguous and complete UML addresses the specification of all the important analysis design, implementation decisions that must be made in developing and deploying a software system.

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3. Constructing

UML models can be directly connected to a variety of programming language through mapping a model from UML to a programming language like PHP, JAVA or C++ or VB. Forward Engineering and Reverse Engineering is possible through UML.

4. Documenting

The Deliverables of a project apart from coding are some Artifacts, which are critical in controlling, measuring and communicating about a system during its developing requirements, architecture, design, source code, project plans, tests, prototypes releases, and others.

USECASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases.

Use case diagrams are formally included in two modeling languages defined by the unified modeling language (UML) and the systems modeling language (sysML).

Unit testing.

It is the testing of individual software units of the application. All decision branches and internal code flow should be validated. It is done after the completion of an individual unit and before the integration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing:

Integration tests were designed to test integrated software components to determine if they actually run as one program. Testing was event driven and was more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test:

Functional tests provided systematic demonstrations that functions tested were available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing was centered on the following items:

Valid Input: identified classes of valid input must be accepted.

Invalid Input: identified classes of invalid input must be rejected.

Functions: identified functions must be exercised.

Output: identified classes of application outputs must be exercised. Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests was focused on requirements, key functions, and special test cases.

Before functional testing was complete, additional tests were identified and the effective value of current tests were

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determined.

System Test:

System testing ensured that the entire integrated software system meets requirements. It tested a configuration to ensure known and predictable results.

Systems development

1. Inputs of the new system included, doctors, medical supplies, equipment, laboratories, capital, beds, labor-medical staff, machines, information.
2. Processing include; quick and easy access to all data that a particular login allows., the system is error free due to minimum human intervention as most of the processes are automated, cost effectiveness due to less storage space required and less stationary used, examination, surgery, monitoring, medication, therapy, data management.
3. Outputs include; healthy, patients, services.
4. Boundary. Professional boundaries are the spaces between the Doctor's power and the patient's vulnerability. The power of the Doctor comes from the Doctor's professional position and access to sensitive personal information.
5. Feedback. Hospital can capture feedback using different platform collection system.

System Implementation

Implementation is the stage where the theoretical design is turned into a working system. Thus, it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

Conclusions

Since we are entering details of the patients electronically in the "hospital management system", data will be secured. Using this application, we can retrieve patient's history with a single click. Thus, processing information will be faster. It guarantees accurate maintenance of the patient details. It reduces the book keeping task and thus reduces the human effort and increases accuracy speed. Hospital management system is essential for maintaining detail about the Doctor, patient, hospital staff etc. I understand that by using the hospital management system project the work became very easy and the hospital will save a lot of time.

Hospital administrators would be able to improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information. Accounting sometimes becomes awfully pathetic and complex. This product will eliminate any such complexity.

Recommendations

It is recommended that hospitals currently practicing the manual system hospital management should switch to the electronic system because it is more efficient and easier to use. Also, since the use of computers is growing fast globally, introducing the electronic system will enable hospitals fit into the current global trend.

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