

Application of Data Flow Model to a Wireless Application Protocol for Institutional Information System.

Dele W.S. Alausa, M.Sc., MNSE^{1*} and O.M. Olaniyi, M.Sc., MSNE²

¹Department of Computer Engineering, Federal Polytechnic, Ilaro, Ogun State, Nigeria.

²Department of Computer Engineering, The Bells University of Technology, Ota, Ogun State, Nigeria.

E-mail: alausa2007@yahoo.com*

ABSTRACT

The limitation of information dissemination through files and hard copies pasted on notice-boards and the bottleneck of keeping paper documents necessitated the need for this work. Automating and digitalizing all forms of records about staff and students using current software technologies such as ASP.NET and SQL 2000 eliminates manual dissemination of information. This was achieved by capturing staff and student's biographical data through the paper-based data capturing form. This paper takes a look at how a data flow model can be applied to WAP application for Institutional Information Systems. This resulted into a data-driven mobile web application which leads to the Institutional Information System having components to capture, store, retrieve, and distribute information from the Institution's gateway and security to protect information from unauthorized access.

(Keywords: institutional information systems, information dissemination, record keeping, wireless application protocol, WAP)

INTRODUCTION

The desire to establish a common format for Internet transfer to mobile telephones, without having to customize the Internet pages for the particular display on every different mobile telephone or personal organizer, brought about the wireless application protocol (WAP) by introducing the concept of the Internet as a wireless service platform. Therefore WAP is a protocol for accessing information and services from wireless devices. It can also be seen as the *defacto* world standard for the presentation and delivery of wireless information and telephony services on mobile phones and other wireless terminals (Al-Mukaddim, et al., 2009).

The broad definition of mobile encompasses many different technologies, from simple voice and text devices to complex interactive graphical computers. Nowadays, advanced technology is extensively being used to revolutionize school management by streamlining education-related processes (School Management, 2009). But the information system is an all-embracing system of data processing, control system and decision-making based on information from the control system (Lei-da Chen, et al., 2009). Information system enables managers and administrators in an organization to perform their roles well.

According to Doyin Talabi (2005), an information system is a set of interrelated components that collects, processes, stores, and disseminates information to support decision-making, control and analysis in an organization. While Eduswift.com (2009) defines an information system as a system of people, data records, and activities that process the data and information in an organization, and it includes the organization's manual and automated processes. It also refers to it as the specific application software that is used to store data records in a computer system and automates some of the information-processing activities of the organization.

Since computer-based information systems use computer technology to process raw data into meaningful information, electronic computers and the related software provide the technical foundation of modern information systems. Thus, to understand information systems, one must understand the organization, the problems they are designed to solve, and the organizational processes that lead to solutions. As such there is interdependence between an organization's hardware, software, communication links, and database, on one hand, and the strategy, rules, and procedures, on the other hand.

In recent years there has been an explosion in the telecommunication industry where almost everyone is mobile in some way (i.e., making contact while on the move). Well, a variety of mobile wireless standards exist today, each has different levels of data capabilities. The distinction between the wireless, wire line, and the Internet service providers, is becoming blurred. Data services provided by the mobile networks are fast becoming popular and this presents a huge opportunity for the mobile service developer (Chance Deani, 2008). Using this latest technology, the online school management software automates an Institution's diverse operations such as system administration and management, records and profiles management, time table generation and updates, attendance management, examination management, and results management. The Institution community portal is marked by numerous useful features such as the school calendar, events, polls, forms, notice board, profile search, and internal mail, etc. (School Management, 2009).

This research work is undertaken because of the limitation of information dissemination through files, since the Polytechnic still sends or receives requests such as staff biographical data and students' biographical data manually on a daily basis. This research objective includes:

- To study the existing Polytechnic Information System.
- To evaluate different methods of Information processing in the Polytechnic.
- To develop a user friendly web interface for interacting with the Institutional Information System.
- To develop a database for staff, students and their contact details.
- To develop a mobile Information Software model for adding values to existing channels of retrieving and disseminating information.

