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# Implementation of a Distributed Database Transcript Processing System (DDTPS)

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## ABSTRACT

There are many challenges associated with university administration of transcript in Nigeria. Amongst these is the delay in connection with the computation of the transcript and even the issuance of it. There is usually delay because most universities in Nigeria still compute and issue transcript manually. There is no doubt that it is time-consuming, more exposed to errors, stressful and even bureaucratic. The huge challenges of this manual system have resulted in wrongly computed transcripts some times. Most universities have not embraced most of these IT-based systems in their departments because of fear of compromise. Fear that if the processing of transcript is done at the central point by only the transcript officers, there might not be a guarantee of data security hence, most automated transcript generating systems still interact with the departments whenever requests for transcripts are made which negatively affects the response time to such requests. In this paper, the system adopted the Structured System Analysis and Design Methodology. (SSADM) and the implementation of the Distributed Database Transcript Processing System (DDTPS) was done using C# programming language, MySQL database application, HTML, Cascading Style Sheet (CSS), ASP.NET Framework and Microsoft Visual Studio. The system developed was able to compute, verify and approves transcript electronically. The system was also able to keep database at the departmental level for swift response to notification requests for verification from the transcript unit. Thereby reducing the delays normally encountered with transcript processing to the barest minimum.

**Keywords**: Distributed-Database, Web page, Web server, Web Application, Transcript, Implementation

## 1. INTRODUCTION

A transcript is defined as a certified document that shows the records of the academic work of a student at the institution of learning [1]. It captures details of marks/grades that a student obtains in the various courses taken in the institution [2]. It can be very demanding at times and very frustrating to try to obtain a transcript from most universities in Nigeria [3]. This challenge is more when one is not physically on ground to monitor this request. Exam and records/departments in all institutions of learning, use the students' transcript management system to put together and evaluate in an exact and broad way all the information about the students' academic record.

The system provides a complete students' academic record and it is expected to be accurate, timely, dependable and consistent. For a large organization, handling and organizing student records into a cohesive and well-organized system might appear like an impossible task. [4].

Therefore, generating, maintaining and retrieval of information call for one of the largest investments because the information is extremely essential for correct students' records and examination data. Indeed the Nigerian university education system wants reformation so as to meet the needs of the society. [5] There is a need for Nigerian universities to endeavor to eliminate those restraints preventing them from effectively responding to the needs of the changing society. No doubt, one of the foremost challenges for students and their various institutions of learning in Nigeria is still the issuance and collection of transcripts. Many times, it takes some months for transcripts requested to be computed and sent to the institutions or organizations in need of them [6-8]. The key challenge in many Nigerian tertiary institutions is the fact that transcripts are still processed manually. This manual processing of transcripts is cumbersome. Each time there is an upward surge in the number transcript request forms, there is usually an untold stress for both students and officers involved in the process. The manual system is ineffective, likely to have human errors and often not secure.

While it true that much research has been done to develop and deploy IT-based systems to curtail these problems, it is still worrisome to see that most universities in Nigeria still process transcripts manually. The enormous time taken in processing academic transcript has impedes students' progress, whereby several applicants lose their admission, scholarship and job opportunities [9]. We observed that the main reason while many universities have not adopted most of these IT-based systems is that the departments have candid fear that if the processing of transcript is left for only the transcript officers to generate at a central point, data security may not be guaranteed. The institution still want the physical authentication of this important document by the various departments and faculties. As a result of this, transcript officers still physically interact with the departments and faculties when a request for a transcript is made. Another serious issue of concern is that these various departments have no database to assist in quickly responding to the request from the transcript unit. The paperwork at the departmental level no doubt delays the response time to such requests. Therefore, suppose there is a system that ensures that each department has a database, then generates transcript electronically and sends a notification to the appropriate departments for verification, and even allows the transcript approval officers to append signatures electronically then, this delays can be reduced. Hence, the implementation of a web-based hybridized-database transcript processing system that possesses these features.

