

Designing An Automatic Web-Based Certificate Verification System For Institutions (CASE STUDY: MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE)

Nwachukwu-Nwokefor K.C

Computer Engineering Department Michael Okpara
University of Agriculture, Umudike
Nwachukwunwoks@gmail.com,

Igbajar Abraham

Computer Engineering Department Michael Okpara
University of Agriculture, Umudike
igbajar35@gmail.com

Abstract—Over the years there have been a great need of easy and fasted means of verify result/certificate to reduce the level of certificate forgery and to ease the stress and also save the time of certificate verification which is done manually today, an employer or anybody concern will have to come or send delegate to school to verify a particular certificate, some employer never did and this has resulted on accepting a forge certificate.

The system can be implemented as a standalone site (recommended) or can also be embedded in an already existing institution official website.

The aim of this study is to design an online certificate verification system based on the verification process adopted by the university to verify her results.

Keywords— Database, MYSQL, Certificate, Encrypting, Authenticate, online. Introduction (Heading 1)

1. INTRODUCTION

The Internet has been one of the most frequently used means of exchanging information among people. The electronic data transmission breaks the distance barrier.

Steve Lawrence, C. Lee Giles, Kurt Bollacker (1999) The rapid increase in the volume of scientific literature has led to researchers constantly fighting information overload in their pursuit of knowledge.

Furthermore, everyone should be able to browse the same websites and have the opportunity for equal user experience in the Internet. In other words, the Internet should be usable by everyone.

Online Certificate Verification system represents the direction of future certificate authenticating development. Promotion of Online Certificate Verification system will bring great benefits to the society and the economy. Online Certificate Verification system improves the speed and quality of services of Certificate Authentication, promotes the globalization of markets, and cuts down cost. The system is designed for employers and universities.

1.1 Background of the study

This Paper is centered on the need to adopt automatic online verification system that will save the huddles of manual verification method.

This will enable anybody or an employer to verify an institution certificate online, without having to come down to the school to do so. All that is required of the employer is to log into the verification link given, which is a link to the university portal and enter the certificate number of the certificate he/she wants to verify, then the original copy of that certificate will be displayed on the screen along with the following message (assuming the name of the certificate owner is "Njoeteni Orikeze"), "Njoeteni Orikeze is a graduate of Computer Engineering Department, Michael Okpara University of Agriculture, Umudike, he graduated in the year 2015. Please carefully compare the certificate you have there with the one on your screen any alteration render that certificate invalid".

But if the certificate number is invalid (i.e a forged certificate number), the following message will be displayed on the screen "Invalid Certificate, we don't have details of this person in our record, it is either you missed typed the certificate number or the owner did not pass through this institution, Verify and try again, please if the problem persist contact the school +234809890347, admin@university.edu.ng"

1.2 AIM:

The aim of this study is:

- To design an online certificate verification system based on the verification process adopted by the university to verify her results.
- To phase out outdated paper/manual method, though the papers will still be kept safe in schools for future reference.
- To make Certificate accessibility Easy
- To save time and Resources

- To prevent risk in transits in result verification, e.t.c

1.3 Objectives of system design

- **Efficiency:** These involve accuracy, speed and comprehensiveness of the system output.
- **Flexibly:** This is the ability of the system to adjust to the changing requirement of user. It also involves portability of system.
- **Practicability:** This is the ability of the System to be able to withstand long period of time operation by the user.
- **Security:** The act of applying security for the protection of the data and it involve hardware

reliability. A system analysis needs to have a workable security platform to protect the system from damage error and by unauthorized user.

2. LITERATURE REVIEW

Academic affair is usually in charge of student result and up to date of the honors awarded to each students. It has a collection of sources, resources, and services, and the structure in which it is housed. There can be no doubt that much of the certificates in this area speculates on the future role of safe means (mini-library) – none of which is particularly clear. Since (1995), or what Tenopir calls the “post web world” (2003), libraries have been seen as in danger of “substitution” The web is becoming “a ubiquitous source of information” giving an “illusion of depth and comprehensiveness” that leads to a questioning of the value of libraries and their collections. This review will not speculate on these future roles, but will focus instead on the certainty of changing technology, increasingly digital information resources and societal shifts that have changed user expectations of online certificate verification system.

