DESIGN AND IMPLEMENTATION OF COMPUTER-BASED EXAMINATION SYSTEM WITH MULTIFACTOR AUTHENTICATION AND MESSAGE NOTIFICATION FEATURES

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Declaration

I declares this work was conducted and done by us, no any part of this work was copied from other sources legally or illegally, all data and information was sourced from both primary and secondary sources. Otherwise mention or knowledge.

Amir Sunusi
IDEAS/24/4267217

_____
Date & Signature

Approval Page

This is to certify that this is an original work undertaking by us and been prepared in accordance with the regulations governing the preparation and presentation of project in Software Engineering

_____ _____

Supervisor Signature/Date

Dedication

I dedicate this project to the Almighty Allah for His endless guidance, strength, and wisdom throughout this journey. This work is also dedicated to my beloved parents, whose love, prayers, and support have been my driving force.

Acknowledgement

First and foremost, I express my sincere gratitude to Allah for granting me the ability to successfully complete this project.

I would like to thank my supervisor Dr. Nasir B.A / Mr. Victor Idonor for their valuable guidance, constructive feedback, and continuous encouragement throughout the development of this project.

My heartfelt appreciation goes to my family for their unwavering love and support. I also acknowledge my colleagues and friends who provided insight, encouragement, and technical help when needed.

Finally, I thank everyone who contributed in any way to the success of this project.

Abstract

This work is concerned with computer based examination system. It focused on trends in online computer based examination and carried out a critical review of current computer based test system employ in Cisco Training Centre of Prof. Iya Abubakar CRC. An alternative system to provide solutions to the current challenges identified in the existing system was then proposed. The system was designed using the object OOAD methodology and implemented using rapid PHP IDE on a Windows 10 system, using PHP, HTML, CSS and MySQL technologies and Apache server as the application server with multifactor authentication.

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CHAPTER ONE: INTRODUCTION

1.1 Background of Study

Computer-based exams (CBE) have a number of important advantages compared to traditional paper-based exams (PBE) such as efficiency, immediate scoring and feedback in the case of multiple-choice question exams. Furthermore, CBE allow more innovative and authentic assessments due to more advanced technological capacities. Examples are the use of video clips and slide shows to assess medical students in surgery or the use of computer based case simulations to assess social skills. However, there are also drawbacks when administering CBE such as the additional need for adequate facilities, test-security, back-up procedures in case of technological failure, and time for staff and students to get acquainted with new technology.

It is generally recognized that examinations determine the extent to which educational objectives have been achieved as well as the extent to which educational institutions have served the needs of community and society (Shah, 2002). Examinations are not limited to measure educational or societal objectives and needs but incorporated in a way of coping with the educational system (Havens, 2002). Rehmani (2003) briefly described that 'examinations play a significant role in determining what goes on in the classroom in terms of what, and how teachers teach and students learn and can have impact on both teaching and learning'. Wikipedia used test or examinations as alternative terms of assessment and defined it as: 'test or an examination (or exam) is an assessment indeed to measure a test-takers knowledge, skill, aptitude, physical, fitness or classification in many other topics'.

The Cisco Networking Academy, Professor Iya Abubakar Community Resource Centre have been widely recognized as the best in the North-Eastern Region of Nigeria where students enrolled for Training and Certification courses ranging from IT Essential to CCNA Routing and Switching (CCNA 1,2,3 & 4). One key feature associated with International Certification/

Training Courses such as the CCNA is the use of Computer Based Exam as a platform for testing the knowledge that students have acquired at the end of the theoretical and Hands on Skills sessions (i.e. end of course exam). Also, the use of Online examinations in the CCNA curriculum enable student to test the instant knowledge that they have acquired at the end of each chapter, which is usually done at the end of each week since a CCNA training module comprises of 9 – 11 chapters and runs for a duration of 12 weeks.

The Cisco exams have changed several times. In 2013, Cisco announced an update to its certification program that "aligns certification and training curricula with evolving industry job roles" (Cisco Technology News Site, 2013). Bobiles (2016) reviewed that 'there are now several different types of Cisco-Certified Network Associate, with "CCNA Routing and Switching" being closest to the original CCNA focus; other types of CCNA focus on security, collaboration, data centres, service providers, video, voice, and wireless'.

