DEVELOPMENT OF WEB-BASED DATABASE SYSTEM FOR BUILDING INFRASTRUCTURAL PROJECTS IN ABIA STATE COLLEGE OF EDUCATION (TECHNICAL) AROCHUKWU

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Abstract

This research is design to provide solution to problem of managing information about building infrastructure project of Abia State College of Education (Technical) Arochukwu. It involves the development of web-based database management system for efficient management of information about building projects and officers at the works unit of the college. Presently, records about building projects are kept manually which makes it difficult to manage. It is often difficult to find information and editing them is stressful. The development of web-based database management system for building infrastructure will make it possible to keep information electronically in the computer. This will make it easy to retrieve information and making corrections will also be possible. This research adopts the Agile software development process consisting of five stages namely requirement phase, design, implementation, verification and maintenance. The programming language used in the development of the system include PhP Myadmin, Hypertext Markup Language, Cascading style sheet and MySQL for database design.

Keywords: Database, web-based system, infrastructure information system.

1.   INTRODUCTION

Information management is vital for effective and efficient running of organization, unit or department. Information according to Mannino (2000) is processed and intelligent data that can be used for decision making. In order to run an organization efficiently, an information system is required. Nagpal (1999) describe information system as a system that combines people, data, procedure, computer hardware and software together for providing information need of organization for effective decision making. When adequate and right information is provided in timely fashion, it will help an organization achieve its goals seamlessly.

Information system is driven by data. Data according to Cornel and Morris (2019) consists of raw facts. Such raw facts could be employment records, payroll, projects and health records. In order to manage and utilize data efficiently, they are organized into database. Database is a collection of persistent data that can be shared and interrelated (Mannion 2004), Database organizes data to facilitates efficient retrieval and modifications (Ozus, 2012). Many software applications perform various functions such as data storage, viewing and processing using database imbedded in them. Therefore, database are important parts of most software applications. They are found in many applications such as library system, shopping applications, student registration and process control.

The advent of internet has provided opportunity for the development of web-based data application system that provides online access to information. This application runs on world wide web which consists of specially formatted documents called web pages and provides link to different type of information including videos and graphics. Database application that utilizes web technologies for providing access to information are referred to as web-based database applications (Paynter and Pearson, 2015). The Internet is the technology that best facilitates a collaborative working environment in a construction project (Walker and Betts, 1997). The use of Internet for construction work can help information transfer occur faster and more effectively and enable new opportunities for the development of distributed systems that can cross

organization boundaries and provide a unique opportunity for teamwork and workflow automation. The challenges of fragmentation in construction activities can also be greatly reduced by using web-based database system for collaboration and coordination between firms participating in a construction project leading to better communication practices. Its benefits include an increase in the quality of documents and the speed of the work, better financial control and communications, and simpler and faster access to common data as well as a decrease in documentation errors. Skibniewski and Abduh (2000) categorized the advantages of web-based database information system in construction company into three areas namely; the support of relevant information services, communication between project participants, and engineering and management computing.

Recently, a concept of how the Web and its associated technologies can be used to manage construction projects has been widely acknowledged by practitioners. This concept is often referred to as a Web-based Project Management System (WPMS) and promises to enhance construction project documentation and control and to revolutionize the way in which a construction project team conducts business. WPMS is an electronic project-management system conducted through the Extranet, which is a private network that uses Internet protocols to transmit information. The system is only accessible by a project team, but team members can be located in different organizations. It basically provides a centralized, commonly accessible, reliable means of transmitting and storing project information (O'Brien, 2000). Web-based information systems can be a potential strategic weapon for organization. The key is to combine internet technology with traditional information strategies and use them to pursue company goals (Pant, Sim and Hsu 1998), namely to overcome obstacles related to cost, time, functionality, and quality (Takahashi, K & Liang ,1997).

1.2   Statement of the problem
Units under works department generate, store, manipulate and retrieve data and information manually. As the departmental data and information is growing, the use of manual method in retrieving information is not only slow, but stressful. Furthermore, manual system of storing and retrieving information is associated with misplacement of records. In addition, the stored information are not well protected against access by unauthorized persons. Hence, the researcher proposed a web-based database for building infrastructural projects in Abia State College of Education (Technical), Arochukwu (ASCETA) that will manage and protect departmental data and information effectively.

