DESIGN AND IMPLEMENTATION OF A WEB-BASED GIS FOR PATIENTS REFERRAL TO HOSPITALS IN ZARIA METROPOLIS

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ABSTRACT
The aim of this Study is to design and Implement a web base GIS for Patients Referral in Zaria Metropolis in order to reduce problems been faced by patient in case of Emergencies. The Development of this model is motivated to provide opportunity for healthcare practitioner to gain access to information that can aid him/her to locate viable hospital for patient in case of emergency. Although considerable research has been for health GIS applications, three challenges still need to be addressed, this relate to health mapping methods, Reusability of health application and interoperability issues. To handle this problem we design a web-based GIS for patient referral to support data sharing and representation. The developed model makes it possible for healthcare practitioner to locate the nearest hospital and the services rendered in case of referrals. The study explores the use of open source software, Web server is Apache extended with support for PHP, MySQL and ARCGIS 9.2 Authentication is built in the model as a security for accessing information in the database.

Keywords: *Web-based GIS, Patients referral and Zaria Metropolis.*

1. INTRODUCTION

Health data are concerned with people's health experiences. Health care providers such as emergency departments, hospitals, clinics, and care facilities are responsible for the health security of people. Health data cover a wide range of areas, including inpatient, outpatient, survey, laboratory, facility, demographic, socio-economic, and environmental information. Their collections can be done through surveillance (e.g., disease registries, population health surveys), the administration of health care systems (e.g., records of emergency department visits, hospital discharge, medical and pharmaceutical services, sales for over-the-counter medications), clinical care delivery (e.g., laboratory and pathology reports, medical records, diagnostic images), administration of public and private sector services (e.g., census statistics, employment records, motor vehicle license and accident records, school enrollment lists, work or school absenteeism records),primary care networks (e.g., patient rosters), environmental monitoring (air pollution observations, air temperature, water quality), cohort research findings, and questionnaire surveys. Since ancient times, people began to realize that diseases in humans and animals are associated with location. For example, Marco Polo became aware of hoof diseases in animals that had consumed selenium-accumulating plants and suffered physical abnormalities, and he believed the cause was the local water supply in given areas [National Research Council (U.S.), 2007]. In the 19th century, Dr. John Snow discovered that deaths associated with the major cholera outbreak in London were located around specific water pumps (subsequently found to be contaminated) by introducing the locations of disease outbreaks into his analysis. At different locations on the Earth, variabilities in natural earth processes, environmental quality, ecological issues, and human activities are likely to affect human health. Throughout history, many geographical studies on health activities have been explored [Cromley, 2003].

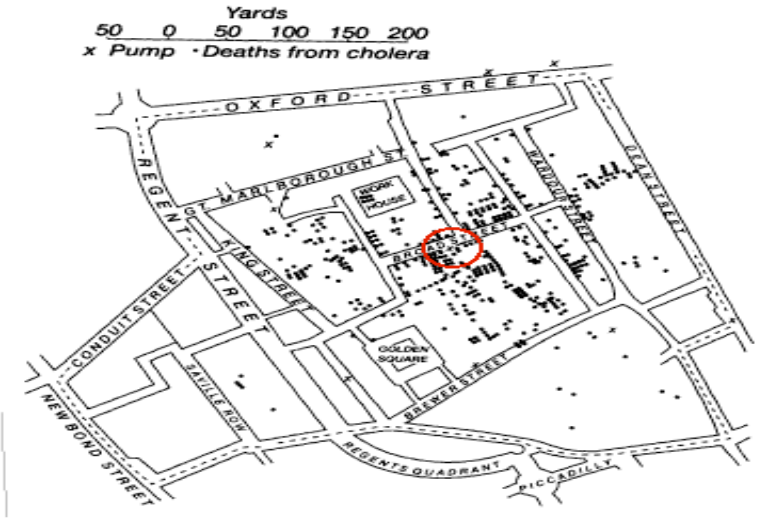

Figure 1. John Snow map of cholera death in London (Gilbert, E.W., 1958)

2. PROBLEMS ASSOCIATED WITH MANUAL METHOD

In spite of the continuous development of geographical health applications, the following three problems still need to be handled: Firstly, the methods to generate maps from health related activities need to be considered. Secondly, integrating and reusing current health applications are constrained to a large extent, (Zeng *et al*, 2004) pointed out that the isolation of existing stand-alone disease management systems lead to data sharing problem. Thirdly, different health application lacks interoperability between them. Interoperability makes it easy to communicate, execute programs or transfer data among various systems in a unified manner.