LITERATURE REVIEW

During the early days of mobile technologies, the typical utilization of handheld devices was mainly for basic personal communication purposes (e.g. initiating calls, exchanging messages, etc.). Today, manufacturers of these devices have developed the market with a large variety of mobile devices such as portable media players, PDAs, phones, and pocket PCs. With newly adopted networking and telecommunication

technologies (WIFI and GPRS), the use of handheld devices have become very popular and are used for a wide range of services which includes internet navigation, e-mailing, location based and context-aware services, and mobile learning. Many mobile applications have been developed to enrich the appliance of these devices and to benefit from their features. These applications are very sensitive to performance (Quality of Service), security and availability.

Al-Mukaddim, et al. (2009), proposed a framework for coherence between WAP and HTTP in which a new markup language and a browser compatible with both of the access control protocols are incorporated. The proposed framework appears to keep the internet knowledge domain unified and centralized, it also bridges the security gap that is present in the existing mobile internet framework thereby creating a common platform in spite of the divergence existing between the HTTP and WAP and ensuring better mobile internet security.

A framework that integrates WAP and MDA Gateway to support collaboration among virtual teams and nomadic workers using heterogeneous communication devices has been proposed by Azeta, et al. (2007). Authors used a collaborative approach between WAP and MDA gateway whereby the capabilities of the handheld device were augmented with the surrounding large screen display devices to enhance its functionalities with regards to Multimedia Messaging Services (MMS). But authors did not address the issues of security and privacy in this work.

According to Muller, et al. (2003), a concept for adapting Web application to the characteristics of mobile devices using a fairly new Composite Capability/Preference Profile (CC/PP) standard for the identification of the mobile device was proposed. The following was stated as motivation for the framework:

The functionalities of mobile devices have evolved for long and these small and smart technological entities have become important tools in our daily life. But behind the term mobile device, there is a broad range of products.

The heterogeneity of these devices becomes apparent and differences between them are getting blurred more and more.

Thus, authors were interested on devices that have a wireless internet connection and a browser that supports TCP/IP. Previous authors, however, did not change the existing database but only added some new tables.

An EIVOM framework, which is a cinema guide application that integrates data from different information systems through Web services technology to provide users with various services that engage them in a truly entertaining experience, was developed by Mohammed, et al. (2009).

The authors' proposed framework represents a logical structure and does not necessarily reflect a physical architecture. The framework involves two main participants; the mobile client environment and the backend server/mobile Web service, which integrates both mobile application and Web technologies together and provides efficient mobile services to wider range of users.

The model development of a Web-based information system for undergraduate students which handles all computations and administration relating to students' records was presented by O. Osunade, et al. (2008). The authors' proposed information management system for students' records which is a web based implementation of the current manual students' registration system as carried out in the department. A data flow model was carried out using a detailed study of the existing student record management systems. The authors' work is limited to a faculty in the University.

Thus, each of these related works tries to tackle a particular issue at once, but different issues are dependent, and have some mutual impact on, each other. The design used for this WAP based Institutional Information System is based on the existing Staff/Students management processes in use at The Federal Polytechnic, Ilaro. The Information System in Figure1 was developed to model the proposed Institutional Information System. The information system in Figure1 provides only three functions at the moment but this will be increased as the research work progresses.

METHODOLOGY

- A detailed study of the existing Polytechnic Information System.
- Evaluation of paper-based staff and student data capture forms.
- Design of a suitable and flexible data flow model for the Institutional Information System.
- Design of a user friendly Web Interface for interacting with the Institutional Information System.
- Implementation of the database design using Microsoft SQL Server 2000.

RESULTS AND DISCUSSION

Using a data flow model for the staff records, the results from this research shows a user interface for all categories of users. The user interface consists of the following pages to accept or receive data.

Application Welcome Page: This page serves as the application's welcome page as shown in Figure 2.

The Authorization Page: This page allows the authorized users to log-in through valid user name and password as shown in Figure 3.

The Home Page: A successful log-in will display the Home page which consists of Mobile Emulator, View Databank Link, Add Record Link and search Engine Link as shown in Figure 4.