1.2 Statement of Problem

The challenges faced with International Training Certifications is that the organizations that issues this certificates adopts a medium whereby its various Training Centres spread across the globe, subjects their trainees to a centralized online examinations platform; in which the performances of the trainees in these centres can be tracked and monitored. For that reason, the Training Centres are mandated to provide internet access to the students which lead to huge budget for data subscriptions.

It has been observed that these Regulatory Bodies, do carry routine maintenance on their online examination platform which may sometimes lead to up twelve (12) hours downtime; prompting the Training centres to reschedule their examinations to a later date leading to the discouragement of students who have extensively prepared for the exam. Also, most of

These Online Training Exams contain recycled questions that have been made available in various websites – prompting to a high level of malpractices.

1.3 Aim and Objectives of Study

The aim of this project is to design and implementation computer based examination system with multi-factor authentication and message notification features.

Objectives of the study

1. Provide a friendly, easy to use examination platform for students.
2. Reduce the level of examination malpractices and improve the credibility of the examinations via multifactor authentication and randomization of exams questions.
3. Provide a real-time processing of results with notifications via SMS and E-Mail at the end of the examination session.

1.4 Scope of the Study

The study covered the design and implementation of a computer based examination system with multifactor authentication and message notification features using Cisco Networking Academy, Prof. Iya Abubakar Community Resource Centre Bauchi as the case study. This system would enable the Training Centre to administer customized questions during examinations and provide access to offline materials.

The limitations of the system to be designed are as follows

1. This Examination system is designed for Educational Institutions (like schools, universities and training centres)
2. The system supports only multiple choice questions.
3. The system would enrol users using the internet before they can use it.
4. The subscribers of MTN and Etisalat Network would not be able to enrolled in the system to the Do Not Disturb (DND) service incorporated by NCC.

1.5 Justification of Study

Due to the challenges, which have persisted in the Cisco Networking Academy online examination is that is been done in the Cisco Official website, the justification for this work is as follows:

1. The online examination platform could not handle the problem of exam malpractice as the questions are found in various website due to inability of the International Training Organization to recycle their questions duly.
2. To save cost of constant purchase of internet data subscription and also save time and human labour of strolling around the exams to fixed problems that arise due to internet connectivity.
3. To provide students with a copy of their results at the end of exams either via SMS or E-mail notification.
4. To provide students with relevant study materials and resource without the need of going to the internet to search and download them.

1.6 Definition of Terms

This defines terminology specific to the problem domain, explaining terms, which may be unfamiliar to the reader of the use-case descriptions or other project documents. The following are the definition of terms used in this project work including acronyms and their meaning:

1. **Examination:** A test to show a person's progress, knowledge or ability, it comprises of some question and multiple choices answer.
2. **Student:** A person who has an account on the computer based online examination platform.
3. **Administrator:** A person who manages the operation of the computer based system.
4. **Guest:** A person who has not registered an account in the computer based examination system.

5. **Profile:** All the information of candidate such as name, course, grades of all examined computer based examinations.
6. **Question:** A problem that has a number of choices and only one correct answer.
7. **CBT:** Computer Based Testing, it is a platform that uses computers to test or assess (examine) candidates.
8. **PPT:** Paper Pencil Test, it is also a platform that uses paper and pencil to test or assess (examine) candidate.
9. **CCNA:** Cisco Certified Networking Associate, this an International Certification Course that is conducted by Cisco Networking Inc., and it covers the discipline of Computer and Mobile Networking.

CHAPTER TWO:
LITERATURE REVIEW

2.1 Introduction

In this chapter, the concepts and technologies used in the work and how they are used are explained. Also in this chapter, the works of other researchers who have worked on related works were discussed under review of related literature, to aid the researcher in solving the identified problems.

2.2 Theoretical Background

The technologies used in this application are web technologies: HTML, CSS, PHP, JavaScript and relational database technology (MySQL); and authentication method such as multifactor authentication together SMS and Email message delivery.