3. MATERIALS AND METHODS

An online Web-based GIS will be designed and implemented using MySQL as the database; Apache will be web server to provide basic functionality of the web services.PHP will be used as scripting language to program the server side that manipulates the knowledge in the database and ARCGIS 9.2 was used to geocode the coordinate of the hospital location.

4. ARCHTECTURAL DESIGN

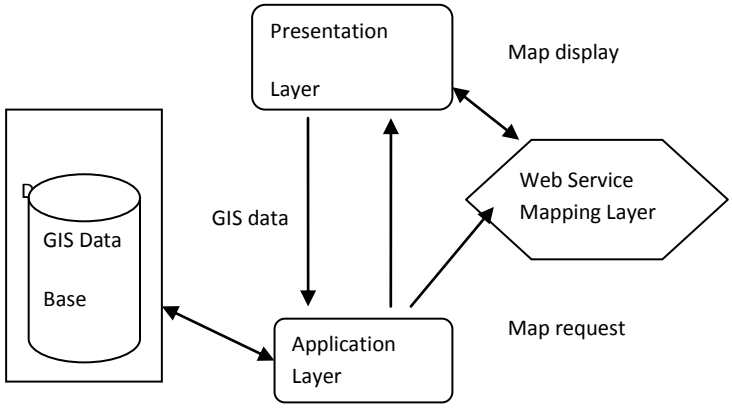

Figure 2 Web-based GIS Architecture (Peng and Tsou, 2003)

The application layer forms the centre of the architecture and oversees the relationship between other components in the system, as well as determining how the system functions. It extracts the data requested by a client from the data layer and then processes it. This is then passed to the presentation layer to display to the client. The application layer is also responsible for performing modifications to the database layer that are requested by the client.

The presentation layer displays the combined output of the application layer and the map generation layer to the client. The Internet and HTML are used to transport this information and allow the communication between these components. In addition to the display of information, change requests are also posted to the application layer

through the presentation layer. Essential system operations such as the setting of marker positions are handled through this mechanism.

The data layer is responsible for the storage and provision of data to the application layer. Databases employ Database Management Software (DBMS) that handle a number of issues including concurrent user access, and the efficient storage of data (Adam and Gangopadhyay 1997).

The main function of the web service mapping layer is the generation of the visual map according to the variables passed to it. The geographic co-ordinates that are passed to it determine the map that is generated.

