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Implemetation of Futuristic Web-Based Application for Insurance Services

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***ABSTRACT**: The management of information and service delivery in insurance companies has remained largely low-tech, relying on paper-based customer service and face-to-face communication. This inimical approach to insurance service is the reason for the low penetration of the insurance industry not just in Nigeria but around the globe compared to the progress rate of its sister banking industry. The aim of this research work is to develop a Web Based Application for Insurance Services as a panacea to the low insurance penetration menace around the globe by computerizing the acquisition and update of policy holder profile, provision of quotes to prospective customers, calculation of premium, payment of premium, making claims and all insurance service. The Web Application was developed with the Microsoft ASP.NET C# programming language for the back end, using the Microsoft Visual Studio as the development environment (IDE), Microsoft SQL for database with some HTML codes used for the front end design of the web application. The study adopted the Agile development approach in the system development life cycle and Object Oriented Design and Analysis (OOAD) in the design and analysis phase. Unified Modeling Language (UML) was used as a graphical language to specify diagrams for documenting the behavior of the system. The system has undergone unit testing (with different test values and results), integration testing and system testing. The system is recommended for use by insurance companies that are still paper based and those that have not fully computerize the insurance value chain in their operation. This system is design to accommodate future development and can be easily tweaked to fit into the fashion of any insurance company. The system has been proven to be efficient and dependable.*
***KEYWORDS:** Insurance, Electronic Insurance, ICT, Internet*

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I. INTRODUCTION

The practice of appraising and controlling risk has evolved as a discrete yield of study and practice in the world. Insurance is a contract, represented by a policy, in which an individual or entity receives financial protection or reimbursement against losses from an insurance company.

Insurance is universally acknowledged to be an institution which eliminates risk, substituting certainty for uncertainty and comes to the timely aid of the insured in the unfortunate event of damage to the insured or her property, or protection from liability for damage or injury caused to a third party (NAIC, 2012).

Among other things, the contract also provides the payment of premium periodically to the insurance company by the insured. There are different types of insurance policies available, and virtually every individuals or businesses can find an insurance company willing to insure them, for a price. The most common types of personal insurance policies are auto, health, homeowners and life insurance policies. Only few individuals in Nigeria have at least one of these types of insurance. Businesses require special types of insurance policies that insure against specific types of risks faced by the particular business. A fast food restaurant, for example, needs a policy that covers damage or injury that occurs as a result of cooking with a deep fryer. An auto dealer is not

subject to this type of risk but does require coverage for damage or injury that could occur during test drives. There are also insurance policies available for very specific needs, such as kidnap and ransom (K&R), medical malpractice and professional liability insurance, also called errors and omissions insurance (Investopedia, 2017).

A manual insurance management system is the one in which all process of the entire insurance value chain are done without the use of computer systems or internet. Records are kept in files and folders, customers have to be present in the insurance company to make a decision on purchasing an insurance policy. In addition, the process is made more difficult by some insurers by asking the client to fill out online (e-insurance) useless forms, the information of which they do not even use in the initial quote process; which is a major reason for low insurance service penetration in Nigeria.

Web (digital) technologies can be applied across the entire insurance value chain, from engaging and interacting with customers and distributors to sales and marketing, service fulfillment (underwriting and payment) and reinvestment as a panacea to the low insurance service penetration in Nigeria, because it has been proven by series of survey by various financial analyst in Nigeria that the toughest challenge faced by the insurance sector is the one that is transforming consumer behavior and business models "*web technology*". Digital is a new market force that is driving a massive change in consumer expectations. It will require a different set of skills, culture and measurement. Industries such as telecommunications, consumer products, and media and entertainment have already harnessed digital to attract and retain new customers. It is time for insurers to evolve and respond: they cannot afford to be on the sidelines of the shift to web technology (Shaun, 2013).