Digital libraries are situated in unique environments, thus environmental factors have also been examined for their impact on users’ awareness, acceptance and use habits often the social contexts or domains surrounding an online certificate verification system are very different, for instance, varies from institution to institution. Adams and Blandford (2004) demonstrate why it is important within academic contexts to market a digital library as a learning resource, but to show users within a clinical domain (e.g., a health care setting) how a digital library system can support evidence-based medicine with information that is “paramount” to decision making. In this thesis, we present the core elements of the manifesto and introduce central aspects of the digital library framework.

2.1 Existing system

Certificate verification method that is prevalent today is a manual process, in this process the institution/organization that want to verify a result will have to trip to the university or send a written request so as to verify result.

The request will then go to academic affair which refer to the library or safe files to look for the duplicate certificate, this can really be time consuming, also sometimes files are lost when moved from one office to another, and in some cases, can be missing or be difficult to locate.

Below is the graphical view of the existing system



Fig. 2.1 Graphical view of the existing system

2.2 The proposed system

This work considered the adoption of the Iterative and Incremental model as shown below;

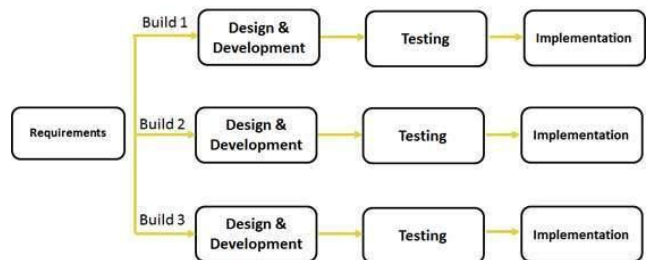


Fig. 2.2 Typical Iterative model diagram “Tutorial Point” (2015)

This model is most often used in the following scenarios:

- Requirements of the complete system are clearly defined and understood.
- Major requirements must be defined; however, some functionalities or requested enhancements may evolve with time.
- There is a time to the market constraint.
- A new technology is being used and is being learnt by the development team while working on the paper.
- Resources with needed skill set are not available and are planned to be used on contract basis for specific iterations.
- There are some high risk features and goals which may change in the future.



Fig 2.3 The schematic view of the proposed system design

2.3 Brief Explanation of the system and operation of the design

In this system efforts are made to explore many options like, consultations of relevant text books that treated verification systems, library process some programming text books that treated hypertext preprocessor (php) programming language, java scripting and other text books.

Online Certificate Verification (OCV) was implemented using webserver. The software components of the graphical user interface (GUI) screens serve as the front-end. The database is implemented using my structured query language MYSQL. The system is tested with verifying a certificate designed for an institution (i.e MOUAAU).

This certificate verification system will follow the same process in an institution, but this time it will be online and automated. The system will be customized to have each certificate number linked to the student's detail.

Each person or organization that want to verify the certificate must have the certificate number and type it into the field named "enter certificate number".

A survey have been carried out with some interview question on "the view of the public on this". Interview were made in various places i.e schools, company and in public places. Interview questions asked ranged from; the ease of use, the feeling of anonymity, security and interface design, and the Information gathered was highly satisfactory.

The first approach will be to set up the system using existing university portal.

One drawback to using this approach includes the multi-valued nature of the data tables in the university portal and different entries.

Under certificate table a single field can hold multiple values. These multiple values can be "related" to values in other fields, also how this relationship is captured and exploited will need to be determined. However information about these relationships will not be available to the public.

2.4 The constraints of the design

Some constraint to this will be the selection of dictionary items to document. As stated earlier, each field can have multiple dictionary items. For example, a field that contains a company name can have a dictionary item that displays the field in its raw form. Another dictionary item for the same field can display the field in all capital letters. Yet another can display only the first 15 characters of the field. Each of these may be used within the system environment for different purposes, such as a number of different certificates.

However, selecting from among them in order to make one or more of these fields Available for the database will not be a simple task. Simply selecting all the dictionary items may be acceptable where there are small numbers of virtual fields. However, selecting a large number of virtual fields may lead to complexity in documentation and querying and may introduce redundancy. There are other similar issues with selecting the appropriate dictionary items for MySQL database.