## 2. PROBLEM STATEMENT

We do not want to lose admission or brilliant job opportunities because of a delay in securing transcript when it is a determinant factor in such a decision. We yearn for a time when everyone can request for his transcript from the comfort of his home and have it processed and forwarded to the organization requesting it without him being physically there to monitor its process. However, this desire is not presently achievable by every Nigerian requesting for transcript because most Nigerian universities still process their transcript request manually. A well-deployed application will eliminate most of these challenges in the current system [10]. Many research works had been ongoing in [12] and [13] including the work of Konyeha and Isere [1] on "Design of a Hybridized-Database Web-Based Transcript Processing System (HWBTP)", this work shows a design framework for a Hybridized-Database Web-Based Transcript Processing System in tertiary institutions in Nigerian. In [11], there were attempt to solve these transcript problems but there is a need to actually implement an architectural framework design to enable us achieve the desired results of processing transcript faster and more efficiently.

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## 3. METHODOLOGY

This work adopted the "Design of a Hybridized-Database Web-Based Transcript Processing System (HWBTP)" developed by Konyeha and Isere [1] to develop and implement the Distributed Database Transcript Processing System (DDTPS). The system adopted the Structured System Analysis and Design Methodology. (SSADM). DDTPS seeks to eliminate some of the challenges faced in the manual transcript processing systems and the automated systems with high human involvement presented in [12] and [13]. With this system, transcript officers generating the transcript don't have to move physically to the various students' department for verification and even approval of the generated transcripts. Everything happens online by the various officers designated to do so. The system seeks to reduce institutions recurrent expenditure because the automated system will definitely require fewer human hands compared to the manual system.