5. IMPLEMENTATION AND RESULT

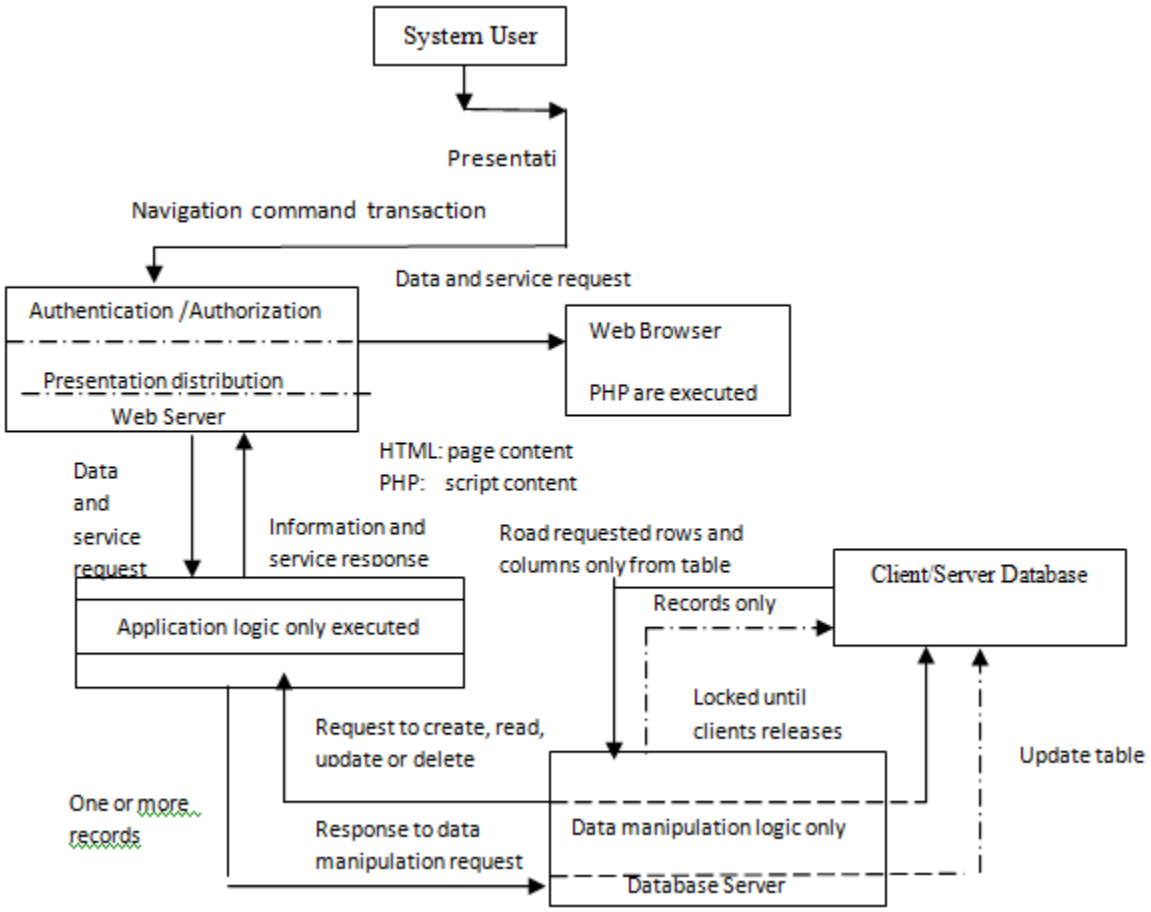

Figure 3 Referral System Network Applications

The basic component of the Internet-based healthcare system's infrastructure is presented in Fig 3 This includes a user interface made of access devices at the remote areas and urban cities. This approach allows users to access the system through the Internet and a common content management gateway, which in turn takes request for any services from the users (physicians and other health professionals) and passes it to the appropriate backend systems.

The common content management gateway provides a single point entry to the system via internet. Once a user logged on, the browser presents the main module of the system to the user. Based on the user's selection and successful authentication, the browser presentation logic redirects the user to the forms to perform the task selected by the user. Furthermore, a procedure provides the presentation logic for processing the service request, for example, submission of a form to register a new patient or update an already existing patient health history. This is invoked by the action of the user. It uses MySQL Transform's methods to convert the HTML form data into MySQL documents. This conversion provides structured data format that would be recognized by the back-end systems in the hospitals.

After the data conversion, the application then invokes the Database. The Database provides a set of operations for the server and procedure to use when accessing the system. The application invokes, for example, the add/update method of the Database to add/update patient data into the appropriate back-end system. In case a patient is to be

referred, a form where the physician will specify the referral information from the patient data and others is presented. After the submission of the completed form, an application is invoked and it converts the HTML form data into MySQL document. This in turn invokes the Database referral methods to transmit and queue up the patient information into the appropriate queue server where the appropriate physician could have access to them. In both cases, it dynamically creates and returns to HTML page with the results of operation specified by the user to the browser.