The operations of insurance company is characterized by the manual method, there is need for new ways of handling information and revamping manual processes that today push mountains of paper from place to place and department to department, as a result, serious threat has been posed to the operation of the service and too much workload on the staffs. The manual method involves the marketing staffs moving from one location to the other to meet up with the requirement of their company and also the files and data of their company are stored in cabinets which are easily degraded by environmental damages and rodents. Manual processes, customer retention, underwriter effectiveness, customer service response, and claims cycle times are all areas within typical insurance companies which are ripe for transformation (Deb, 2011).

Over the years, insurance companies in Nigeria has integrated call centers in their mode of operation as part of efforts to deliver and maintain high service levels, customer satisfaction and retention but this did not adequately solve the challenge of low penetration of insurance company. Recently, insurance companies has to some extent adopted the web technology to promote self-service as a strategy to reduce workload on staffs, expanding their customer base and revamping some manual processes like enrollment, request/delivery of quick quotes, and publicity of insurance policies. Not only does Web self-service enhance customer service, it also helps to migrate calls away from expensive call center agents. Call center agents can dedicate their time to handling more complex inquiries and concentrating on selling activities, rather than responding to routine calls that can be easily automated. The opportunities for self-service in insurance abound for all customer audiences. Members can view policy coverage, pay bills, make changes to policies, submit claims and check the status of claims progress (Genesys, 2008).

The main thrust of this research paper is to implement a web-based application for insurance services that automate the value chain such as engaging and interacting with customers and distributors, sales/marketing, service fulfillment (underwriting and payment) and reinvestment. Depending upon the user information, real time quotes are generated from the web-based application. The project is designed as a means to avert the low insurance penetration in Nigeria by promoting and managing a good customer relationship/experience using our modern day web technology.

II. REVIEW OF RELATED LITERATURE

The insurance industry contributes to the financial sector of an economy and also provides an important social security net in countries (Shri, 2015). Philip (2012), citing Patrick (1966), said that, the insurance sector is closely linked with macroeconomic factors (e.g. inflation, currency controls and the national income of a country), regulation and supervision, and the achievement of national development objectives, as well as the international trade regime. Given its dual infrastructural and commercial role, the sector has attracted great interest in the context of privatization and liberalization. According to Albert (group chief executive officer of

Zimre holdings limited, at the 17th Insurance Congress of Developing Countries (ICDC, 2013), the Insurance Industry in Africa is at different stages of development and has been growing at a moderate pace relative to the other sectors of the Financial Services Industry.

According to Martin et al. (2004), electronic-insurance as one of the main parts of e-commerce is an industry that has been considered extremely. The loss of spatial and temporal restrictions, reduction of rates, increasing the sales volume, easy access to information, reduction of transaction costs, customer focus, specialization of activities and restructuring sales network are some advantages of electronic insurance. He stated that, general meaning of electronic-insurance is the use of internet and information technology to produce and distribute the insurance services. And the specific meaning of e-insurance is, providing insurance coverage through an insurance policy, in which all request, proposal, contract, negotiation will be performed online.

Anthony et al., (2017), noted that today's insurance consumers, whether they be individuals or businesses, have grown accustomed to modern technological conveniences and now demand the same from the insurance market. In other words, legacy insurance entities can no longer ignore developments around them if they want to remain competitive in the marketplace. As trust and brand loyalty across all markets continues to decline, carriers, agents, and regulators must adapt to new expectations regarding all aspects of the insurance transaction value chain, from underwriting and rating, to claims payment.

In the words of Mohammed Kari (NAICOM Commissioner for Insurance), on information technology it is said that:" there is no doubt that the application of Information and Communication Technology (ICT) is a critical success factor in the running of any business today and the Insurance Industry continues to explore the benefits it offers. Information technology applications are catalyst to the development of any industry but not without its challenges, the most critical of which is security. He said that "The Commission (National Insurance Commission) is to establish the framework for Information technology supervision of insurance Institutions and promote arrangements for efficient and more cost effective applications in the Insurance Industry" (Nkechi, 2017).