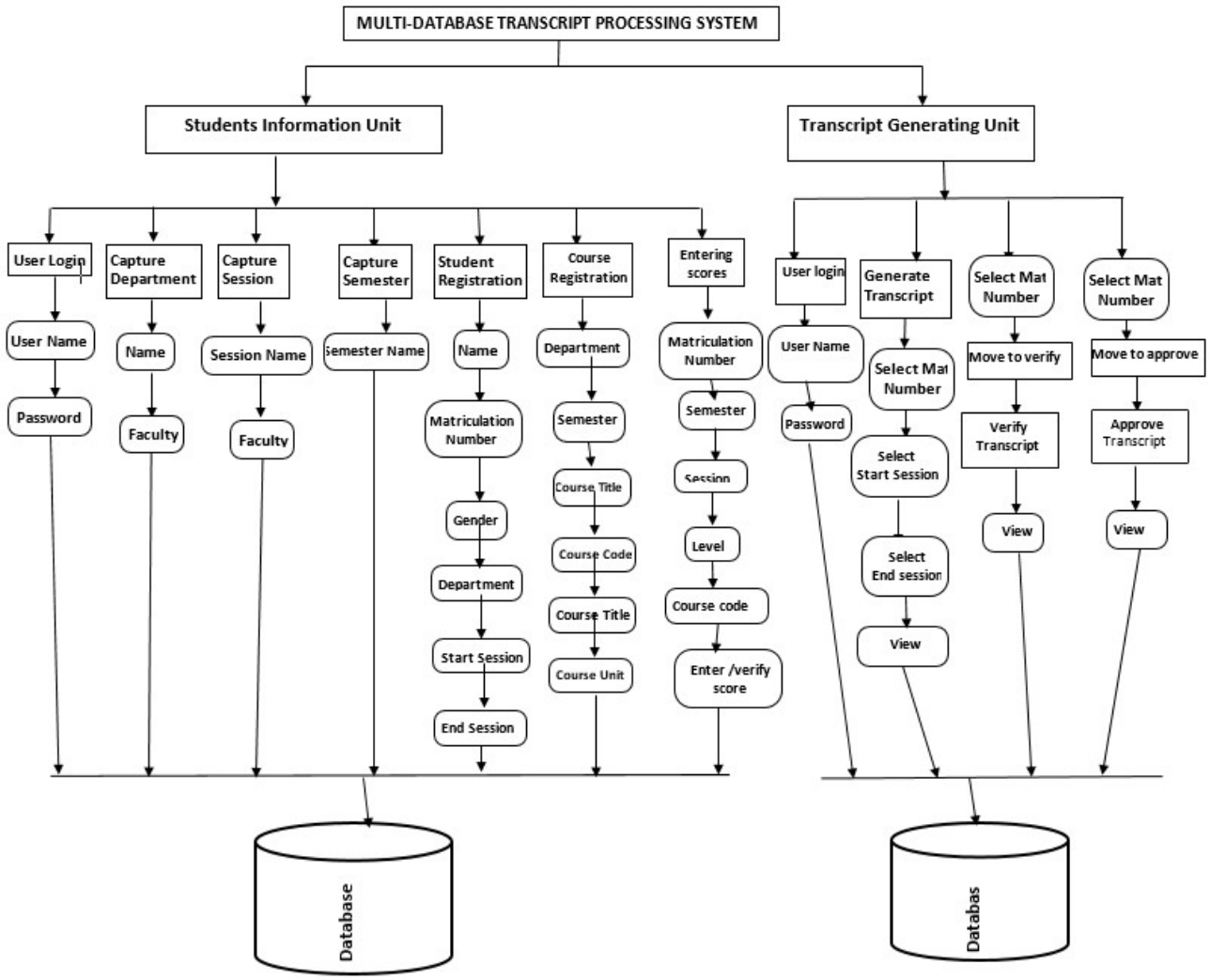



**Fig 3.1: The design of the Hybridized-database transcript processing system (Konyeha, Isere [1])**

Figure 3.1 depicts the design of the transcript system. The dual nature of the system:- the Students Information Unit and the transcript Generating Unit gives rise to its name 'Hybridized-database transcript processing system.' Under the Students Information Unit, activities like student registration, curriculum set up, course registration and exam scores entries are carried out and information is saved in the database while been uploaded to the central database for use by the Transcript Generating Unit. This unit generates, verifies approves the transcript.

## 4. SYSTEM ARCHITECTURE

The system architecture of the Distributed-database transcript processing system is shown in Figure 4

