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Digital Red Book: An Improvement of The Conventional Pregnancy Monitoring System Via Digitalization

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Abstract: Digital Red Book: An Improvement of the Conventional Pregnancy Monitoring System Via Digitalization is built to assist medical officers to monitor the baby's development and the mother of the child until the child reaches the age of six-year-old and replace the conventional red book that have been used since the 1980s. This project aims to develop a system for medical officers to monitor the development of children and the mother. The development method that we use is the Software Development Life cycle was employed in this project to generate a complete overview of the rhythms watch inventory system. Previously government medical officers use what is to be called the 'Red book' which contained information about child growth which was out of style compared to this era. This method is obsolete and could lead to misinformation and inefficient data storage. Our end result for this project is fully integrated personal pregnancy data storage which will display all information regarding the doctor's visitation and pregnancy stage. Users can also review the data that are stored in the system which is confidential towards other users. The system will provide an efficient way of data storing and information transfer for medical purposes.

Keywords: Inventory, Data Storage, Red Book, SDLC, Pregnancy

1. Introduction

An inventory management system or inventory system is the process by which you track your goods throughout your entire supply chain, from purchasing to production to end sales. It governs how the researchers approach inventory management for your business. Medical officers monitor the baby's

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development in pregnant women by tracking it using a 'Red book' which monitors the baby's development until the child reaches the age of six years' old.

However, the concept of 'Red book' is using a conventional book which the doctors will prescribe or write each visit. This project is undertaken to improve or replace the antenatal book/card with a system that will monitor the mother and child's development digitally [1].

Most medical constitutions in Malaysia still use what most would call a red book for monitoring the child and the mother's health and development. However Manual storage systems can result in a variety of errors in data recording, such as information not being updated, illegible writing, or the loss of records books. Without a proper data storing system would lead to storing data inefficiently and would cause many problems later for medical institutions [2].

This project utilizes databases to store bigger data and more efficiently without worrying about any data loss. The system that we have worked on will be stored into the database that the researchers set up. By taking all the necessary information from the pregnancy monitoring book and converting it accordingly. By digitizing all the information from the red book all the information will be stored inside a database for medical officers to keep track of the child and mother's health and development [3].

The objective of this project is to:

(i) To develop a system to monitor the development of the pregnant women replacing the 'Red book' that pregnant women used to carry

(ii) To conduct a test of feasibility in order to establish properties of response measures that will determine the success of replacing the 'Red book' that pregnant women carry.

(iii) To evaluate the performance of the system which will successfully display the pregnant women information.

Moreover, methodology is a key method for the system development and production, as well as better organized system development in planning. As a result, in order to complete this project, we employ the SDLC design for this system which will be discussed soon. The system limitation is that it was for the doctors and medical staff and the patient with their child monitoring the mother and the child health growth.

This part goes through the literature review and the technology employed in this project's creation. The research was carried out to find the finest proposal for improving the traditional pregnancy monitoring system through digitalization. A comparison of modules and programming languages was performed on equivalent systems.

1.1 Study of the technology used

Several research on the technology to be used in the Digital red book must be conducted to ensure that the project development may be realized. The two studies are related to Management Information System and the inventory system which are the foundations of this project development.

1.1.1 Management Information System

A management Information system (MIS) is a computerized database of financial information that is organized and coded in such a way that it generates regular operational reports for all levels of management in a firm. Special reports can usually be easily obtained from the system. The primary goal of the MIS is to provide managers with feedback on their own performance so that upper management can monitor the organization as a whole. The information shown by the MIS often compared actual data to planned outcomes and results from the previous year consequently, it analyzes progress versus goal.

Data is received by the MIS from company units and functions. Some data is automatically collected through computer-linked checkout counters.

1.1.2 Inventory System

An inventory management system or also known as inventory system is the process by which the respondent tracks the goods throughout the entire supply chain, from purchasing to production end sales. It governs how it approach in inventory management for business.

2. Materials and Methods

2.1 Model used

The development for this system, SDLC model, has been picked because the process to make the system is precise and easier to track back any problem that has happened throughout the project. **Figure 1** shows the SDLC model that been used to develop the system.