The View Databank Link: This will display a page that consists of a table which store the Staff Databank features such as Staff mobile phones, Staff name, Department, School, Sent Messages and Data sent for all the Staff that have their biographical data with the organization as shown in Table 1.

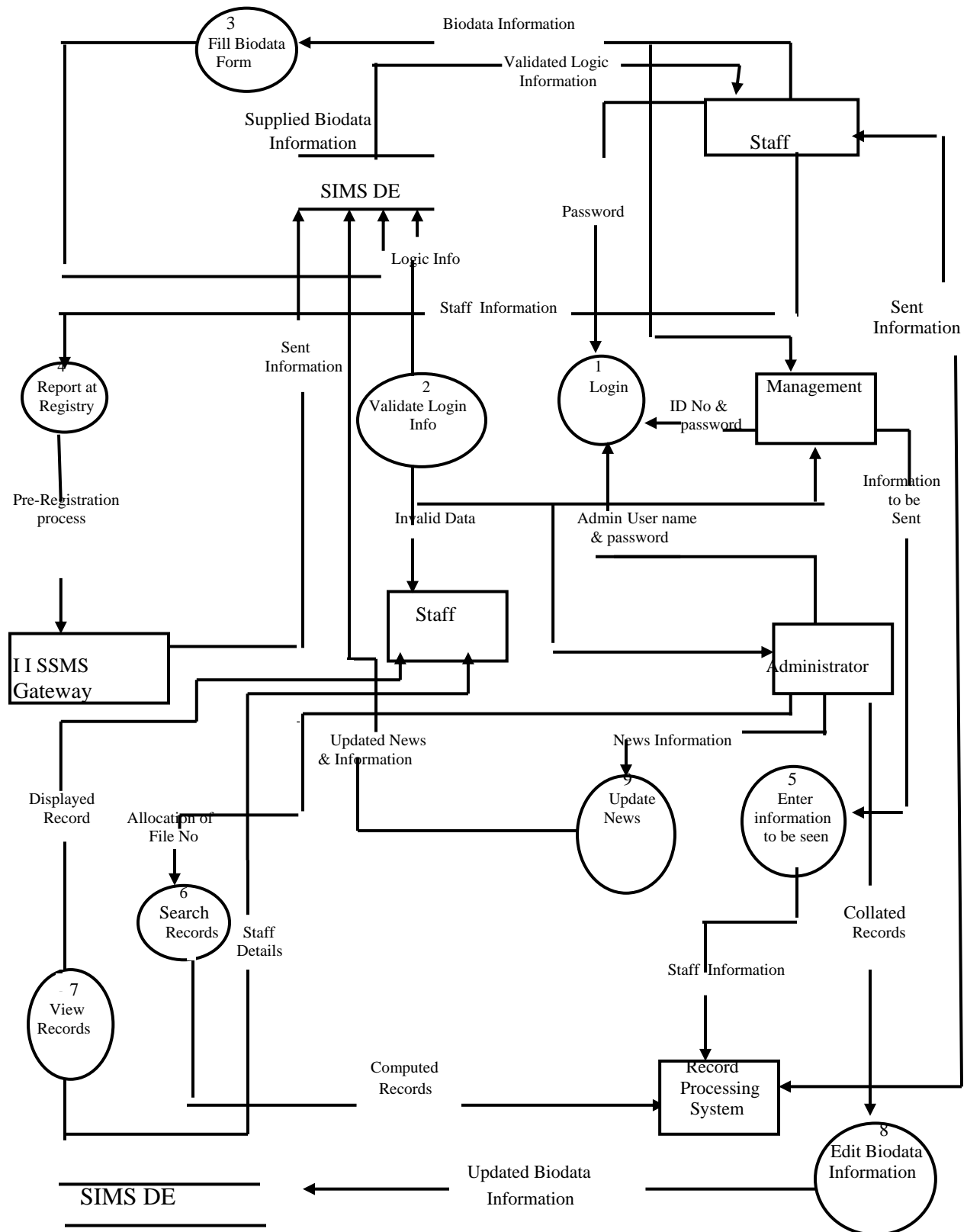


Figure1: Staff Information System for The Federal Polytechnic, Ilaro Curled from [10].