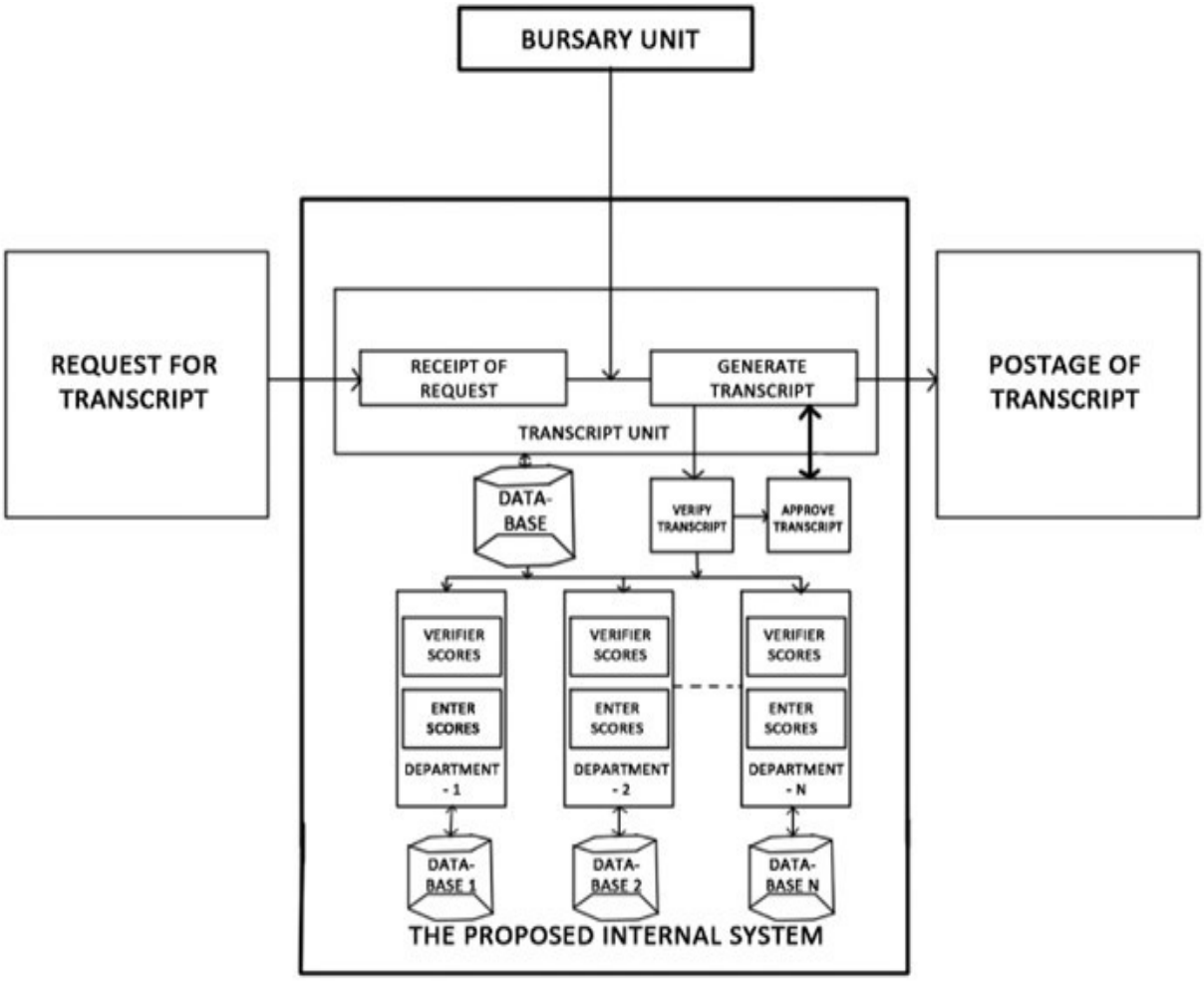



**Fig 4: The hybridized-database transcript generating system Architecture (Konyeha, Isere [1])**

**4.1 Development Tools**

The development tools used in the implementation of the web application include the following:

1. C# programming language
2. MySQL database application
3. HTML language
4. Cascading Style Sheet (CSS)
5. ASP.NET Framework
6. Microsoft Visual Studio 2017

**4..1.1 Request for Transcript:**

Here requests for transcripts are made either as students come physically to make requests or they make use of the institution's online portal for the institutions that have. During this process, students are directed to make payment through the method approved by the institution. And they are asked to submit their necessary data like matriculation numbers.

**4.1.2 Bursary Unit**

This handles all the finances in connection with the transcript

**4.1.3 Transcript Unit**

This unit receives requests for transcript. It ensures that the individual making the request has made the necessary payment as it liaises with the bursary unit for that confirmation. It uses the student information to generate the transcript and the system sends a notification to the appropriate department that will verify. In the implementation of this system, the staff in the transcript unit will not have to physically move to the various departments and faculties to monitor this transcript verification and approval process as they often do in the existing system reviewed and most institutions in Nigeria. Everything happens online. It is also the transcript unit that prints and sends the approved transcript to the institution in need of the document.

**4.1.4 Transcript Verification Unit**

This unit is at the department level. The officer in charge at the department gets the notification from the system that a transcript has been generated. He verifies the information on the generated transcript against that at the department database. He sends feedback to the transcript unit if there is variation so that harmonization can take place or simply click a button to verify thereby changing the transcript status from 'transcript not verified' to 'transcript verified.' It is significant to note here that this proposed Hybridized-database transcript processing system is going to eliminate all the paperwork usually associated with this process in most institutions. This no doubt will enhance the efficiency of the system.

**4.1.5 Transcript Approval Unit**

This unit is at the faculty level. The individual designated to approve transcript gets the notification that a transcript has been generated and verified. He simply clicks on the button to change its status from 'transcript verified' to 'transcript Approved.' This button click also appends his signature electronically.

### 4.1.6 Department

Here various Department does all it takes to set-up the system. Some of the activities happening here are to enter the students' information, registering the courses and entering the scores. These various departments also upload all this information to the central database for transcript generation while retaining the information in their database for any future verification process.