1.3   Objectives of the Study
The objectives of the study are as follows:
1. Determine the infrastructure database system requirement.
2. Design the infrastructure database system.
3. Develop the infrastructure database system.
4. Test the developed infrastructure database system
5. Determine user's satisfaction with the infrastructure database system.

2.   Literature Review
This part presented properties, functionality and database architecture. It also presented a study related to the present study. Data as stated is the heart of a database system. Data is simply raw facts. Database according to Ozsu (2012) is a large and persistent collection of (more or less similar) pieces of information organized in a way that facilitates efficient retrieval and modification. Examples of database application include, but not limited to web indexes, library catalogue, medical records, bank accounts management, stock control, personnel systems, product catalogues, telephone directories, train timetables, airline bookings, credit card details, students records, customer histories, stock market price and discussion board among others (Alechina, 2004).

2.1   Database Properties

Watt and Eng (2012) identified the following as properties of a database:

- It is a representation of some aspect of the real world or collection of data elements (facts) representing real world information.
- A database is logical, coherent and internally consistent.
- A database is designed, built and populated with data for specific purpose.
- Each data item is stored in field.
- A combination of fields makes up a table. For example, each field in an employee table contains data about an individual employee.

2.2   Functionality of Database Management System

Database Management System (DBMS) are designed to facilitate data storage, retrieval as well as data manipulation by single or multiple users. DBMS according to Frank (1988) should have the following functionality:

- Storage and retrieval of data; selection of data based on multitude of access keys (e.g. name of a person, street address of building);
- Standardized access to data and separation of data storage and retrieval functions from the program using the data (this makes database and application programs independent, so that changes in one do not necessarily lead to changes in other);
- Interface between database and application programs based on a logical description of data (details of physical storage structure should be transparent to the applications);
- Make access functions in applications independent of the physical storage structure, so adaptation to expanding storage needs do not influence the application programs;
- Allow for access to the data by several users at the same time; and
- Provide for the definition of consistency constraints for the data which will then be automatically enforced. Consistency constraints are rules which must holds for all data stored, and are an excellent technique to reduce the number of errors in a large data.
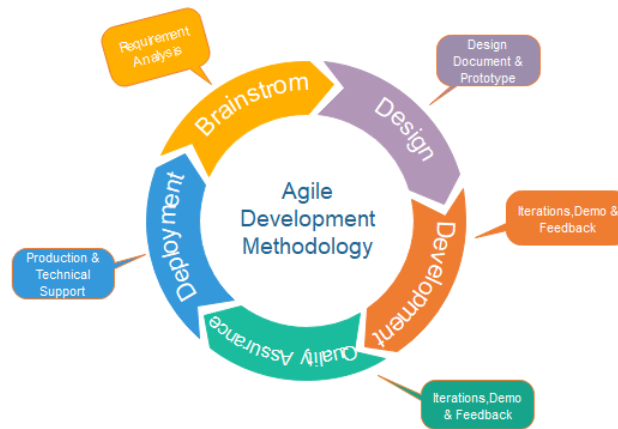
2.3   Web-Based Information System

Web Based Information System Applications that appear on intranets and extranets using web technology can be referred to as web-based information systems (Paynter and Pearson, 2004). There are several synonyms that refer to web-based information systems such as web applications, web-based applications, web-based systems, internet web applications, and rich internet applications. But there is a difference between web-based information systems and standard web applications or pages. The difference lies in the nature and type of information created for users. The application of web standards is uni-directional in terms of providing information to users. While web-based information systems can be interpreted as applications that not only disseminate information, but also proactively interact with users to be able to help their work. (Takahashi and Liang, 1997).

