HAWASSA UNIVERSITY

FACULTY OF INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE
SOFTWARE ENGINEERING PROJECT
TITLE : STUDENT CLINIC SYSTEM

GROUP 5

KALEAB TESFAYE	**1801/14**
NATHAN ABAYNEH	**2403/14**
GETAHUN DERJE	**1463/14**
EYOB HAILU	**1249/14**
VENUS HAILEMESKEL	**3064/14**

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1.1. BACKGROUND

The Techno IOT Campus is one of Hawassa University's key branch campuses and an important center for technological innovation. The university is renowned for its academic brilliance. Even though Techo is a great campus with a lot of qualities there are some areas that require modern solutions given how tech-driven the university is. Among this areas The Student Clinic System is one of them .

The current manual and traditional clinical system face challenges such as a lack of a centralized platform, data loss, resource wastage, poor service quality, and difficulties in resource tracking and reporting.The total standard of health care given to students is impacted by the inefficiencies in the current system, which also add to time and resource restrictions.

A comprehensive and modern system is what the proposed project aims to establish in order to address these problems. The system intends to improve overall service quality, resource tracking efficiency, and data accuracy by utilizing database management, user-friendly interfaces, and secure authentication. It will include functions including report production, seamless medical information retrieval, and the creation of prescriptions and referrals. This project is in line with the university's mission to deliver safe, effective health care.
The project will explore the specific features, functionalities, and benefits of the proposed software solution, marking a significant step forward for health care services at Hawassa University.

1.2. STATEMENT OF PROBLEM

A number of important problems have been identified in the Statement of Problem regarding the development of Student Clinic System for the Hawassa IOT Campus. The current system faces challenges such as

Absence of a Centralized Platform: Information and activities could be scattered among several files or places in the absence of a centralized platform. This may result in inefficiencies, management challenges, and delayed interaction between users.

Data Loss: Unexpected incidents such as fire , exposure to water and light degradation of the paper quality due several reasons are just a few of the causes of data loss. This can cause important information to become unavailable, which could cause operational problems for the clinic.

Financial Resource Wastage: The traditional manual file processing may result in higher paper, printing, and physical storage expenses. The costs related to buying, setting up, and keeping physical records add to the waste of financial resources.

Time Inefficiencies: Finding and retrieving patient records by hand from physical files takes a lot of time. Health care providers are less able to treat students quickly and efficiently because they must spend important time looking through paperwork.

Restrictions in Space: Physical files need specialized storage space, and the clinic may run out of room as the number of records rises. Overload caused by inefficient utilization of physical space can make it challenging for employees to get around and quickly obtain the information they need.

Poor quality of sevice : The manual retrieval of student medical records can lead to delays in providing timely medical care. Healthcare professionals may spend considerable time searching for information, potentially impacting the speed of diagnosis and treatment.

Prone to error: Manual data entry increases the risk of errors, such as incorrect patient details or treatment records. Inaccurate information can lead to misdiagnoses, inappropriate treatments, and overall compromise the quality of healthcare services.

Lack of Patient Security and Privacy: The security and privacy of patient information are compromised when files are handled manually. Physical documents can be lost or stolen, which affects the privacy of student medical information.

The absence of Data Analytics and Report: The clinic's capabilities to use data analytics to get information about patient trends, treatment outcomes, and overall performance is limited by the lack of a digital system. A manual system limits the use of data for ongoing healthcare service improvement.

Problems with Resource Tracking: It is difficult to keep track of how medical supplies and equipment are being used when there are ineffective tracking systems in place. This may result in shortages or overages, which would affect the operation of the clinic.

1.3. OBJECTIVE

1.3.1. GENERAL OBJECTIVE

Our goal is to address the primary challenges mentioned in the Problem Statement by changing from a manual technique to a digital one. Establishing a central platform that optimizes data administration, reduces the possibility of data loss, and improves overall operational efficiency is the main goal of the project. In order to minimize financial expenses, increase time efficiency, and optimize spatial usage, this involves addressing resource waste through computerization. The project also aims to improve interaction between departments, accelerate access to correct patient information, and secure sensitive medical data privacy and security in order to increase the overall quality of service. Our project's goal is to establish a modern, integrated student clinic system that will greatly improve the student’s health care experience in the campus.

1.3.2. SPECIFIC OBJECTIVE

- To Create a Centralized Database that simplifies data administration and guarantee that permanent patient records are kept on one, easily accessible platform, create and set up a centralized database system.

- To reduce the possibility of data loss, maintain clinic operations, and protect patient data from unexpected events, establish reliable backup and recovery procedures.