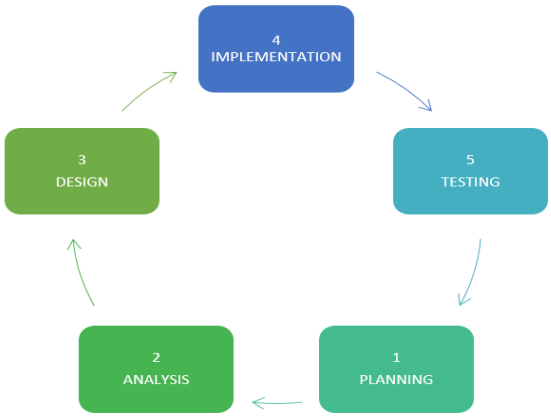

Figure 1: SDLC model

Table 1: Activity for each phase used

Phase	Activity	Output
Planning	• Recommendations and project • Work division, project objective, scope and problems	• Project Proposal • Obtain information during interview to solve some problems
Analysis	• Collect and analyze any information regarding to project development	• Brainstorming idea to solve the problem. • Choose specific tools and softwares to be use in this project.
Design	• Sketch rough design for a website.	• Design for each website's pages.

Implementation	• Choose suitable programming language	• Programming Language been chosen are PHP, HTML, CSS and SQL
Testing	• Test the system with real data and gain information to fix any error.	• Feedback and suggestion from the respondent

As shown in **Table 1**, SDLC is a process followed for a software project, within a software organization. It consists of a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle defines a methodology for improving the quality of software and the overall development process [4][5][6].

3. Results and Discussion

3.1 Results

This system that the researchers used for the research is PHP for inserting, exporting, displaying, and store data in MySQL. The Xampp server in which the respondent uses to create a localhost website and for implementation purposes so that users may understand how the system works. This section will go over numerous pages from the website that was created.

The main purpose for this page is to check the current input for the patient that has been registered at a medical facility by a medical staff member. The list for registered patients to be checked can be shown as in **Figure 2**.

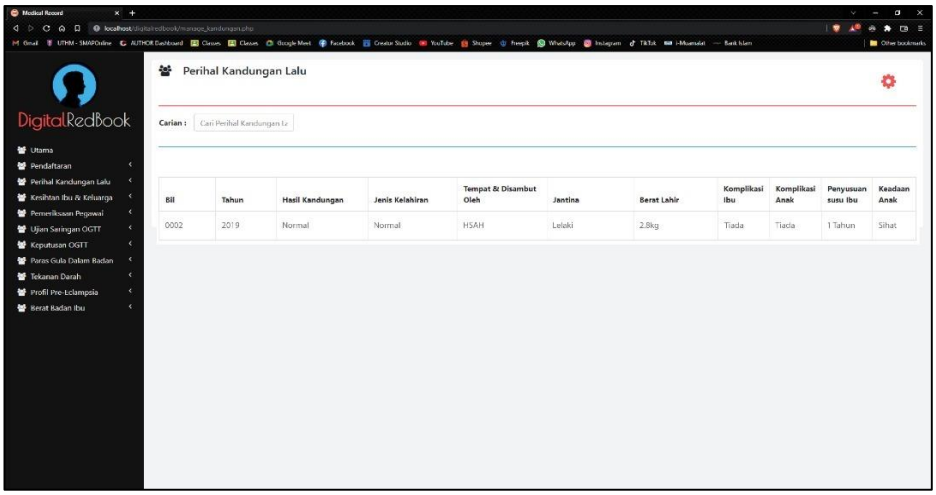

Figure 2: Page check current patient data

The other function is to make data insertion for patient data. The data that will be inserted by the medical staff is the child and the mother's health development which include in **Figure 3** shows the interface for the child and mother information.