1. The main building technology of the application, Computer Based Testing System is the HTML, The HTML is the markup language used to describe and define the content of webpage. The HTML issued to tell the browser what to display on the page, like appearance of text such as bold or italics text and also used to specify images. The main HTML features

used were form and Cascading Style Sheet. The form was used to collect LOGIN data- username and password-from a user and a submit button (Login)to send the collected data to a web document to act on the data.

2. The styling of the application was done using CSS. This include the

   i. The Layout
   ii. Link Styling
   iii. Colouring
   iv. Picture Alignment
   v. Menu Building

Cascading Style Sheets (CSS) is a style sheet language used to describe the look and formatting of the document written in HTML. Presentation of information to the user by the browser was controlled by means of Cascading Style Sheet. Cascading Style Sheet is a cornerstone specification of the web and was used in the application to describe their presentation. CSS was designed to enable the separation of document content from document presentation, including elements such as the layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for tableless web design). It avoids those portions of markup that would specify presentation by instead, providing that information in a separate file. For each relevant HTML element (identified by tags), it provides a list of formatting instructions. For example, it might say (in CSS syntax), "All heading 1 element should be bold." Therefore, no formatting markup such as bold tags () is needed within the content; what is needed is simply semantic markup saying, "this text is a level 1 heading".

3. JavaScript is combined with HTML and CSS to create a dynamic HTML pages. JavaScript is commonly used on the internet to create web pages that respond to user actions, like when user moves a mouse pointer over an image or clicks a form button. JavaScript was used for the client side scripting and security, it was also integrated with jQuery and ajax to create Model Windows used in the application like:

i. Generating Print preview display
ii. To ensure the registrant does not submit empty forms
iii. To ensure that the information requested is what the user enters using the JAVASCRIPT regular expression to match the data submitted.

4. The connection to the database was done using the scripting language PHP. In the project, PHP was used for:

i. Handling data validation
ii. Editing, Deleting information in the database
iii. Database connectivity
iv. Managing Scripting Functionality
v. Generating Dynamic content in the application like displaying the information of traffic offenders in the application
vi. Searching and fetching information from the database and sorting them accordingly like the periodic display of traffic defaulters in the application.

PHP is a server-side scripting language designed for web development but also used as a general-purpose programming language. PHP is used in the application to access database and provide server-side form, because it is closely integrated with MySQL database, open source, light weight and does not consume much server resources to render page.

PHP syntax:

```
<?php
Code
?>
```

PHP code can be simply mixed with HTML code, or it can be used in combination with various tinplating engines and web frameworks. PHP code is usually processed by a PHP interpreter, which is usually implemented as a webserver's native module or a Common Gateway Interface (CGI) executable. After the PHP code is interpreted and executed, the web server sends resulting output to its client, usually in form of a part of the generated web page – for example, PHP code was used to generate a web page's HTML code, an image, and some other data. PHP has also evolved to include a command-line interface (CLI) capability

and can be used in standalone graphical applications. PHP iscontained within the body of an HTML page and runs on window-based serverswith an installed interpreter.

5. The database used for storing information in this project application is MySQL.

Working together with PHP is MySQL, most widely used open-source relational database management system (RDBMS). The SQL phrase stands for StructuredQuery Language. MySQL is a popular choice of database for use in webapplications, and is a central component of the widely-used LAMP open sourceweb application software stack (and other 'AMP' stacks). LAMP is an acronymfor Linux, Apache, MySQL, Perl/PHP/Python. Both PHP and MySQLinstructions are used in this application are used together in the code to open thedatabase, establish connection between it and the HTML code to insert data, retrieve data, delete data etc.

6. Multifactor Authentication is the latest secure authentication technique. Though Single-factor authentication (SFA) has been used widely; it is not secure enough for online transactions. Single factor authentication has been around for a while now, yet it does not have any meaningful security measure. The solution is to have multi-factor authentication which increases the security levels of a system by using multiple authentication factors that include at least three of the following: Username, Question Answer Verification, Image Authentication, Pin and Password.