## 5. RESULTS

### I/O Interfaces

### 5.1 Login Form

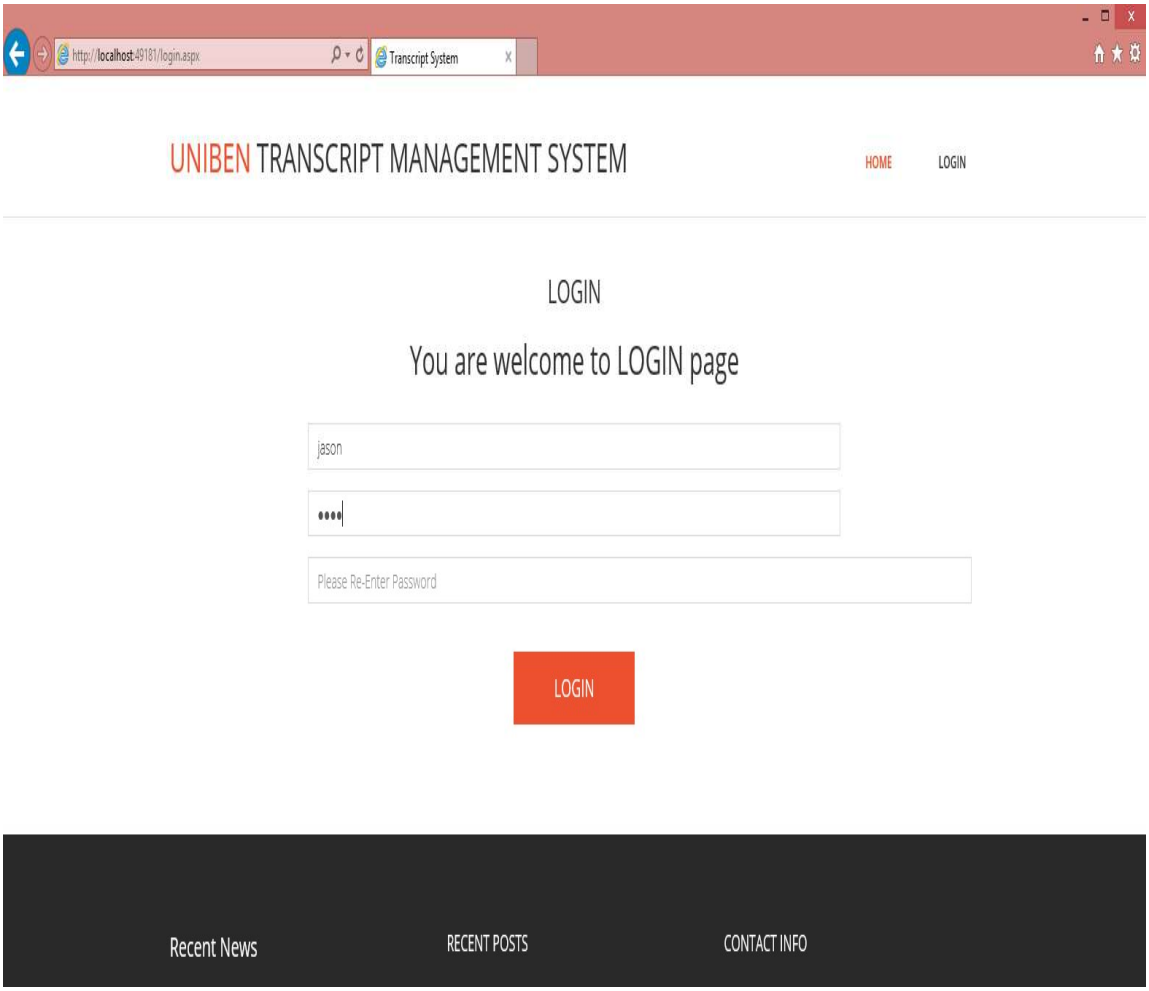



**Figure 5.1: Login