In a MySQL database environment, tables have dictionary items for each field that define the source of the data. These dictionary items are stored in a logical table that, Under OCV can be inspected programmatically.

This additional information can provide insight into relationships between fields, Relationships between

tables, and formatting of fields. This paper will be a first attempt to deploy system in the university environment.

The University portal environment is one of a subset of database environments typically referred to as "multi-value" databases. Many of these environments have data table "dictionaries" that describe the data more completely than using MySQL database. Further, since "joins" are defined in dictionary items, mapping the query-building capability of Unity onto RETRIEVE will be a unique challenge.

2.5 The need for a new system

This paper will be able to provide a means to compare the certificate on hand and the original certificate given by the institution, comparing the content of the sample certificate in the test environment using OCV system with using host based programs for Documentation. Additionally, OCV will be modified to create RETRIEVE query statements, or a version of Unity with this feature will be created. This system will save time and resources that are used in the existing system.

2.6 Expectation Analysis and Sample of the New System

During the first phase of the paper, sample tables will be selected from those available. These tables will be tested for with sample certificates. During this phase, the types of limitations inherent in accessing multivalued information via database will be documented. This information will be required for comparison with the scripting method.

The second phase of the paper will focus on minimizing the issues with database found by the testing in phase one. During this phase it may be necessary to create a program on the host system to create "clean" or SQL compliant dictionary items for fields that currently are not compliant. This will increase the number of fields available to the database. This phase should be completed within the second month of the project. At this time it may also be possible to create programs to add additional fields to the @select record of each table. These programs would "inspect" dictionary items not in the @select dictionary and decide whether or not they should be placed there. This decision would be based, among other things, on whether the dictionary entry is for a field that already has an entry in the @select dictionary and the suitability of the dictionary item compared to others for the same field.

Work during the third phase of the project will repeat the mapping of the data tables using the tools present in OCV. The information recorded during this phase will also be used in the report for comparison against other methods. This, being the second time through a process, should give us an idea not only of the time required to document using Unity, but, also, an improved estimate of time to implementation with an experienced user.

The fourth phase is a more difficult one. During this phase we need to implement a set of programs to increase the data available for the creation of OCV.

The fifth phase of this project will involve modifying OCV to generate RETRIEVE query statements that will execute on the host system rather than through a database. This will be useful because of the multi-valued nature of the host system.

3.1 Tools and Resources

HTML / CSS

Javascript

Php programming

Server (either, wamp or xamp or linux server or IIS windows)

3.2 Functions of OCVS: It will serve as a quick and more reliable means of verifying institutions Original Certificate. This will save time and Energy and some form of inconveniences that is being experience by intuitions or organizations trying to verify result.

3.3 Design specification of OCVS: We now discuss the technicalities of the OCVS design architecture, including the top-down structure and database environment.

3.4 Top-down structure: OCVS is made of four major subsystems which interact with users by means of GUI screens, namely, online user Registration System (OURS), Online Certificate verification System (OCVS), User Statistics System (USS) and OCVS Database Manager (ODM) as explained below;

- **Online User Registration System (OURS):** OURS is the subsystem responsible for managing the user registration process. It provides interfaces where users can enter their records as well as update their records.
- **Online Certificate Verification System (OCVS):** OCVS manages all online Certificates. It provides interactive interfaces for registered users to access their desired certificates. OCVS works alongside ODM to deny people who do not have a valid certificate number to access any certificate.
- **User Statistics System (USS):** USS is the subsystem responsible for automatically displaying the statistics of the user, whether they are online or offline and to record the activities and the interaction the user had with the system including time of logging and log out.

Alongside OCVS and ODM, USS provides a user-friendly interface where an institution original certificates are displayed. Also, it provides facilities for the printing of hard copies of certificates.

- **OCVS Database Manager (ODM):** ODM has an important role to play in the operation of OCVS, in that, it is the part that stores information such as user registration details, certificates of students.

Online Certificate Verification System database environment:

- **OCVS entities:** OVIS database comprises four major entities, namely, User Registration, User_Log_Book, Certificate details, The user Registration entity or table gives information about registered users. It contains fields or

attributes like the username and password (in hashed format) Name,Address and others. The user_Log_Book keeps records on the date and time the registered user logs into the OCVS to use. It has attributes as username, Date, Time and. The certificate image and Certificate detail contain information about students who owns the certificate that is being verified.