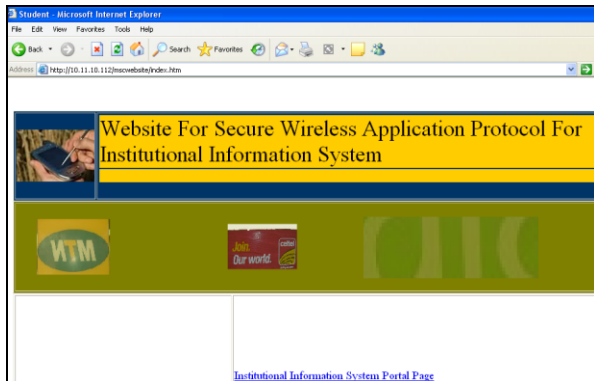


Figure 2: Simulated Web Page.



Figure 4: Home Page.

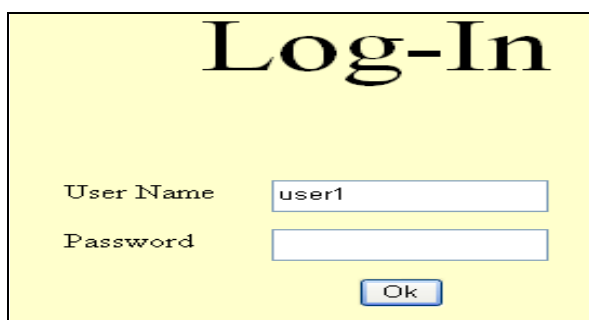


Figure 3: Authorization Page.

The Add Record link: This is an independent page used to capture the staff biodata into the Database. The three processing buttons for this event are “Send button”, “Update button”, and “Search button”. At the back-coding, store-procedures (Transact SQL language) are created for each of the button event with front coding that triggers each of the store-procedure.

Table 1: The View Databank Link.

Staff Databank Sent Messages					Home Page
mobilephone	staffname	school	department	messages	datesent
08035855769	Mr Egunsola O.K	School of Environmental Studies	Department of Estate Management	Meeting holds tommorrow.	5/13/2009 6:08:5 PM
08035855769	Mr Egunsola O.K	School of Environmental Studies	Department of Estate Management	Strike to commence tommorrow	5/13/2009 6:08:5 PM
08027878208	Mrs Osiwoga O.R	School of Engineering	Department of Computer Engineering	Meeting holds tommorrow.	5/13/2009 6:08:5 PM
08027878208	Mrs Osiwoga O.R	School of Engineering	Department of Computer Engineering	Strike to commence tommorrow	5/13/2009 6:08:5 PM
08037133285	Mr Alausa	School of Environmental Studies	Department of Estate Management	Meeting holds tommorrow.	5/14/2009 4:48:2 PM
08037133285	Mr Alausa	School of Environmental Studies	Department of Estate Management	Strike to commence tommorrow	5/14/2009 4:48:2 PM
08051719795	Miss Sandra Okoro	School of Applied Science	Department of Computer Science	Meeting holds tommorrow.	5/14/2009 5:05:5 PM
08051719795	Miss Sandra Okoro	School of Applied Science	Department of Computer Science	Strike to commence tommorrow	5/14/2009 5:05:5 PM
08029427917	Mrs Akinyemi omotola	School of Engineering	Department of Civil Engineering	Meeting holds tommorrow.	5/14/2009 5:44:0 PM
08029427917	Mrs Akinyemi	School of Engineering	Department of Civil Engineering	Strike to commence	5/14/2009 5:44:0

Send Button: This is used to transfer the data entered on the screen to the database.

Search Button: This button helps the administrator to find out or locate for any particular staff phone number.

The Update Button: This is used to edit data. On the same page there is Download Staff Biodata Link.

The Download Staff Biodata Link: This is used to display the staff biodata on the same page as in update button as shown in Figure 5.