Form**

### 5.2 Score Entering Officer

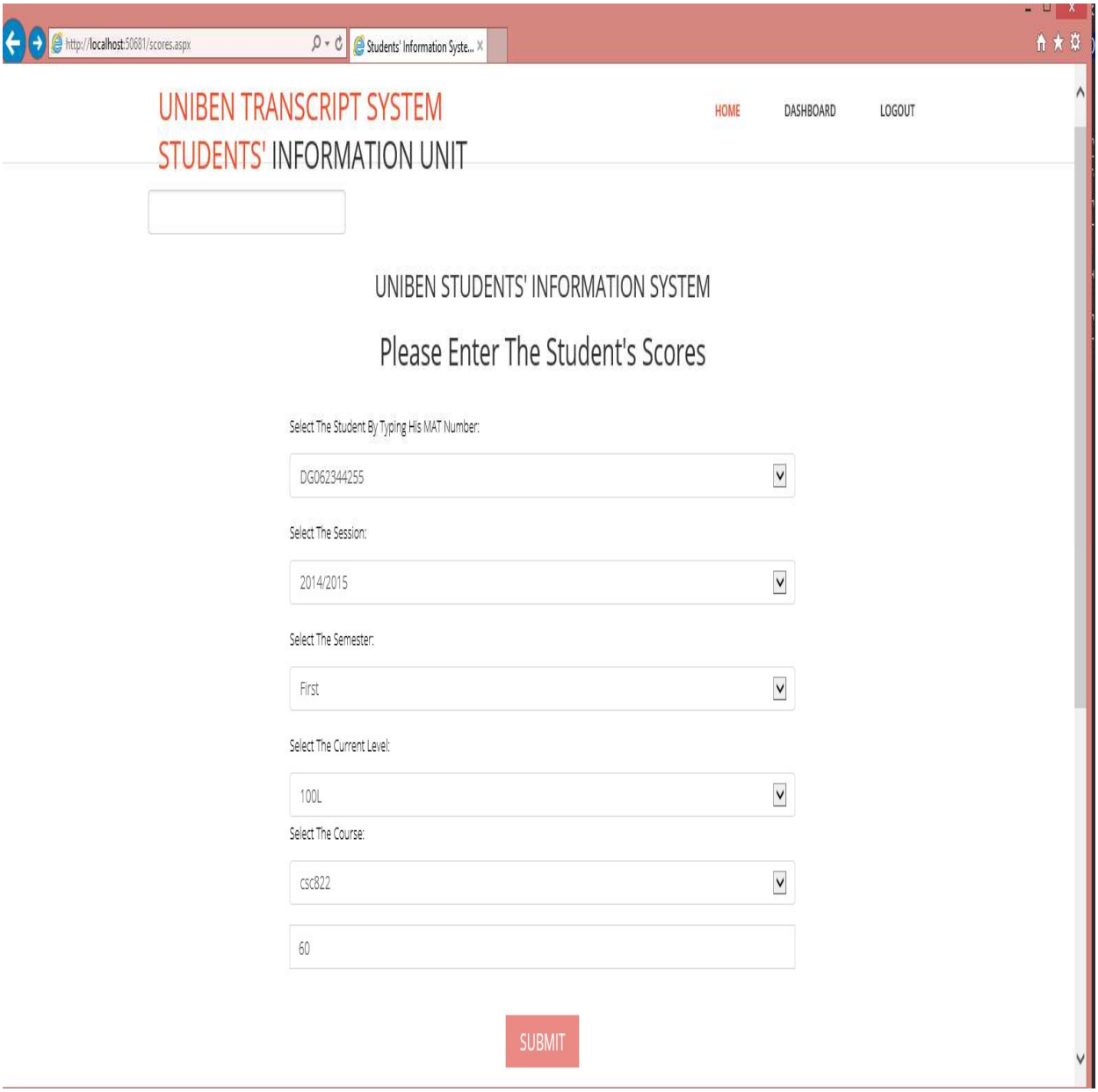
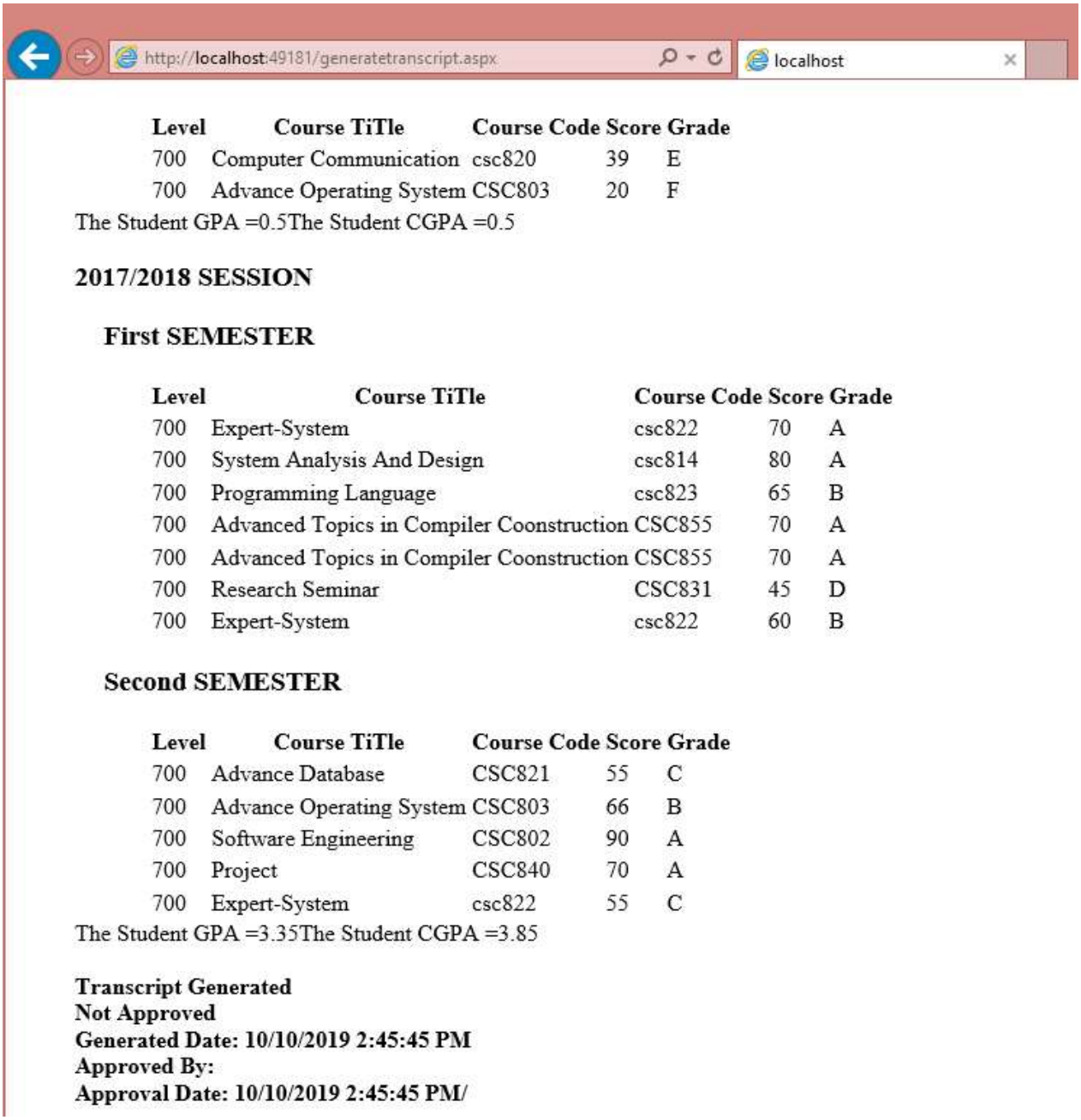