3.   Methodology
3.1   Agile Process Model
Agile process model refers to a software development approach based on iterative development. Agile methods break tasks into smaller iterations, or parts do not directly involve long term planning. The project scope and requirements are laid down at the beginning of the development process. Plans regarding the number of iterations, the duration and the scope of each iteration are clearly defined in advance (Javapoint,
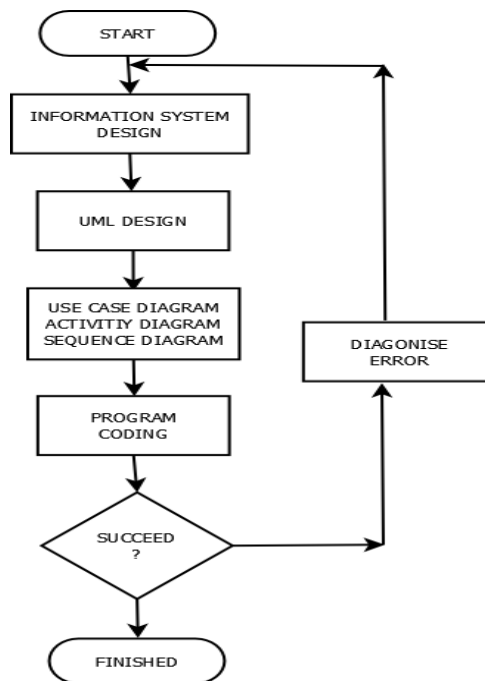

2021)

Figure 3.1: Agile Process Model

3.2   System Design Flowchart
Figure 3.2: System Flow Diagram for Building Infrastructure System

4.   Discussion

4.1 Use Case Diagram

Figure 4.1 describes the web-based building maintenance system information system, there are two actors or users namely administrator and maintenance officer which can be any of the employee working at the works unit or department of the college. Administrator has access rights to perform user registration, project list update, project maintenance, appraisal settings and report on performance results and points and maintenance officers have access rights to the Project maintenances, port on performance results and points.
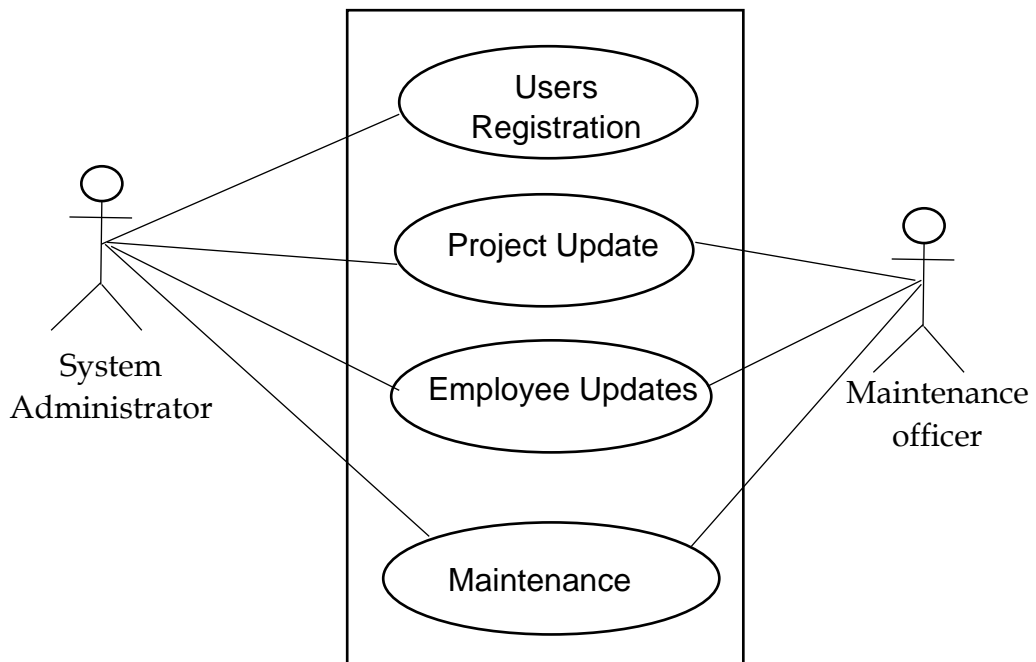