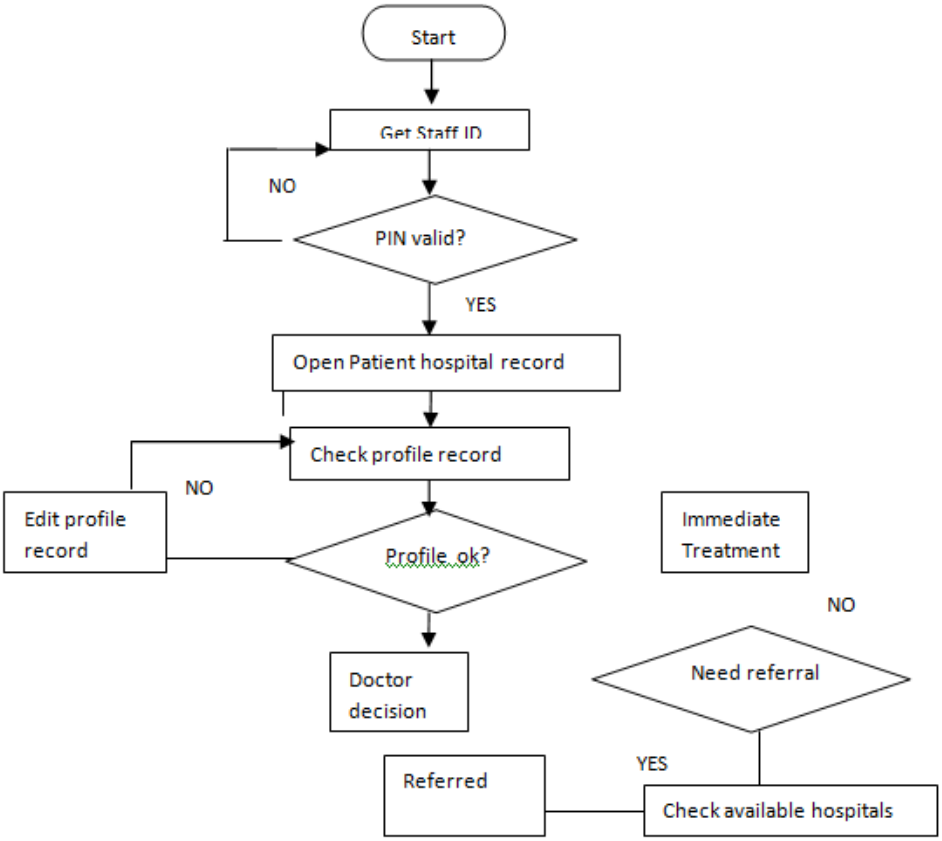

Figure 4 Referral interactive diagram

6. AUTHENTICATION AND AUTHORIZATION

Authentication in Web services has to do with ensuring that the identity of a user cannot be forged or altered. Hence, authentication focuses on the verification of the identity of voters. Put simply, the identities of voters must be true and verifiable, where as authorization in the Web service context means ensuring that votes can be cast only by authorized voter.