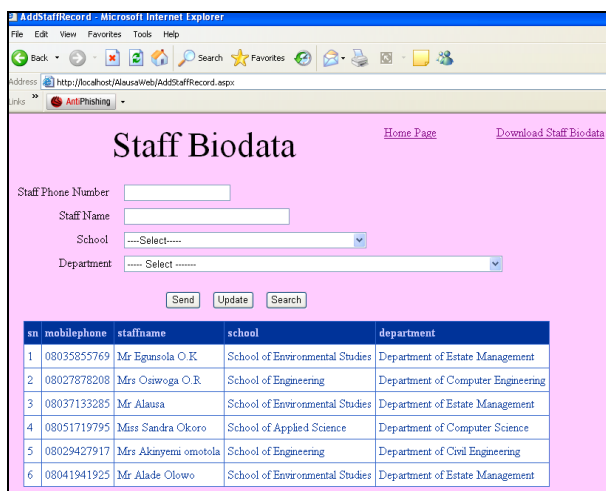


Figure 5: Add Record Link.

The Search Engine Link: this is an engine page that helps the administrator to identify a particular unique phone number with all the messages sent. This is achieved through the use of emulator and search computer icon located at the upper right corner of the mobile emulator as shown in Figure 6.



Figure 6: Search Engine Link.

DISCUSSION

The model shown in Figure 7 below describes an interface where the mobile applications and the Web gateway interact with each other. The staffs' are able to register according to information provided in the staff manual. The submitted form is verified for staff phone number, staff name, staff status, department and school using existing data in the database. The staff is notified about his record up-to-date via the user interface. The staff can also make changes if there is error by complaining to the administrator who in turns updates the staff records.

CONCLUSION

This paper presented the framework of how a Data-Flow Architecture can be used for the deployment of a secured wireless application protocol for institutional information system. The implementation of this work will add value to staff, students and the institution in general by offering the staff and students Information Retrieval Services, while the Institution offers Information Dissemination Services by providing the platform. The work is a WAP based implementation of the current manual staff and students' registration system.

REFERENCES

1. Al-Mukaddim, K.P, M.D. Abdul Mutalib, and F.Z. Minhaz. 2009. "An Internet Framework to Bring Coherence between WAP and HTTP ensuring Better Mobile Internet Security". <http://arxiv.org/ftp/cs/papers/0605/0605061.pdf>.
2. Azeta, A.A., M.O. Oyelami, and J.O. Daramola. 2007. "An Architectural Framework for Collaboration of Heterogeneous Communication Devices Using WAP and Mobile Device Augmented (MDA) Gateway Integration". *Proceedings of the International Conference & Workshop on Third Generation (3G) GSM & Mobile Computing: An Engine for National Development*. Covenant University: Ota, Nigeria.
3. Chance Deanni. 2008. "What is WAP?". *WAP Forum*. <http://www.wapforum.org>
4. Doyin Talabi. 2005. *Basic Computer Applications*. Datalink Associate: Lagos, Nigeria.