Fig 4.1: The Use Case Diagram for Building Management System

4.2 Login Activity Diagram

Figure 4.2 depicts series of activities to be performed by the system administrator to gain access right to the system.
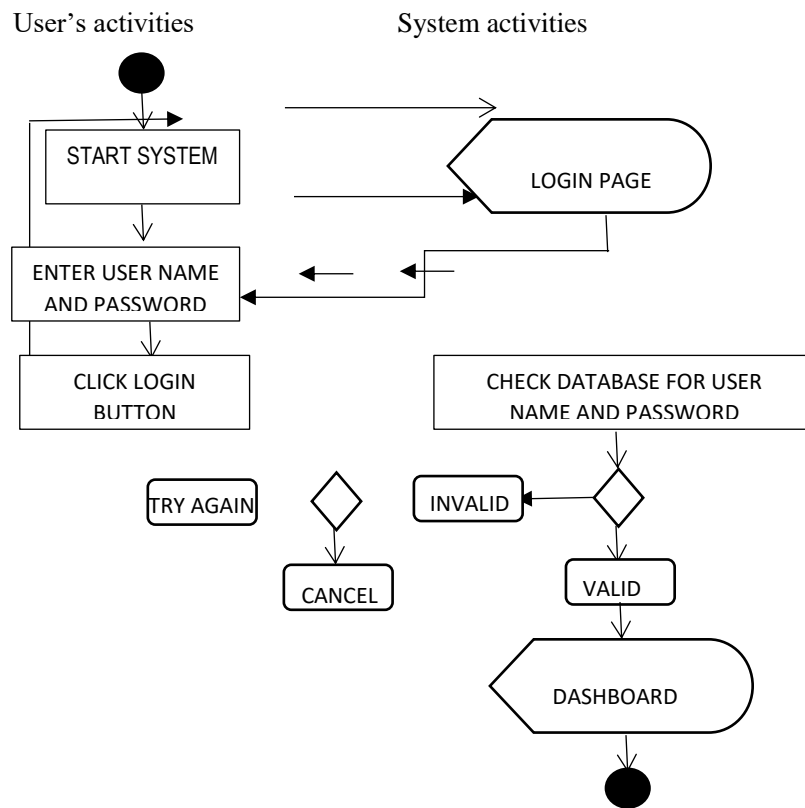
User's activities   System activities

START SYSTEM

LOGIN PAGE

ENTER USER NAME AND PASSWORD

CLICK LOGIN BUTTON

CHECK DATABASE FOR USER NAME AND PASSWORD

TRY AGAIN

INVALID

CANCEL

VALID

DASHBOARD

Figure 4.2: Activities diagram for login sub function

4.3 Sequence diagram for sub–New Project function

Figure 4.3 depicts behavior of the new project sub function as related to interactions between the administrator, web-page, the web server and database.
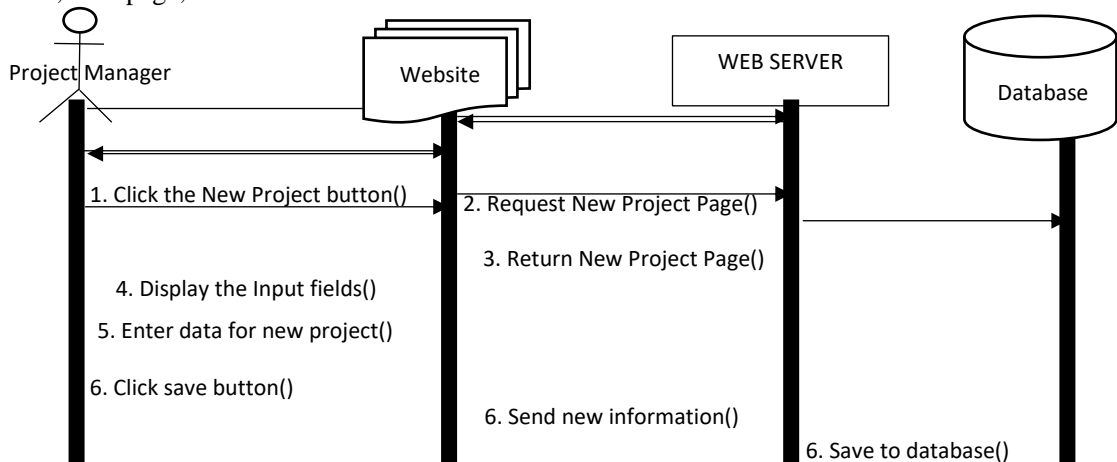
Project Manager