**Figure 5.2 Score Entering Officer trying to enter a student's scores**

### 5.3 Transcript Unit




| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Computer Communication | csc820 | 39 | E |
| 700 | Advance Operating System | CSC803 | 20 | F |

The Student GPA =0.5The Student CGPA =0.5

**2017/2018 SESSION**

**First SEMESTER**

| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Expert-System | csc822 | 70 | A |
| 700 | System Analysis And Design | csc814 | 80 | A |
| 700 | Programming Language | csc823 | 65 | B |
| 700 | Advanced Topics in Compiler Coonstruction | CSC855 | 70 | A |
| 700 | Advanced Topics in Compiler Coonstruction | CSC855 | 70 | A |
| 700 | Research Seminar | CSC831 | 45 | D |
| 700 | Expert-System | csc822 | 60 | B |

**Second SEMESTER**

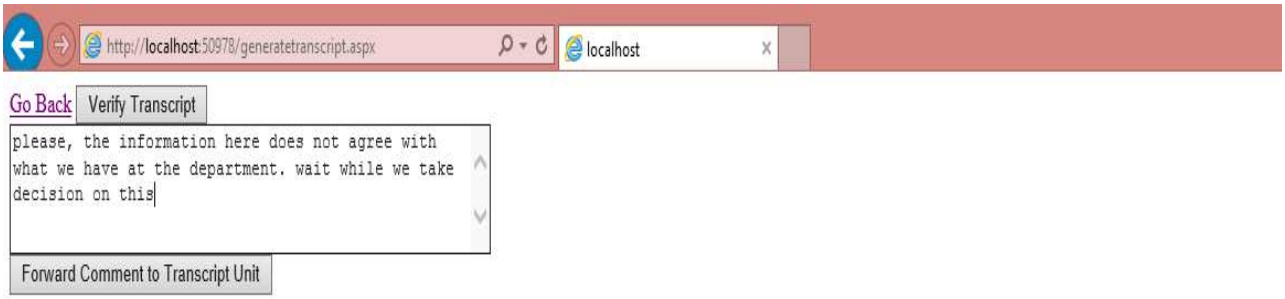
| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Advance Database | CSC821 | 55 | C |
| 700 | Advance Operating System | CSC803 | 66 | B |
| 700 | Software Engineering | CSC802 | 90 | A |
| 700 | Project | CSC840 | 70 | A |
| 700 | Expert-System | csc822 | 55 | C |