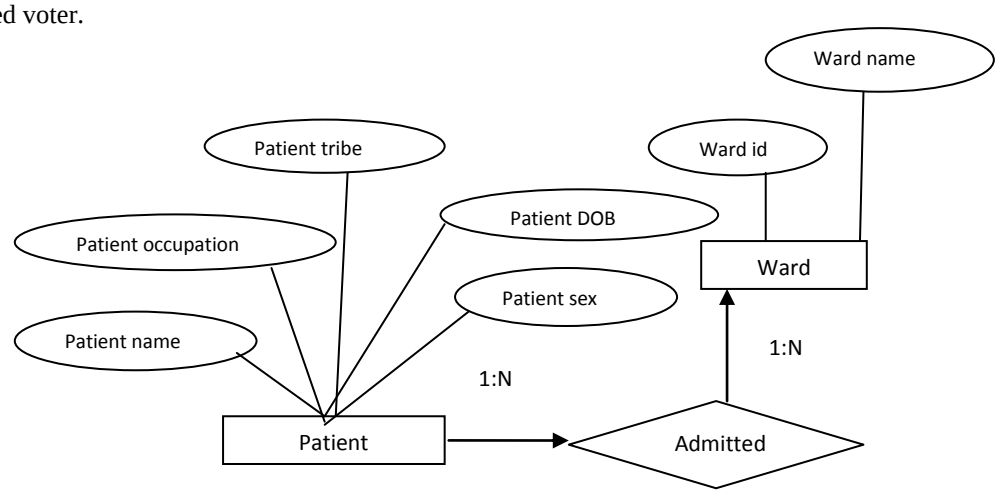

Figure 5. Entity Relationship Diagram of Patient and Ward

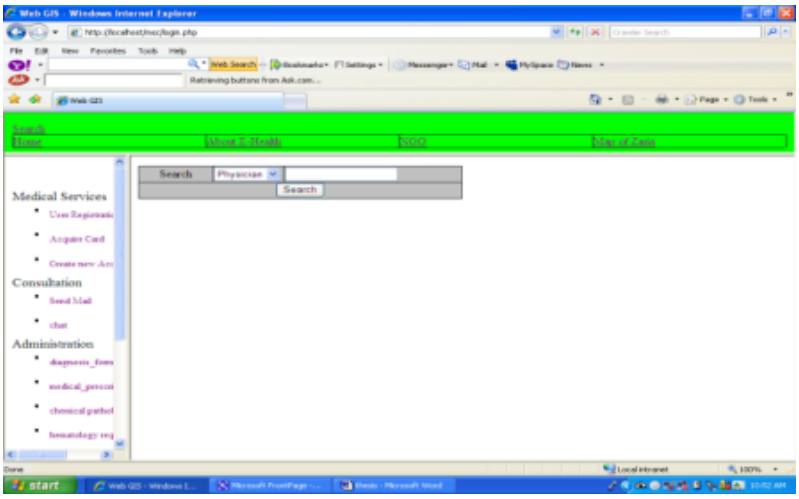

Figure 6.An html form Page

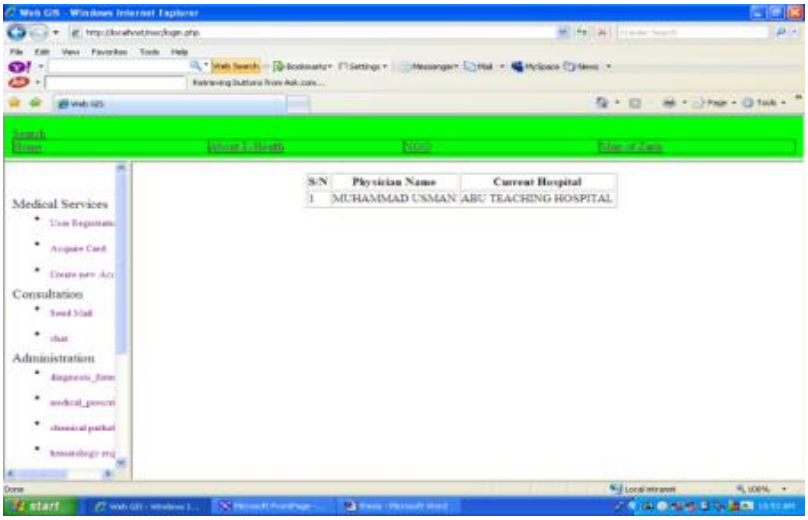

Figure7. shows a displaying the result of the query entered

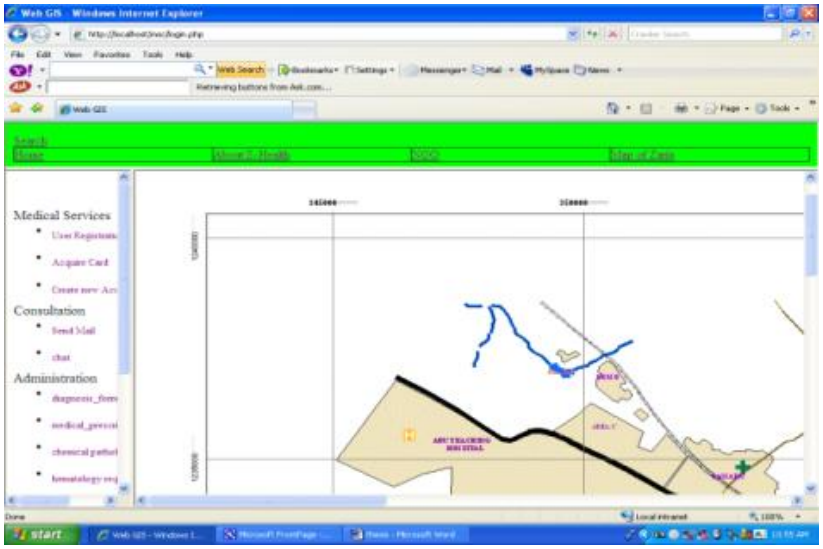

Figure 8.shows a Page displaying Map of Zaria

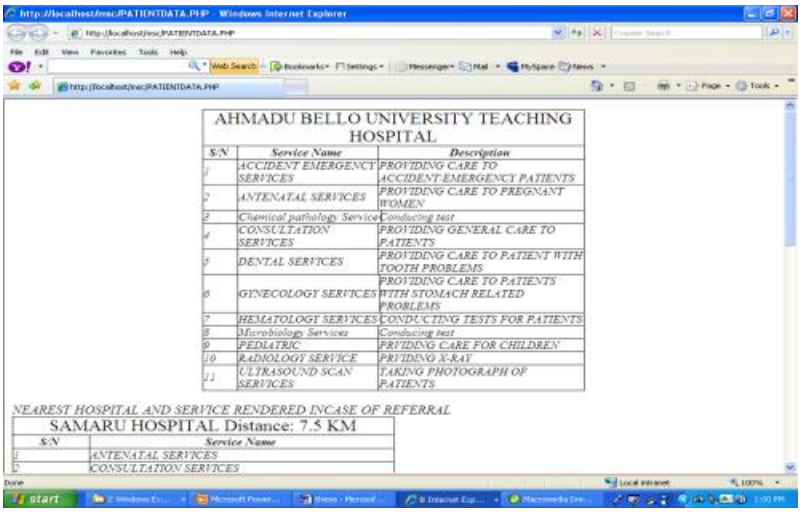

Figure 9 shows a Page displaying the output

7. SUMMARY AND CONCLUSION

As technology advances, particularly in the area of information and communication keep growing on daily basis, taking advantage and keeping abreast of these technologies is a paramount concern to users in order to reduce problems been faced by patient in case of Emergencies. The research work describes the Design and Implementation of a referral system that can aid him/her to locate viable hospital for patient in case of emergency. The developed model makes it possible for healthcare practitioner to locate the nearest hospital and the services rendered in case of referrals.

8. REFERENCES

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