According to Leila et al. (2012), in a short period of time, the internet is regarded as one of the most effective means of communication, and studies have shown that Americans were the pioneers to acceptance of internet and using it in online purchases and developing e-commerce in other countries; and it seems there is no other option but to accept it. The world transformations indicate that, in the last century, using e-commerce has been the major activity of developed countries. Developing countries also are moving quickly towards accessing and using it. However, all countries based on infrastructures and capabilities have invested in this important activity.

III. SYSTEM DEVELOPMENT METHODOLOGY

3.1.1 Analysis of Existing System

The existing system analysis began with a survey of Leadway insurance mode of operation and their web based application (Leadway, 2017). In the past, strong relationships bound customers to their insurance companies. But customers have become more sensitive to affordable price for better products including web services. With the quest to have a concrete understanding of the existing system during the analysis of this system, it was discovered that insurance application has gone beyond the conventional stand-alone application and web application to cloud based insurance application. Considering the robustness of the IT requirements of the insurance industry; there is also a paradigm shift from customize insurance software system (like that of Leadway insurance) to generic/commercial insurance software system that any insurance organization can adopt and easily configure to suit the operations of their organization.

3.1.2 Analysis of the Proposed System

Haven critically examined the existing system of operations of Leadway insurance and other commercial insurance application with a view to discover problem areas, it became obvious that the development and deployment of a cost effective, secure, scalable and reliable platform that offers a host of customer/business management functionalities is a matter of absolute necessity if every drawback in the insurance value chain identified in the problem statement must be revamped. The proposed system simplifies the business critical insurance process functions by adopting the most efficient and most recent methodology and technology. The proposed system is a secured automated web application for electronic insurance service, which provides variety of optional multi-level authentication mechanisms which includes either biometric authentication or one-time-password (OTP). This feature is included to avert the security threat on policy holder

classified data/file that the existing systems fail to pay attention to. The proposed system provides a specialized dashboard for every policy holder in other to enable policy holder have a centralized access to information that concern the status/progress of requested service, view history of their transactions with their insurer, perform customer based operations such as adding reminders, easily make claims from their secured dashboard, update personal profile which could better enhance services delivered to them, enable policy renewal notification, book appointment with representative of the insurer, and access to online facilities that enable user to store files related to their policy for the sake of easy retrieval and security.

The proposed system intends to build a premium calculator which will be placed in strategic locations on the web application including the user dashboard. The premium calculator helps policy holder to easily determine the total premium to be paid over a specified period of time base on the type of policy subscribed and the policy holder risk profile without the help of any broker or the actuary department of the insurer. This feature guarantees the consistency of the actuary department of the insurer and helps to retain policy holder and even attract prospective policy holder. This feature is not in the existing systems and it is a top priority in the proposed system.

3.1.3 Functional Requirements Analysis of the Proposed System

The functional requirement of the proposed system needed to ensure efficiency of the proposed system, maximization of feature provided in the system and the convenience of all the levels of the system user are listed below:

- Each page in the site needs to load in a reasonable amount of time
- An exception handler should be implemented to manage input mismatch which can result to infinite process
- Mechanism for cancelation and changing operations should be employed
- Latest web techniques like Caching should be implemented to speed up the loading of dynamic pages

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3.1.3.1 Non Functional Requirements Analysis

There following are the non-functional requirements that concern the proposed system:

- The user interface should provide clear indication of navigation paths
- The color and layout should look consistent to the users
- Access control such as user login should be implemented to prevent destructive actions
- Means to interact with external data storage
- Accessibility for mobile devices
- Means to provide informative representation of report
- Search engine in the staff page to quickly access an insured person
- Provision of awareness articles to get staff and policy holder abreast with development in the organization and the entire insurance industry
- Provision of organization contact Information on the web application

1.2 System Methodology

The development methodology adopted for the proposed system is a hybrid of Agile development methodology (for development process management) and object oriented analysis and design-OOAD (for analysis and design). Agile SDLC model is a combination of iterative and incremental process models with focus on process adaptability and customer satisfaction by rapid delivery of working software product. Agile Methods break the product into small incremental builds. Object–Oriented Analysis (OOA) is the procedure of identifying software engineering requirements and developing software specifications in terms of a software system's object model, which comprises of interacting objects.