2.3 Review of Related Literatures

There is a growing body of research focused on developing better ways to manage e-exams systems and e-learning systems. Some of these researches focused on various sections of the system and these includes: Schramm (2008) looked at e-learning web based system that could simply offer and grade mathematical questions with infinite patience. Therefore, it needs the capability for in and output of mathematical formulas, the dynamic generation of plots and the generation of random expressions and numbers. Al-Bayati and Hussein (2008) presents an

applied Generic Software of multiple kinds of e-exam package; this package of e-exam is oriented to Hearing Impaired (HI) persons. Therefore, the exam material of this package is translated into language of HI persons like sign language and finger spelling. The idea of the Generic software is to present an empty template to the teacher who would like to develop his required e-exam for the needful topic (mathematics, language, science, etc.) and desired set of exam kinds (multiple choices, matching between words, fill in blanks, etc.).

Web-based Examination System is an effective solution for mass education evaluation (Zhenming et al, 2003). They developed a novel online examination system based on a Browser/Server framework which carries out the examination and auto-grading for objective questions and operating questions, such as programming, operating Microsoft Windows, editing Microsoft Word, Excel and PowerPoint, etc. It has been successfully applied to the distance evaluation of basic operating skills of computer science, such as the course of computer skills in Universities and the nationwide examination for the high school graduates in Zhejiang Province, China. Another paper (He, 2006) presents a web-based educational assessment system by applying Bloom's taxonomy to evaluate student learning outcomes and teacher instructional practices in real time. The system performance is rather encouraging with experimentation in science and mathematics courses of two local high schools.

Another paper proposed web based online examination system (Rashid et al, 2002). The system carries out the examination and auto-grading for students' exams. The system facilitates conducting exams, collection of answers, auto-marking the submissions and production of reports for the test. It supports many kinds of questions. It was used via Internet and is therefore suitable for both local and remote examination. The system could help lecturers, instructors, teachers and others who are willing to create new exams or edit existing ones as well as students participating in the exams. The system was built using various open source technologies AJAX, PHP, HTML and MYSQL database are used in this system. An auto-

grading module was generalized to enable different exam and question types. The system was tested in the Mansoura university quality assurance centre. The test proved the validity of using this kind of web based systems for evaluates students in the institutions with high rate of students.

An online website for tutoring and e-examination of economic course aimed to present a novel software tool can be used for online examination and tutorial application of the syllabus of economic course (EL Emary and Al Sondos, 2006). Also, among the main interests of the paper is to produce a software through it we make sure that students have studied all the concepts of economics. So, the proposed software is structured from two major modules: The first one was an online website to review and make self-test for all the material of economic course. The second part is an online examination using a large database bank of questions through it the level of students can be evaluated immediately and some statistical evaluations can be obtained. The developed software offers the following features:

1 Instructors could add any further questions to maximize the size of the bank of questions.
2 Different examinations for each student with randomly selected questions from the bank of questions can be done.
3 Different reports for the instructors, students, classes…etc. can be obtained.
4 Several students can take their exams simultaneously without any problem inside and outside their campus. The proposed software has been designed to work base on the client server architecture.

Electronic exam is a difficult part of e-learning security (Huszti and Petho, 2008). The paper describes a cryptographic scheme that possesses security requirements, such that authenticity, anonymity, secrecy, robustness, correctness without the existence of a Trusted Third Party. The

proposed protocol also provides students a receipt, a proof of a successful submission, and it is based on existence of anonymous return channels. Another research work proposed a theoretical approach that incorporates available fingerprint biometrics authentication technologies in conjunction with e-learning environments to curb unethical conduct during e-learning exam taking (Levy and Ramim, 2007). The proposed approach suggests practical solution that can incorporate a random fingerprint biometrics user authentication during exam taking in e-learning courses. Doing so is hypothesized to curb exam cheating in e-learning environments.

Ayo et al (2007) proposed a model for e-Examination in Nigeria where all applicants are subjected to online entrance examination as a way of curbing the irregularities as proposed by the Joint Admissions Matriculation Board (JAMB), the body saddled with the responsibility of conducting entrance examinations into all the Nigerian universities. This model was designed and tested in Covenant University, one of the private universities in Nigeria. Their findings revealed that the system has the potentials to eliminate some of the problems that are associated with the traditional methods of examination such as impersonation and other forms of examination malpractices. Based on the development of e-learning in the only Open University in Nigeria (Ipaye, 2009), discusses the process of establishing e-learning environment. Another paper seeks to solve a part of that problem by designing and developing a web application where tests in multiple choice formats will be taken online and graded immediately (Akinsanmi et al, 2010). The web application relies solely on Microsoft developed technologies. It runs on the Microsoft.net framework, uses the ASP.NET web server, C# as the intermediate language, ADO.NET to interact with the relational database and Microsoft SQL server as the relational database.