- To Enhance accessibility to patient information by implementing a digital system that allows healthcare providers quick and secure access during consultations.

- To Implement efficient data retrieval mechanisms to significantly reduce the time healthcare providers spend accessing patient records, ensuring timely and effective medical care.

- To implement a system that will track resource availability, enhance resource allocation.

- To Implement features such as quick search and retrieval functionalities within the system to significantly reduce the time healthcare providers spend accessing patient records, enhancing overall efficiency.

- To transition from physical to digital patient records, reducing the need for extensive physical storage space and enabling efficient organization and retrieval of information.

- Protect patient information from potential security risks and illegal access by using encryption algorithms to secure data during access and storage.

By achieving these specific objectives, the project aims to save time for health care providers, optimize storage space, and improve the overall efficiency of the student clinic system at Hawassa Campus.

1.4. SCOPE OF THE PROJECT

Our software development project's scope includes developing and implementing a modern student clinic system for the Hawassa Campus. The creation of a centralized database system for the effective administration of medical records and patient data is one of the main goals. By solving problems with patient care delays and inaccurate data in the current manual clinical system, the project will improve the quality of service. In order to reduce waste, further efforts will be made to optimize resource tracking, which includes supply management . To protect patient data, security measures including encryption and access controls will be implemented . By modernizing medical records and having efficient storage solutions in place, the project primarily seeks to reduce time and storage space. With the help of this extensive scope, the Hawassa Campus community will have access to a current, effective, and secure healthcare setting in the student clinic system.

1.5. SYSTEM DEVELOPMENT METHOD

For our project developing an advanced Student Clinic System for Hawassa Campus ,We chose the **Waterfall approach** because of a number of important considerations. primarily, our project benefits from stable and well-defined requirements, where the general concept and characteristics of the student clinic system are clear from the beginning. As it predicts no changes in requirements during the development process, this is consistent with the sequential and linear approach of the Waterfall model. Furthermore, the Waterfall model's organized phases offer clarity in planning these aspects ahead. Timeline certainty is essential for efficient project management. The sequential nature of Waterfall allows team members to concentrate on their specific responsibilities. Lastly, the Waterfall model's focus on documentation matches very nicely with the requirements of our project, guaranteeing thorough documentation for possible maintenance, and future reference. All of these factors combined make the Waterfall model an appropriate option for accomplishing the stated goals of our student clinic system development project.

WATERFALL MODEL STEPS

1.Requirements Gathering and Analysis

here is a breakdown of the key features and functionalities to be considered during the development process:

User Authentication and Authorization: Implement a secure user authentication system to ensure that only authorized personnel can access the system. Define role-based access controls to manage different levels of permissions for healthcare providers, administrators, and other users.

Security and Privacy: Incorporate encryption protocols to safeguard sensitive medical data during transmission and storage. Implement strict access controls to protect patient information and ensure compliance with privacy regulations.

User-Friendly Interface: Design a user-friendly interface that allows users to navigate the system effortlessly. Consider usability best practices to enhance the overall user experience for healthcare providers, administrators, and other users

Scalability and Performance: Develop the system with scalability in mind to accommodate potential growth in data and user base.

Prescription and Referral Paperworks: Include features for healthcare providers to digitally prepare prescriptions , referral and absence approval paperwork within the system. Ensure that these documents are generated accurately and are compliant with healthcare standards.

Generate Reports: Implement a reporting module to generate various types of reports, including patient demographics , available / unavailable resources like medications in the store .

Resource Tracking: Integrate resource tracking functionalities to monitor and manage medical supplies and equipment.

Student Medical Information Retrieval: Develop a retrieval system for quick access to student medical information. Implement filters and search parameters to facilitate efficient information retrieval for healthcare providers during consultations.

Creating New Medical Records: Include functionality for creating new medical records for students entering the clinic. Ensure a standardized and user-friendly process for capturing essential patient information and medical history.

2)System Design

In the system design step of the Waterfall model for the IoT Student Clinical Management System project, several critical tasks are carried out to lay the foundation for the subsequent phases of development. Here are the major activities conducted during this step:

- Create a detailed architecture blueprint outlining the IoT Student Clinical Management System's general framework.
- Determine the system's essential elements, their interrelationships, and the data flow.
- Create detailed database schema to define the structure of the database. Specify tables, relationships, and data types necessary to store and retrieve essential information related to users, clinical processes, resource tracking, and reporting.
- design user interface to ensure a user-friendly experience.
- Describe the main elements of the high-level architectural design and how they interact. Layers like the User Interface, Application, Integration, Database, and Infrastructure are included in this.
- Ensure that the design aligns with the project's goals and requirements.
- Specify the hardware and system requirements needed to support the IoT Student Clinical Management System.
- Consider scalability and performance requirements to ensure the system can handle increasing user demands.
- Finally, document the entire system design clearly. Because this documentation will serves as a reference for developers, system administrators that are involved in the project.