3.3 System Design

The proposed system design is represented diagrammatically using the Unified Modeling Language (UML), specifically the UML deployment architecture, UML use fourteen different diagrams (interaction and behavioural), but this study uses the case diagram, UML class diagram and UML activity diagram. The unified Modeling Language (UML) is a standard object-oriented, component-based software system modeling tool. It is

a tool used to visualize, describe, build and document the software intensive systems. The use of UML enables staffs, users, analyst and developers and designers to communicate efficiently and enhance mutual understanding, which can improve efficiency of the software development and quality of the software design.

3.3.1 Deployment Architecture

Most of the UML diagrams are used to handle logical components but deployment diagrams are made to focus on the hardware topology of a system. Deployment diagrams are used by the system engineers to visualize the topology of the physical components of a system, where the software components are deployed. (Tutorialspoint, 2017) in the deployment architecture, hardware devices, processors and software execution environments (system Artifacts) are reflected as Nodes. There are two types of Nodes: Device Node and Execution Environment Node. The proposed system is a web-based application, which is deployed in an execution environment node (Microsoft SQL and .NET framework compatible database server and web server respectively) in the online host company of which every device node (mobiles and PCs) connect to from any location. The control flows from the execution environment node to the device node. The deployment diagram of the proposed system is shown in figure 1 below.

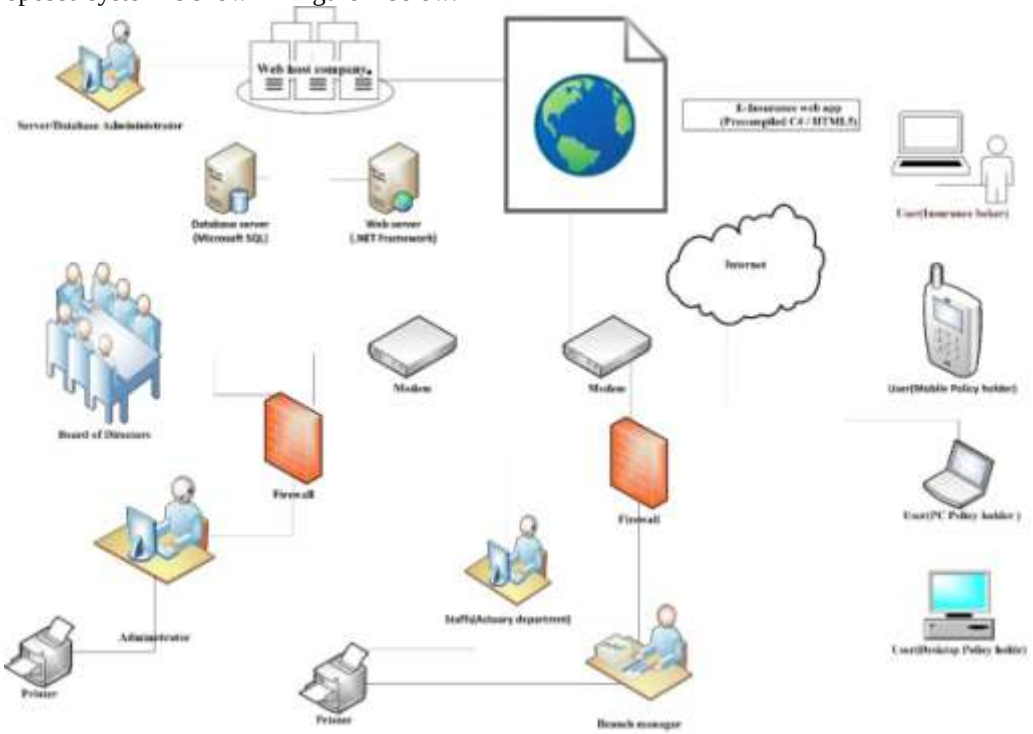

Figure 1: Deployment diagram of the proposed E-insurance System

3.3.2 Use Case Design

Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Consequently, when a system is analyzed to gather its functionalities, use cases are prepared and actors are identified. Actors can be a human user, some internal applications, or may be some external applications. The identified Actor in the E-Insurance system were Actuary desk officer, Administrator, Policy holder, Branch manager, Director if ICT (board member), Insurance broker, and Web host. The Use Case is represented in figures 2 and 3 below.