A large body of literature already exists on online assessment using computers and paper. For example, Bodmann and Robinson (2004) conducted an experimental study to compare speed

and performances differences among CBTs and PPTs. In the experiment fifty-five undergraduate students enrolled in the subject of educational psychology, participated in the studies which were already familiar with CBTs. Both CBTs and PPTs contained 30 MCQs items with 35 minute of time limit. The findings observed that undergraduates completed the CBT faster than PBT with no difference in scores. Research outcomes have thus supported the fact that when students are motivated and testing conditions are equivalent, there are no differences between the scores obtained via CBT or PPT (Lynch, 1997 &Marson, Patry, and Berstein, 2001; cited by Alabi, Issa and Oyekunle, 2012).

Gary et al (2008) at the University of New South Wales, Sydney studied the effect of online formative assessment on learning. The outcomes support the contention that integrated well designed online formative assessments can have significant positive effects on learning. Web based formative assessments also support equity and inclusiveness by allowing students to attempt each assessment anonymously on multiple occasions at any time.

Lim, et al., (2006) examined medical students' attitude about CB Vs PB testing in Singapore. Through an online survey, 213 (53.5%) final-year MBBS students were tested out of which 91 (79.8%) preferred CBT, 11 (9.6%) preferred P&P format and 12 (10.5%) were un-sure. The study found that 42 indicated that 42 liked CBT because of good quality of images and independent of assigned seating positions; 22 liked CBT because they could proceed at their own pace; one stated that CBT examinations was fun; 4 enjoyed the convenience of CBT and 6 cited "equality" as the reason they preferred CBT over P&P testing.

Karadeniz (2009) studied the impact of paper based, web based and mobile based assessment on students' achievement. A group of 38 students were experimented for 3 weeks. Significant differences were found between the scores achieved by the students in second week but not in first week. The paper revealed that students had positive attitude towards web based and

mobile based assessment due to ease of use, comprehensive and instant feedback. Moreover, most favoured tests were web based and the least favoured were paper based.

Calarina and Wallace (2002) investigated to confirm several key factors in CBT versus PPT assessment. Factors of the study were content familiarity, computer familiarity, competitiveness, and gender. The study used a post-test only designed with one factor, test mode (Computer-based and Paper-based). Students' score on 100-item multiple choice 51 items and students' self-report on a distance learning survey were treated as dependent variables. Four sections of Computer Fundamental Course consisting of 105 students were selected as sample of the investigations. Results showed that CBT delivery impacted positively on students' scores as compared to PPT. The study found that the CBT group out-performed the PPT group. Gender, competitiveness, and computer familiarity were not related to this performance difference, though content familiarity was.

Jim and Sean (2006) concluded that the e-assessment can be justified in a number of ways. It can help avoid the meltdown of current paper-based systems; it can assess valuable life skills; and it can be better for users. For example, by providing on demand tests with immediate feedback and perhaps diagnostic feedback, and more accurate results via adaptive testing, it can help improve the technical quality of tests by improving the reliability of scoring. Therefore, a proper preparation of the students for the exam via an introduction to the software, a CBT could be a good method to curtail examinations malpractice effectively.

A study by Ayo (2007) on Nigerian University stated that 81.3% of the applicants were computer literate, while the remaining 18.7% were guided through the examination. The total number 1023 (75.7%) of respondents who participated in the e-examination conducted in Covenant University took electronic examination for the first time and as such found the examination easy, a few found it a little challenging but adjusted with time. The study revealed

that only 327 (24.2%) of the applicants had not been involved in any form of electronic examination before, and found it difficult.