- **Queries:** In a database environment, a query is the object which facilitates retrieval, insertion, update and deletion of records. ODM makes use of various queries in order to maintain system data. Some of these include Retrieve_User_Record (which retrieves the details of a registered user from the user_Registration table), Update_User_Record (which updates the records of a user), users_from_a_Region (which displays the details of all registered users from a given region in the country/world), Certificate image (which displays a copy of the original certificate that was awarded to the students at their time of graduation, and log in Status_of_users (which displays the list of users who have already registered in the system and may have had some interactions with the system.
- **Entity-relationship diagram:** The relationship between the various entities that make up a system is an important aspect of any database design. This relationship could be of three kinds; one-to-one, one-to-many and many-to many. The entity-relationship diagram on OCVS ODM an important synergy of the online certificate verification.

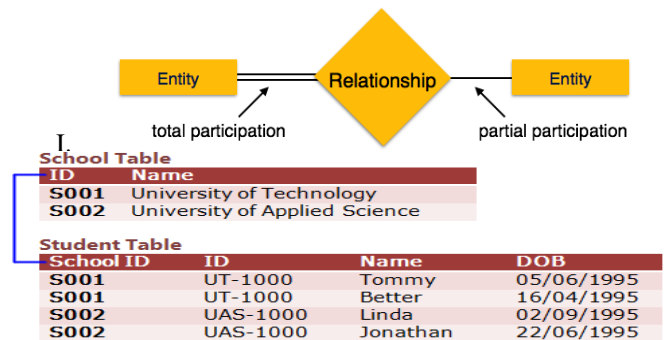


Fig. 3.1 Entity relationship diagram

4. Installation of a database management system (DBMS): A DBMS called the OCV Database Manager (ODM) would be installed to manage system data. ODM Would allow for certificates to be retrieved, added, updated, deleted, sorted and traversed easily and quickly. ODM would also store data with regard to the certificates and other information relevant to the system. A Graphical User Interface (GUI) application has been developed to allow prospective students' certificate detailed authentication to be added and verified online. The application would also enable a functionality that allows only school authorities in

charge to add and remove or modify certificate details when they require it.

4.1 Implementation of controls to avoid double calling up different result instead of the one requested.

User identification and access control functionalities are built into the system so as to guard against sniffing and unnecessary download of students certificates. Also, these features would help to prevent anyone without the proper authorization to gain access into the system. This means no body can print or view certificate indiscriminately.

4.2 Implementation of controls to eliminate invalid number to access a certificates:

The design architecture of the system does not easily allow a user to enter just any number and view certificate. For example, trying to enter an invalid number, an error message will display "invalid certificate number."

- **Generation of reports:** The system would allow the preparation and printing of various reports, ranging from log in user, history of visitors and what they did on the portal.

4.3 Provision of personalized portal to all registered Users: Each registered User would be able to interact with the system as if it were made personally for him, upon log in. This function is designed to make the system Interactive as well as user friendly. For example, a registered user, "Okoroji Hope", upon logging in would meet a welcome screen with the greeting message "Welcome Okoroji Hope".

4.4 Verifying Certificate: A prospective user would need to register at a designated and having his/her unique username and password to access the portal, and he/she will be using it each time he wants to verify the institution's Certificate. The person would then be expected to provide a password known only to him during registration. The username and password would then be entered into the system to give access to the user into the verification system so as to use it.

If any of the data is wrong, the user would be denied access. Registered user who forget their username or passwords may contact the school webmaster for help or use the "forgot password" link on the page to recover it.

The user can view the certificate using the certificate number, but cannot make changes to the certificate.

4.5 System design

The package require to run the verification process was written with php and javascript, then installed into the system to be used for the execution of the process, it was also be tested and run with different certificates for its limit and level of its accuracy. To obtain the best possible result the certificates and detail must conform to the certificate number used. Parallel approach is system adopted in the implementation of the design for the system, parallel approach is a system whereby the computer based system is allowed to run alongside the existing manual method. After a given time depending on the configurations and the speed of the system use in the

implementation of the verification a report from the system unit is display on the screen which can be evaluated and if the results are acceptable the system can be fully adopted.