Website

WEB SERVER

Database

1. Click the New Project button()

2. Request New Project Page()

3. Return New Project Page()

4. Display the Input fields()

5. Enter data for new project()

6. Click save button()

6. Send new information()

6. Save to database()

Figure 4.3: Sequence Diagram for Creating New Project Record

4.4   Interface Design
4.4.1   Administrator Login Menu Interface
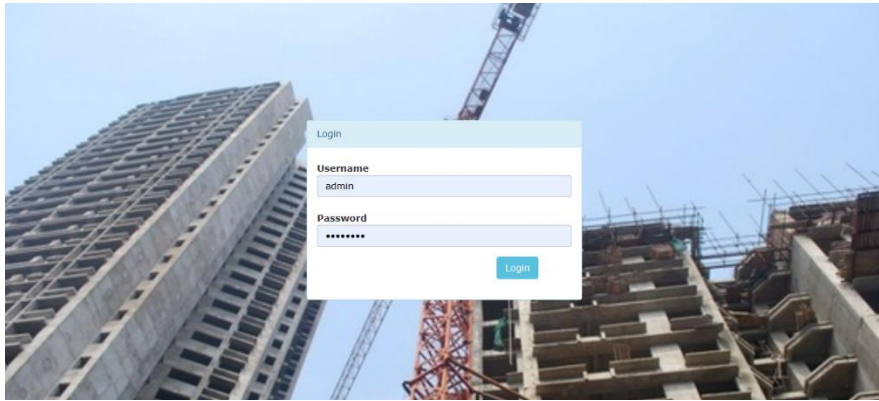

Figure 4.4.1: Login Interface Menu
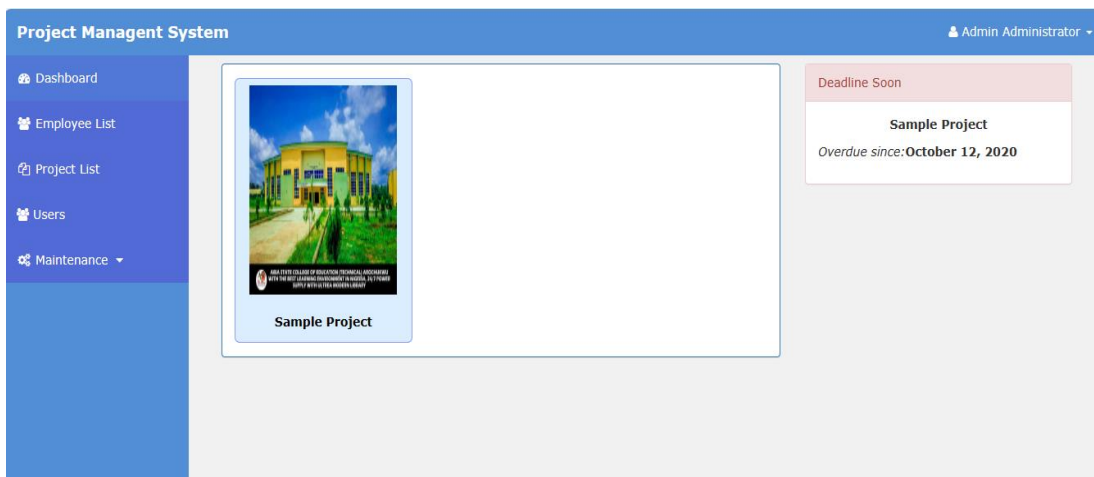
4.4.2   Dashboard Screen

Figure 4.4.2: The Dashboard Interface for Administrator

5.   Conclusion

Web-Based database management information system has been able to produce the expected output. The user-friendly design has made it easier for maintenance officer to create and update building database effectively. The Agil software development process enhances the construction of the application and made it possible to be delivered in record time.

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