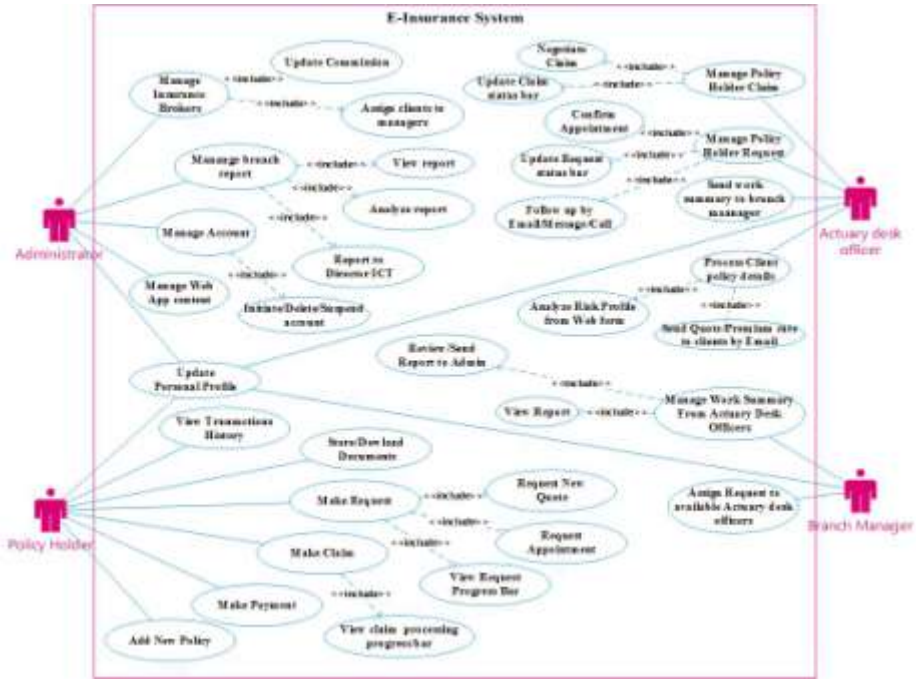

Figure 2: Use case diagram showing the use case of Administrator, Actuary desk officer and Policy holder

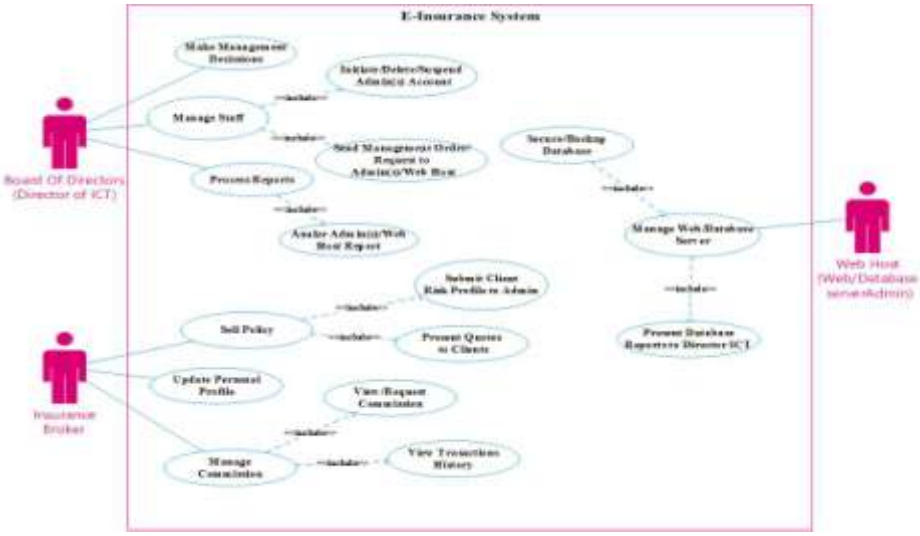

Figure 3: Use case diagram showing the use case of Director of ICT, Web host and Insurance broker

3.3.4 Activity Diagram

Activity diagram is UML behavior diagram which shows flow of control or object flow with emphasis on the sequence and conditions of the flow. The Activity diagram of the control flow of insurance value chain and user activity is shown in figure 4 below.