Now lets see the application layer of the system to be design to get a little understanding of what the system intends to provide. The Application Layer of the IoT Student Clinical Management System is made up of a number of modules that are intended to provide particular features that are crucial to the IOT clinic. The following is a summary of the main Application Layer functionality:

- It has user management module that is responsible for handling user authentication, authorization, and profile management. It manages user registration, login, and password reset functionality.
- It has clinical process module that is focused on facilitating clinical processes which includes handling the submission, tracking, and processing of medical requests and services.
- It has resource tracking module that is dedicated to provide efficient resource management, this module tracks and manages essential resources such as medical supplies, equipment, and personnel.
- It has reporting module that generates reports and analytic data related to clinical activities, resource utilization, and other relevant metrics.

3) Implementation:

This is the stage where the designed system is actually built or implemented based on the specifications and plans established during the previous phases (requirements gathering, system design). In this phase, the focus is on transforming the design documentation into executable code.
Key activities during the Implementation phase include:

- Coding
- Documentation updates
- Finalizing the system

4) Testing

In this phase of the Waterfall model, the primary goal is to rigorously evaluate the software to ensure that it meets the specified requirements and functions as intended. This phase involves several stages of testing, each building upon the previous one to progressively validate the system's correctness and reliability.

Here are the key activities in the Testing phase:

- Unit testing
- Integration testing
- System Testing:
- Acceptance Testing:
- Regression Testing:

5) Deployment and maintenance

In the Waterfall model, the Deployment and Maintenance phase follows the successful completion of the Testing phase. This phase involves the release of the developed software to users and the ongoing support and maintenance of the system.

Here are the key activities during the Deployment and Maintenance phase:

- Deployment
- Monitoring and Performance Optimization
- Feedback Collection
- Updates and Enhancements
- Continuous Support
- Regular Maintenance Tasks

1.6. SOFTWARE AND HARDWARE REQUIREMENT

Software Requirements:

Operating System : Our system should be compatible with widely used operating systems such as Windows, macOS, and Linux to ensure accessibility for a diverse user base.

Database Management System: The DBMS is responsible for efficiently storing, organizing, and retrieving data.

Anti-virus : Anti-virus software is essential for protecting the system against malicious software and potential security threats.

Firewalls : Firewalls act as a barrier between the system and external networks, regulating incoming and outgoing traffic.

Hardware Requirements:

Computers: Desktop or laptop computers are the primary hardware for system users, including healthcare providers and administrators.

Printers : Printers are essential hardware components for generating prescription and referral paperwork. The system should be compatible with standard printers, ensuring seamless document printing for medical records and other relevant documents.

Scanners: Scanners are hardware devices used for digitizing physical documents and medical records.

Backup Systems : Backup systems, including redundant storage devices, are crucial hardware components for data protection and system recovery.

1.7. PROJECT SCHEDULE (GANTT CHART)

Using a Gantt chart is essential for efficient project management during the methodical development of the IoT Student Clinical Management System. With its clear illustration of project tasks across time, this visual tool enables accurate timeline analysis and up-to-date project status information. The project is carried out in phases that are structured:

The first stage includes extensive research, exploring the current IoT Student Clinical Center. This step involves gathering relevant data from other people's projects that are similar to ours . Then comes the planning stage, where a detailed strategy is created using the information that has been gathered. The project is guided by this master plan as it goes through the phases of analysis, design, implementation, deployment, and maintenance.

As the project progresses, the requirement gathering phase makes sure that it closely complies with client and user needs. After that, the requirements are gathered and carefully examined to determine their essential importance to the system. A complete specification of the hardware and software requirements, including high-level architectural design and particular design elements, is the first step towards the ensuing System Design process.

The Implementation phase begins when the project picks up steam. This is reconstructing the system during the system design phase into manageable, well-designed modules, which prepares the way for the coding phase with polished modules. The Gantt chart provides an in-depth view of the project's trajectory and milestones by illustrating the complete project timeline and task dependencies.

GANTT CHART

Task name	Time allotted	status	Jan 2024	Feb 2024
			18 - 30	1 - 30
Requirement gathering	8 days	completed		
System analysis	8 days	In progress		
System design	10 days	Not Started		
Implementation And testing	12 days	Not started		
deployment	6 days	Not started		