CHAPTER THREE: SYSTEMS ANALYSIS AND DESIGN

3.1 Introduction

System development can generally be thought of as having two major components: system analysis and system design. System design is the process of planning a new business system or one to replace an existing system. Before this can be done, we must thoroughly understand the old system and determine how computer and software can be used to make the operation effective. System analysis and Design refers to the process of examining business situation with the intent of improving it through better procedures and methods. System analysis and Design relates to shaping organizations, improving performance and achieving objectives for profitability and growth. The emphasis is on system in action, the relationship among subsystem and their contribution to meeting a common goal.

Methodology

This study relied on information obtained from secondary sources especially online materials, documents of relevant agencies like NITDA. From these documents required information was obtained on the performance computer based test in CCNA Certifications. The author also examined reports, academic research papers, articles and newspaper reports on essence of CBT in Cisco Networking Academy. The obtained information enables the critical review of current state of Cisco Training Centre in Prof. Iya Abubukar Resource Centre, Bauchi in which Object Oriented Analysis and Design (OOAD) methodology was used during the software development. Object Oriented Analysis and Design methodology is a software engineering approach that modules a system as a group of interacting object. OOAD models are pictures that illustrate the system's objects from various perspectives such as structures and behaviours. Two stages are involved in the approach; Object Oriented Analysis and Object Oriented Design. Unified Modelling Language (UML) notation is the design tool used for modelling in

this research.UML used in the research includes: Use Case diagrams, Data Flow diagrams and Class diagrams.

3.2 Description of the Existing System

The existing system is the Cisco Network Academy website (NetAcad) that allows Cisco Certified Training Centres to enrol and train students based on the Cisco Curriculum. Candidates/Students that have paid for the training fees are required to submit theirScreen name (user-id) and email address to the Centres' Cisco Instructor, who thenenters these details in the website (using he/her Cisco Certified Instructor Account). After this process, the Cisco NetAcad website sends an activation email to the student, in which the email contains the student's screen name, a temporary password in which the student is mandated to change, and a link that takes the student to a portal where he/she is expected to fill-in their personal and other relevantdetails.

After, the student has enrolled successfully, the student is expected at any time to use either his/her email address or screen name and password to access Cisco NetAcd website. And once login student can perform operation such as

i. Read the Cisco Study material

ii. Take Chapters Assessment and also the end of course test: Here, the chapter assessment contains 20-25 questions while the exams contain 50-55 questions drawn from a pool of questions. Also, duration is allocated for the assessment.

iii. Download resources such as the Simulation Software (Packet Tracer)

iv. Browse the catalogue of courses offered by Cisco Networking Academy

Problem Associated with the Existing System

With the current system, students need access to internet to be able to access and read the study material online. Also, the Host Centre have to subscribe for internet access that would be used when students need to access relevant information and take assessments, sincestudentsare mandated to take assessments under the closed supervision of a Cisco Instructor to avoid the case of examination malpractice.

With these aforementioned problems, other challenges that arise in this system due to the problem associated with internet access and other technical issues are as follow:

1. Cisco Networking Academy do perform routine maintenance of the website which causes 12 – 24 hours download time, hence assessments scheduled during this period is cancelled and the Instructor have to shift it to a later to the dismay of the student who have come prepared to take the exams.
2. The usage of this system is cost intensive for both students and the Cisco Training Centre as regular internet access is demanded.
3. The assessments contain questions that are hardly recycled and student tend to abandoned studying the online material,and focus on searching the internet for websites that have the assessmentquestions for the sole reason of passing.

3.3 Analysis of Proposed System

The proposed system is a web-based application that that enable users to take assessment in real time and update the central database.

The new system when designed will reduce the problems associated with the existing system in order to improve the credibility of the CCNA Training Module. Below are the ways in which this can be achieved:

1. There will be an enrolment page and a verification page where student would be able to register and verify their registration by entering two (2) codes i.e. one code sent to their email and the other to their mobile device.
2. Once a student has login into the system, he/she would see list of courses available.
3. Then once the enrolled course is clicked, a list of available exams would be displayed.
4. Before a student attempts to take an assessment, a One-Time Passcode would be entered which is issued by the instructor before the commencement of an exams.
5. Each assessment consists of 20-25 questions containing options A – F, in which the system would randomized the questions for different students.
6. At the end of the assessment, a student would be able to see his/her scores (results) and copies sent to both the student's Email account (Email) and mobile device (SMS) instantly.
7. There would be a resource page where student would be able to access and download materials like E-books, relevant Software etc.