The Student GPA =3.35The Student CGPA =3.85

**Transcript Generated**
**Not Approved**
**Generated Date: 10/10/2019 2:45:45 PM**
**Approved By:**
**Approval Date: 10/10/2019 2:45:45 PM/**

**Figure 5.3 Final Part of the generated transcript not yet approved**

### 5.4 Verification Officer




**UNIVERSITY OF BENIN**

**Isere Osazee**

**DEPARTMENT OF Computer Science,**
**FACULTY OF Physical Sciences**

**2016/2017 SESSION**

**First SEMESTER**

| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Advance Database | CSC821 | 30 | E |
| 700 | System Analysis And Design | csc814 | 20 | F |

**Second SEMESTER**

| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Computer Communication | csc820 | 39 | E |
| 700 | Advance Operating System | CSC803 | 20 | F |

The Student GPA =0.5The Student CGPA =0.5

**2017/2018 SESSION**

**Figure 5.4 Verification Officer's commenting on observation while verifying**

## 5.5 Transcript Approval Officer


**2017/2018 SESSION**

**First SEMESTER**

| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Expert-System | csc822 | 70 | A |
| 700 | System Analysis And Design | csc814 | 80 | A |
| 700 | Programming Language | csc823 | 65 | B |
| 700 | Advanced Topics in Compiler Coonstruction | CSC855 | 70 | A |
| 700 | Advanced Topics in Compiler Coonstruction | CSC855 | 70 | A |
| 700 | Research Seminar | CSC831 | 45 | D |
| 700 | Expert-System | csc822 | 60 | B |

**Second SEMESTER**

| Level | Course TiTle | Course Code | Score | Grade |
|---|---|---|---|---|
| 700 | Advance Database | CSC821 | 55 | C |
| 700 | Advance Operating System | CSC803 | 66 | B |
| 700 | Software Engineering | CSC802 | 90 | A |
| 700 | Project | CSC840 | 70 | A |
| 700 | Expert-System | csc822 | 55 | C |

The Student GPA =3.35The Student CGPA =3.85

**Transcript Approved**
**Approval Successful**
**Generated Date: 10/21/2019 2:28:11 PM**
**Approved By: John Udoka**
**Approval Date: 10/21/2019 2:53:09 PM/**

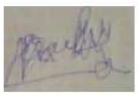


**Figure 5.5 Final Part of the generated transcript already Approved**

## 6. DISCUSSIONS

This paper has presented the implementation of the architecture for a Hybridized-Database Web-Based Transcript Processing System (HWBTP). If the tertiary institutions in Nigeria adopt this design and implement it, it is going to reduce their recurrent expenditure because the automated system will definitely require fewer human hands compared to the manual system. It is going to save money for the students too and they will heap a sigh of relief away from the usual stress of going several times to track the process of transcript generation. They will not have to travel down to make the request and track this process because the document will be processed sooner than expected. The system is also going to guarantee the security of data and its integrity if during implementation various users' access to the database is limited by their access levels and a secure database server like MYSQL is involved.

## 7. FINDINGS

This research work has contributed to knowledge in the following ways:

1. The developed hybrid web-based centralized transcript processing system could interact with a database created in the department.
2. The system developed was implemented and used to produce accurate transcripts. These were generated in the university format.
3. The system was tested to ensure that it is fully automated and the developed system performed faster and more efficiently with very little or no human intervention.

## 8. FUTURE WORKS

The benefits of the developed system will be better appreciated when the system is integrated with the institution's existing automated system. So, the future work may include an appropriate Application Programming Interface (API) to make this automatic integration possible.

**Acknowledgement**

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