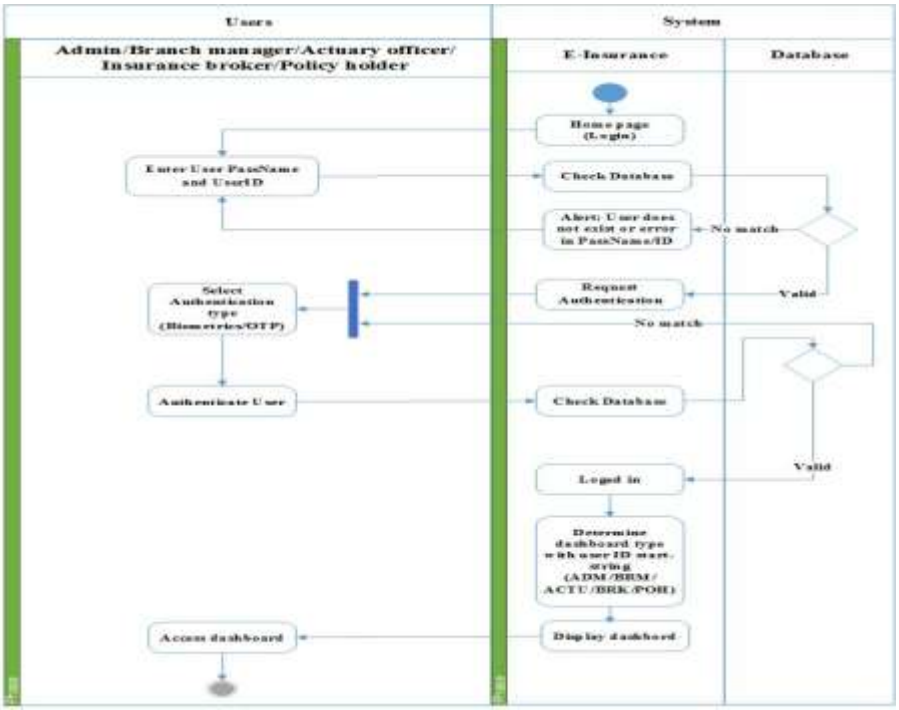

Figure 4: Activity diagram showing control flow of insurance value chain and user activity

3.3.5 Class Diagram

Class diagrams are the mainstay of object-oriented analysis and design, it shows the classes of the system, their interrelationships (including inheritance, aggregation, and association), and the operations and attributes of the classes. Figure 5 below show the class diagram for the E-Insurance system.