Use Case Diagrams

Use case diagrams are used during requirements collection and analysis as a graphical means of representing the functional requirements of the system. Use cases focus on the behaviour of the system from external point of view. Use cases are developed during requirement collection and are further refined and corrected as they are reviewed (by stakeholders) during analysis.Also, this diagram shows a set of use cases, actors and relationships. Actors are external entities that interact with the system. Examples of actors include users and administrator, bank and customer …etc., or another system like central database.

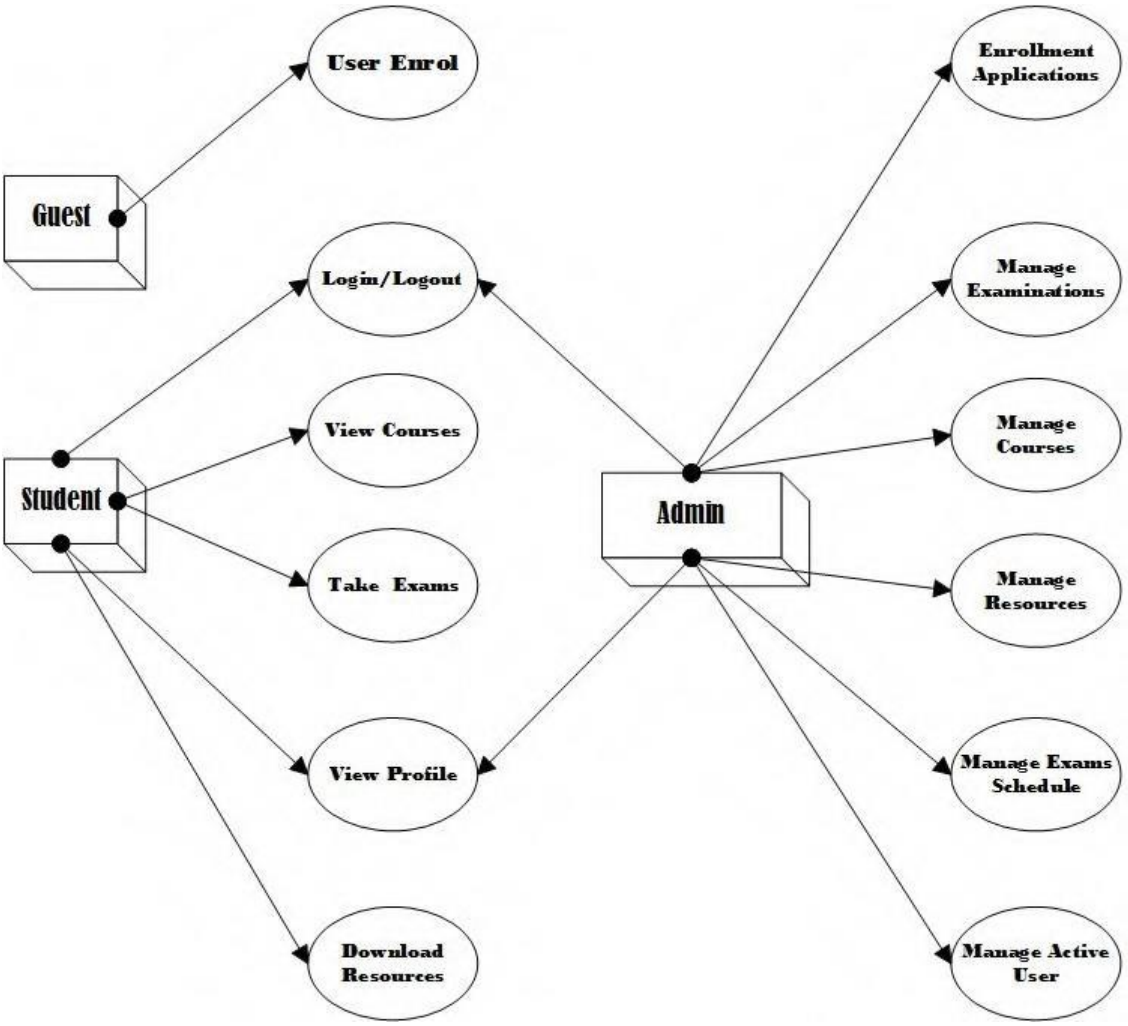

Figure 1: Use Case Diagram of the Proposed System.