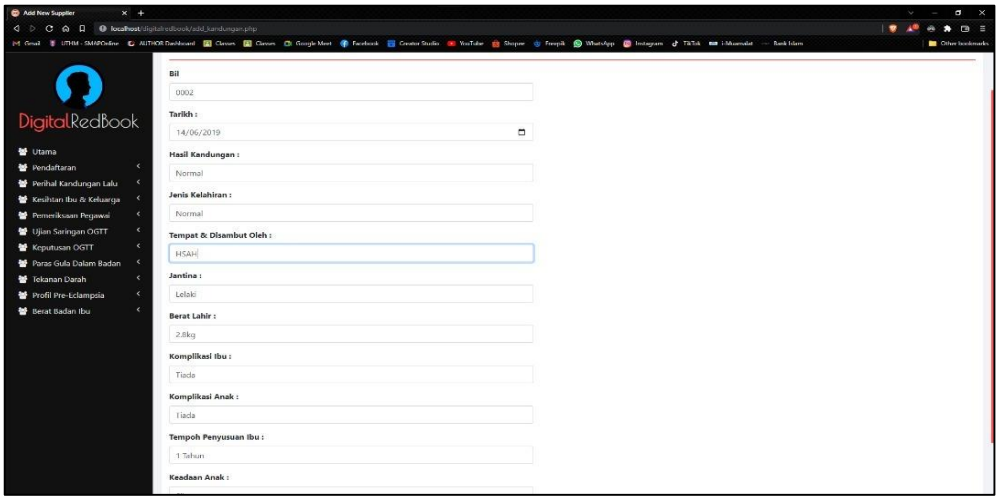

Figure 3: Key in personal maternal information

After key in the necessary information, the data will proceed into the database and will update the data if any change or edit occurred from any data change.

3.2 Discussions

System testing is crucial to make sure that the data will be stored as the real data and will prove that the system works as expected. Evaluation processes also need to be done so the medical staff that operate the system can see the result and give any comments to make the website become more efficient.

Table 2: First section of the questionnaire

Item	Testing	Result
1	• The respondent asked for the role of the person asked	• We have a total of 2 nurses, 1 doctor and a mother or patient
2	• The digital red book effectiveness	• Overall, most of the people who fill in the respondent questionnaire agree that the red book is effective
3	• Comparison with the conventional red book	• Agree that the digital red book version is much more efficient and easier to use
4	• Is the prototype input clear	• User agreed that all the input in the system is clear
5	• Recommendation to be used in all medical institutions.	• Agree because it is easy to use than the conventional red book

In **table 2**, the respondent formed a questionnaire for the staff and the patient which the respondents broke it into three sections in which the first section asked about the general overview of the digital red book system. The second section is for the admin while the third section is for patient reviews.

3.3 Advantages of the system

Among the advantages that can be obtained through the development of this system during the system testing are:

- **Convenient and easy to use**

  The digital red book is very easy to key in data and to view the necessary information given.

- **Display all information available**

  The digital red book has all the necessary information for the patient to view the status of the child and the admin can update and edit any information and it will update the information.

- **Selection of any tabs or category**

  The system showcases all information from the conventional red book and makes it digital.

3.4 Disadvantages of the system

Among the flaws that Digital Red Book: An improvement of the conventional pregnancy monitoring system via digitalization during the testing of the system are:

- This system is only suitable on a computer (PC or laptop) because the website design will deviate when used on a phone.
- The system has to use the internet and is unable to do any offline transactions.
- Less features as some content from the conventional red book is still there.

3.5 Improvement recommendation on the system

Among the improvements and suggestions given by the business during the testing of the system to ensure that the system developed does not have any problems are:

- **Create it into application**

  This system can be used on mobile phones such as Android and iOS to make it easier for patients to look into their information.

- **The interface design can be improved**

  This can attract others, especially the government to adopt the idea for it to be used among all medical institutions.

- **Make it offline compatible**

  This way it is easier in case of an emergency which will not require the internet for it to be used.

4. Conclusion

The researchers expect the end result for this project is fully integrated personal pregnancy data storage which will display all information regarding the doctor's visitation and pregnancy stage. Users can also review the data that are stored in the system which is confidential towards other users. The

system will provide an efficient way of data storing and information transfer for medical purposes. Overall, the respondent project succeeded to achieve the objective of the project which ultimately improved data storing, unsystematic, using old conventional methods and inaccurate data to monitor the child and the mother's development. As a result, we solved the conventional red book issues by developing a system that has achieved a set of objectives that can undoubtedly assist medical staff handle their data more efficiently, systematically, and easily by workers, and the data received is more accurate for the medical sector. As a result, the system benefits from the medical staffs' ability to adapt to the new system in their data storage and success transition from conventional to digital, as well as the ability to fully utilize the medical staffs' work efficiency while making it convenient for the patient to monitor its child's development.

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