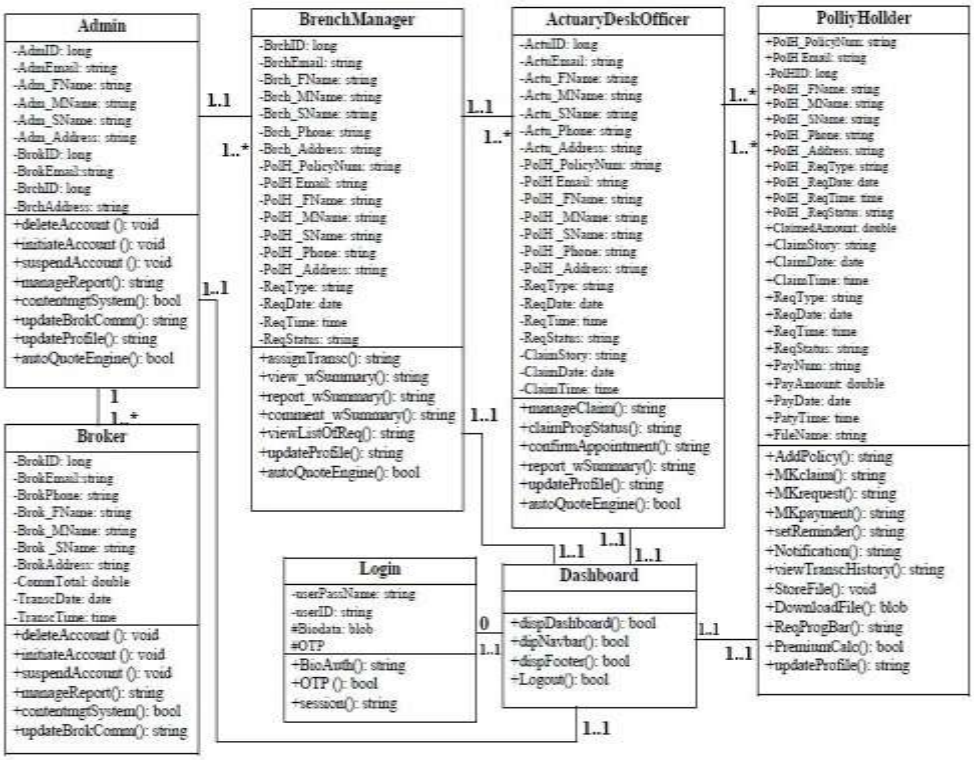

Figure 5: Class diagram showing attributes and method of the proposed E-Insurance web application

3.3.6 Database Design

Req_History Table			
Column Name	**Constraint**	**Data Type**	**Description**
ReqHID	PK	Long	ID generated by system
ReqType	Not Null	Varchar(10)	Either claim, new policy, appointment, quote or help as reuest
ReqDate	Not Null	DateTime	The date a particular request was made
ReqTime	Not Null	DateTime	The time a particular request was made
ReqProg_ID	FK,Not Null	Long	Foreign key of Req_ProgBar table which shows status in Req_History table
UserID	FK,Not Null	Long	Foreign key of User profile table linking every request to a policy holder
PolicyNum	FK	Long	Foreign key of UserPolicy table that shows policy number in case of request on a particular coverage

Contact Table			
Column Name	**Constraint**	**Data Type**	**Description**
ContactID	PK	Int	Auto Increment
Email	Not Null	Varchar(25)	Needed for account recovery and future transactions
Phone	Not Null	Varchar(14)	User phone number
Country	Not Null	Varchar(25)	Residence Country not nationality
State	Not Null	Varchar(20)	Residence State
City		Varchar(25)	Residence City
Street	Not Null	Varchar(50)	Resi8dence Street

MakeClaim Table			
Column Name	**Constraint**	**Data Type**	**Description**
Mk_claimID	PK	Long	Made claim ID generated by the system
UserID	FK, Not Null	Long	Foreign key of UserName table linking basic details of a user to a particular claim
ClaimAmount	Not Null	Double	Amount a policy holder expect from the insurance company at the occurrence of unforeseen event
ClaimDate	Not Null	DateTime	The date a claim was made
ClaimTime	Not Null	DateTime	The time a claim was made
ClaimStory		Varchar(Max)	Description of the unforeseen event
PolicyNum	FK,Not Null	Long	Foreign key of UserPolicy table providing basic details of a coverage whose claim was made

Payment Table			
Column Name	**Constraint**	**Data Type**	**Description**
PayNum	PK	Int	Payment number generated by the system
ID	Not Null	Int	Auto increment
UserID	FK,Not Null	Long	Foreign key of UserName table linking basic details of a user to a particular payment
PayAmount	Not Null	Double	Amount a policy holder paid for premium and other transactions
PayDate	Not Null	DateTime	Date of payment
PayTime	Not Null	DateTime	Time of payment
PolicyNum	FK,Not Null	Long	Foreign key of UserPolicy table linking the policy type paid for and other policy detail to a particular payment