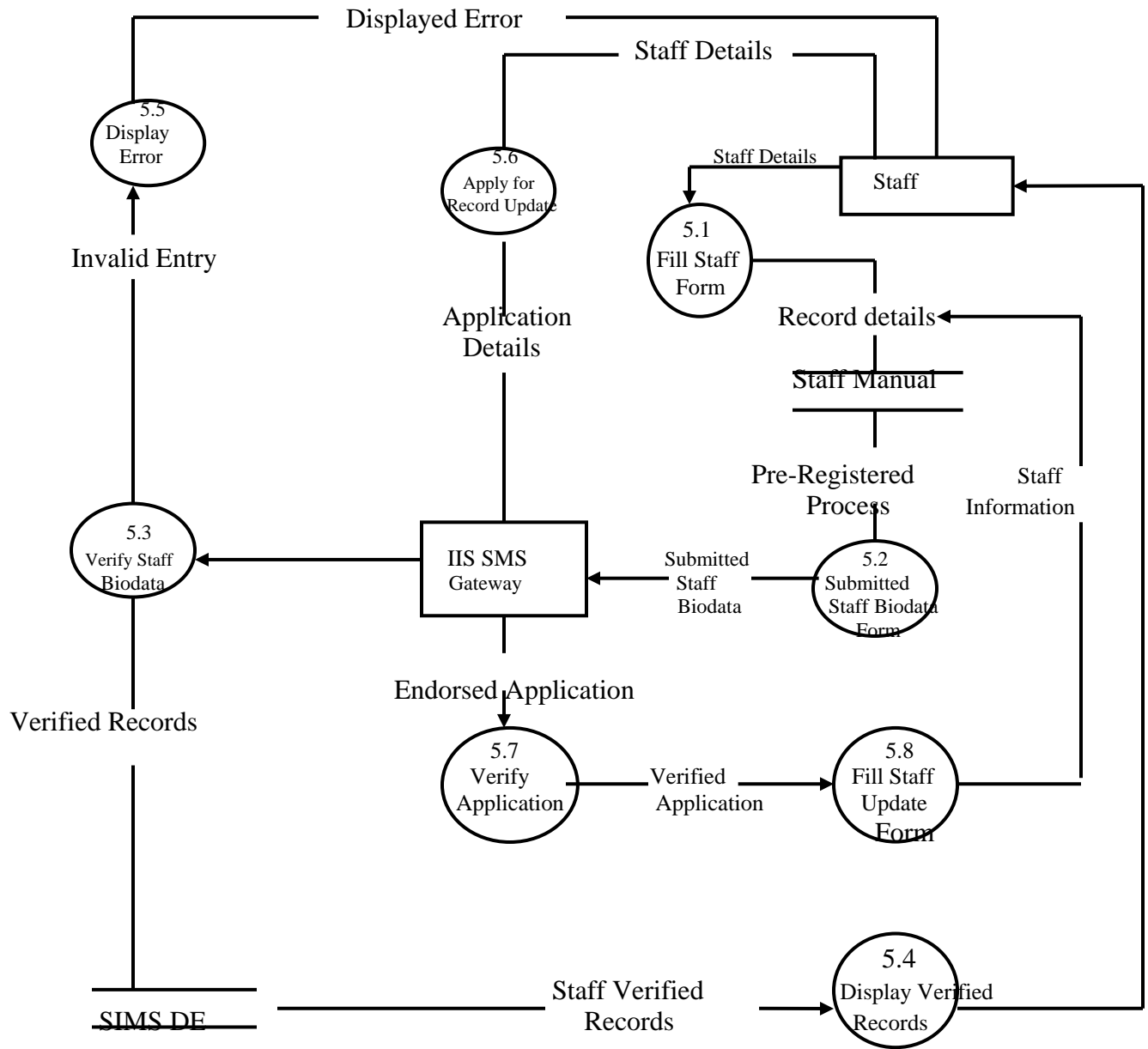


Figure 7: Data Flow Model for Staff Registration in the Staff Information Management System of the Polytechnic Curled from [9].

- Information System. 2009. <http://www.eduswift.com>
- Lei-da Chen and G.W. Skelton. 2005. "Mobile Commerce Application Development". Cybertech Publishing: Chicago, IL.
- Muller, J., T. Lenhart, D. Henrici, M. Hillenbrand, and P. Muller. 2003. "Developing Web Applications for Mobile Devices".
- Mohammed, A.S., B. Abdelghani, D. Rachida, and M. Rabeb. 2009. "Towards an Efficient Framework for Designing, Developing and Using Secure Mobile Applications". *Proceedings of World Academy of Science, Engineering and Technology*. 40. <http://dspace.icsy.de:1200/dspace/bitstream/123456789/141/1/DPArchiv.0117.pdf>

9. Osunade, O. and F. Adewale. 2008. "Data Flow of a Web Based Student Information System". *Proceedings of the third International Conference on ICT Applications (AICTTRA)*, O.A.U.: Ile-Ife, Nigeria.
10. School Management. 2009. <http://www.eduswift.com>.

SUGGESTED CITATION

Alausa, D.W.S. and O.M. Aoaniyi. 2012. "Application of Data Flow Model to a Wireless Application Protocol for Institutional Information System". *Pacific Journal of Science and Technology*. 13(1):308-315.