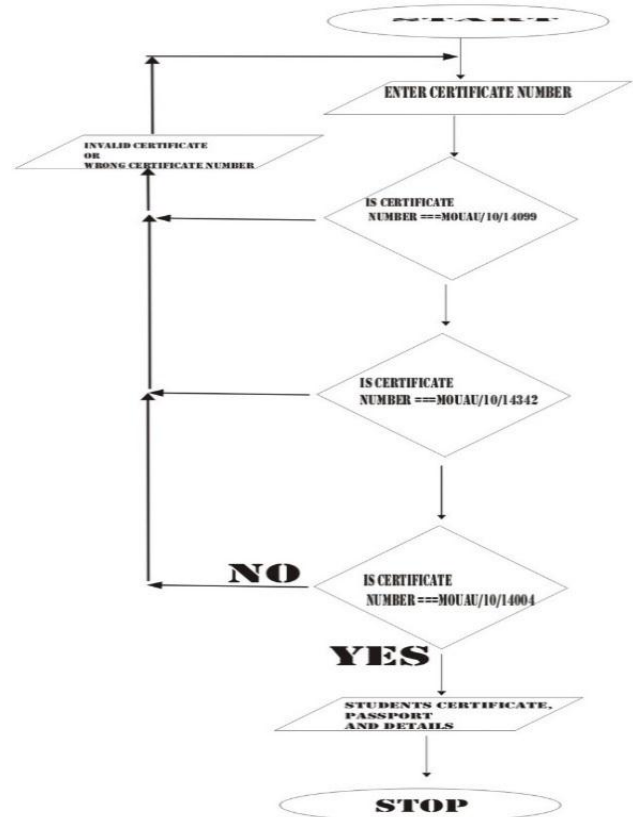


Fig. 4.1 Flow Chart of the entire system

4.6 Sample code used in the design

- **Database connection**

```

$server="localhost";
$user="Idumuesah"; $pass="Alioje"; $db="tutorials"; /
/ connect to mysql mysql_connect($server, $user, $pass) or die("Sorry, can't connect to the mysql."); //
select the db mysql_select_db($db) or die("Sorry, can't select the database."); ?>
    
```

Database code

```

<?php session_start(); require("includes/connecti
on.php"); if(isset($_GET['page'])){ $pages=array("pr
oducts", "cart"); if(in_array($_GET['page'], $pages)) {
$_page=$_GET['page']; }else{ $_page="Authenticate
"; } }else{
$_page="Fake"; } ?>
    
```

4.7 The output of the design, the implementation window



Fig. 4.2 online certificate verification system

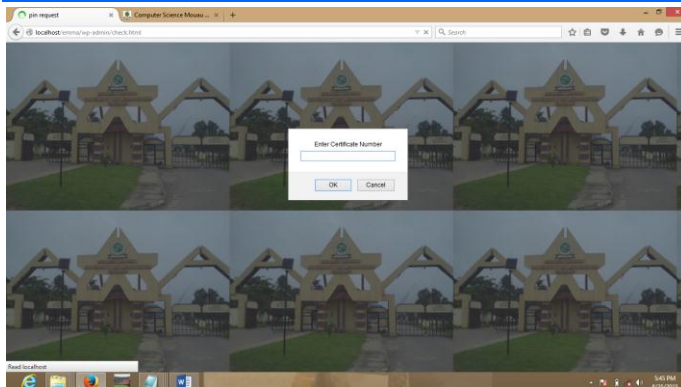


Fig. 4.3 Online verification (certificate number request) page

5.0 Summary

In summary, it is the main objective of the system to provide an easy to use application that acts like a personal assistant by providing employer with an optimally planned schedule and easy confirmation of certificates. To optimize process taking into account various user constraints as well as other information like location of activities, their duration, and travel signal strength depending on mode of internet connectivity. Provide flexibility by offering to reload to accommodate any eventuality.

- Provide access to user anytime and anywhere and linked to the central server.
- Provide a web interface and/or other application.

5.1 Recommendation

It is recommended that a more elaborate and extensive research be fashioned out using php programming language to be used in the execution of a very complex application/process which is expected to surpass what is in this research work, due to the parallel approach method that were adopted in the system.