Store_File Table			
Column Name	**Constraint**	**Data Type**	**Description**
ID	PK	Int	Auto increment
File	Not Null	Bit	Stored file
FileName	Not Null	Varchar(30)	File name
FileSize	Not Null	Varchar(25)	File size in database
FileType	Not Null	Varchar(5)	File format
DateCreated	Not Null	DateCreated	Last modified date

Claim Table			
Column Name	**Constraint**	**Data Type**	**Description**
ClaimID	PK	Long	System generated ID for every claim
ID	Not Null	Int	Auto increment
MK_claimID	FK,Not Null	Long	Foreign key of make claim table linking made claim details to actuary desk officer claim processing table
Issued_Date	Not Null	DateTime	Date claim was finally released to policy holder
ReqProg_ID	FK,Not Null	Int	Status1, status2, Status3, Status4

IV. IMPLEMENTATION/RESULTS

4.1 Choice of Programming Language

Since the advent of the World Wide Web (www), experts in the field of web technology has made significant innovations that has resulted to a paradigm shift from static HTML pages to dynamic HTML pages (web application) and data-driven solutions that have the capacity to support entire business processes. Several programming languages that support web technology now exist in large number with the expectation of much more in few years to come, among the leading technology/programming language that support web technology on the server side are Perl, Ruby, PHP, ASP, ASP.NET, JAVA (JAVA serve pages/JSP), ColdFusion markup languages, Node.js, Python, R(rApache), ActiveVFP, Google Apps Script while JavaScript, ActionScript, Flash technology and AJAX (Asynchronous JavaScript And XML) top the table of client side scripting language.

4.2 Development Tools of The Proposed System

- Microsoft Visual Studio 2015 as development IDE
- Microsoft SQL server management studio 2012 for local host and database management
- Microsoft word 2016 for documentation of the proposed system
- Microsoft Visio 2016 for analysis and design of the proposed system

2.3 System Testing

At this stage, unit testing and integration testing have addressed most of the functionality concerns in this system. Hence, system testing in this paper focuses on the non-functional aspects of the system such as the look and feel of the system, responsiveness in a mobile environment, page load time etc.

V. RESULTS

Figure 6: Home Page News and Image Slider

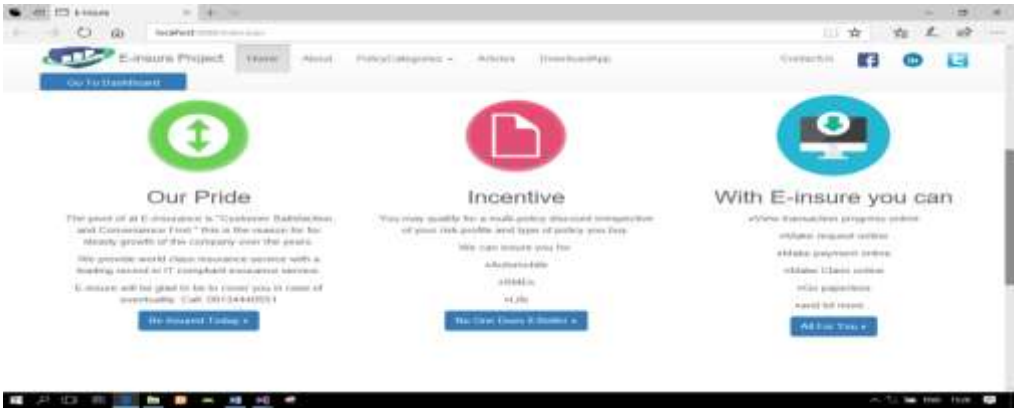

Figure 7: Home Page Marketing Point

Figure 8: Sign in Pop Up

Figure 9: Signed in User Dash Board

Figure 10: Screen Shot of Payment Page

VI. CONCLUSION

From proper analysis and assessment of the designed system it can be safely concluded that the system is an efficient, usable and reliable E-Insurance system. It is working properly and adequately meets the minimum expectations that were for it initially. The new system is expected to give benefits to the users and staff in terms of efficiency in the usage of library system

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