5.2 Conclusion

OCVS will be a useful research tool that will open up new techniques for verifying and confirming certificates before accepting it. It saves time and reduces errors to its minimum level as compare with manual approach which have limiting point. In designing application for verifying certificate online JavaScript is more convenient to use and it is less prone to errors.

In order to utilize information, it must be accessible. Accessibility includes both documentation of available data and tools for accessing the data. OCVS provides a tool that can assist with the documentation of ODBC accessible data and with the retrieval of the information. However, with a poorly documented multi-valued database system with a lack of information available via ODBC, these tools may not be enough. This project will provide some extensions to OCVS that will allow it to work with a multi-valued database system. Additionally, this project will research additional steps and programs to help increase the availability of information via ODBC.

Online certificate verification system offers convenience to the users and considerable ease to employers as they can get original certificate from school easily and more quickly than conventional methods of manual verification. Even though computerized verification systems have a number of advantages over manual ones, there a few challenges that must be overcome in order that their benefits may be fully realized. First of all, there is the high initial cost of implementing such a system, as is typical of all computerized systems. (This is often prohibitive to developing countries like Nigeria).

Secondly, there is the challenge of users' education. The public/user needs to be educated adequately on the use of online verification system.

A third concern is the verification system security; how the system could be attacked by hackers and fraudsters, including system administrators (who may be in favour of some particular students). Finally, verification system security should be allowed to be scrutinized by experts in systems analysis and design, computer programming and computer system security. This would be the only way to ensure public confidence in such systems.

REFERENCES

- [1] Adams, A., & Blandford, A. (2002). Acceptability of medical digital libraries. *Health Informatics Journal*, 8(2), 58-66.
- [2] ATTFIELD S., FEGAN S. & BLANDFORD A. (2009) Idea Generation and Material Consolidation: Tool Use and Intermediate Artefacts in Journalistic Writing Cognition, *Technology and Work*. 11(3) pp. 227-239 DOI 10.1007/s10111-008-0111-6 (Online first February 2008)
- [3] ATTFIELD S., DE GABRIELLE S. and BLANDFORD A. (2009) The Loneliness of the Long-Distance Document Reviewer: E-Discovery and Cognitive Ergonomics. *DESI III Global E-Discover/E-Disclosure Workshop: 12th International Conference on Artificial Intelligence and Law*. Barcelona, Spain.
- [4] Aha, D. W . (1991), Instance-based learning algorithms, *Machine Learning* 6(1), 37-66
- [5] Aha, D. W ., Kibler , D. & Albert, M. K. (1990). Instance-based learning algorithms. Draft submission to *Machine Learning*.
- [6] Ann Blandford – (2004) Google Scholar Citations scholar.google.com/citations?user=uXQUCwAAAAJ Professor of Human-Computer Interaction, UCL - ucl.ac.uk Digital Libraries, 2004.
- [7] ATTFIELD S. and BLANDFORD A. (2009) Improving the Cost Structure of Sensemaking: Analysing User Concepts to Inform Information Systems Design. In *Proc. of INTERACT 2009*, Uppsalla, Sweden, Aug 24-28
- [8] BRASSIL D., HOGAN C. and ATTFIELD S. (2009) The Centrality of User Modelling to High Recall with High Precision Search. In *Proc. of the IEEE*

- International Conference on Systems, Man and Cybernetics 2009.
- [9] Chiagunye Tochukwu, Nwachukwu nwokeafor K.C, Udeani Henrieta (2015) Designing a Web Based Digital Library Management System for Institutions and Colleges IJISSET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 3.
- [10] Tutorial Point (2015) online article on software design Methodology and Design http://www.tutorialspoint.com/sdlc/sdlc_quick_guide.htm
- [11] Chiagunye Tochukwu, Nwachukwu-Nwokeafor K.C Igbajar Abraham, (2015) Designing an Integrated, Secured and Intelligent E-Commerce Platform for Online Shopping; International Journal of Trend in Research and Development, Volume 2(4), ISSN 2394-9333 www.ijtrd.com
- [12] Chiagunye Tochukwu, Inyama Hyacinth, Nwachukwu nwokeafor K.C (2015), Agent Based Markov Chain for Job Shop Scheduling and Control: Review of the Modeling Technigue, International Journal of Electrical, Electronic, Computer Science and Engineering (IJECCSE) Vol. 01, No. 01, P. 10-24.