Data Flow Diagram

A data flow diagram (DFD) uses a very limited number of primitive symbols to represent the functions performed by a system and the data flow among the functions. Starting with a set of high-level functions that a system performs, a DFD model hierarchy represents various sub-functions. The data flow diagram depicted in figure 3.2 below shows the relationship among the entities in the EA system. The entity "**Student**" can take examination after he or she gains access to the system. The entity "**Admin**" can upload questions to be answered by student into the CBT database using any preferred question format, set the schedule time for the exams and

configure the correct option or set of options for the questions. Furthermore, the"**Admin**" entity is saddled with the responsibility of managing students account, courses, granting students access to participate in an assessment. The entity "**EA System**" is responsible for authenticating the users of the system and also provides the timing functionality for the examination. The system logs off a student upon expiration of duration for the examination. The "**Resource**" serves as a data store that enables storage and retrieval of materials.

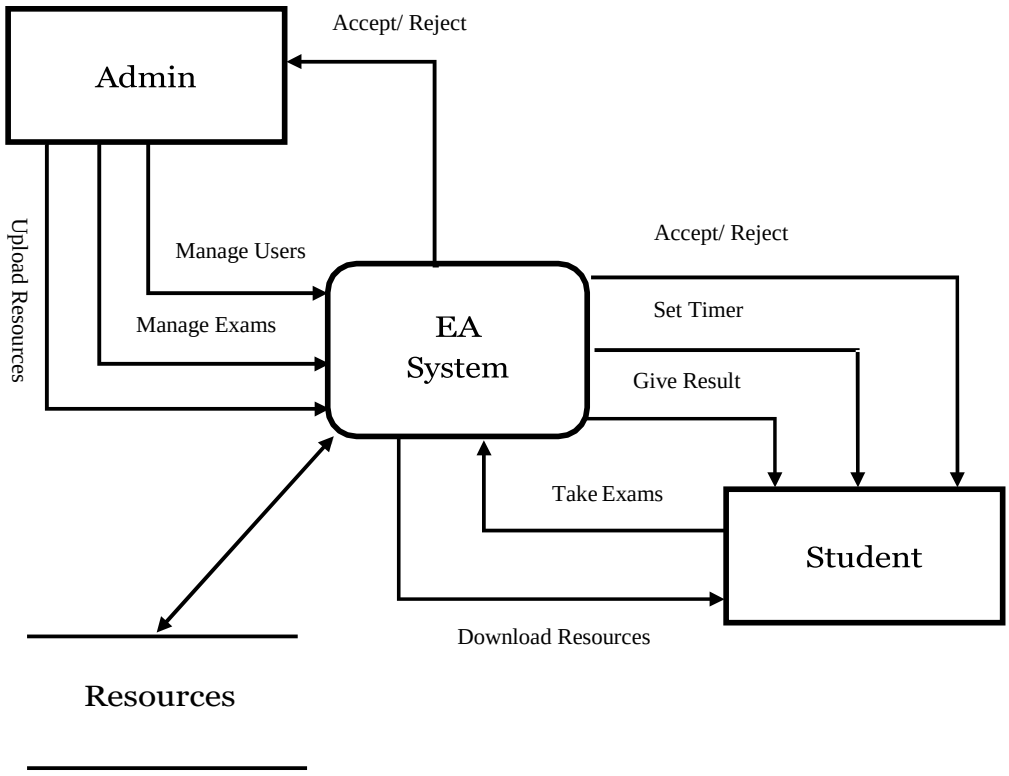

Figure 2: Data Flow Diagram of the Proposed System

Class Diagram

The class diagram describes the types of objects in a system and the various kinds of static relationships that exist among them. In UML, a class is represented by a rectangle with one or more horizontal compartments. The upper compartment holds the name of the class. The name

of the class is the only required field in a class diagram. By convention, the class name starts with a capital letter. The (optional) centre compartment of the class rectangle holds the list of the class attributes/data members, and the (optional) lower compartment holds the list of operations/methods.

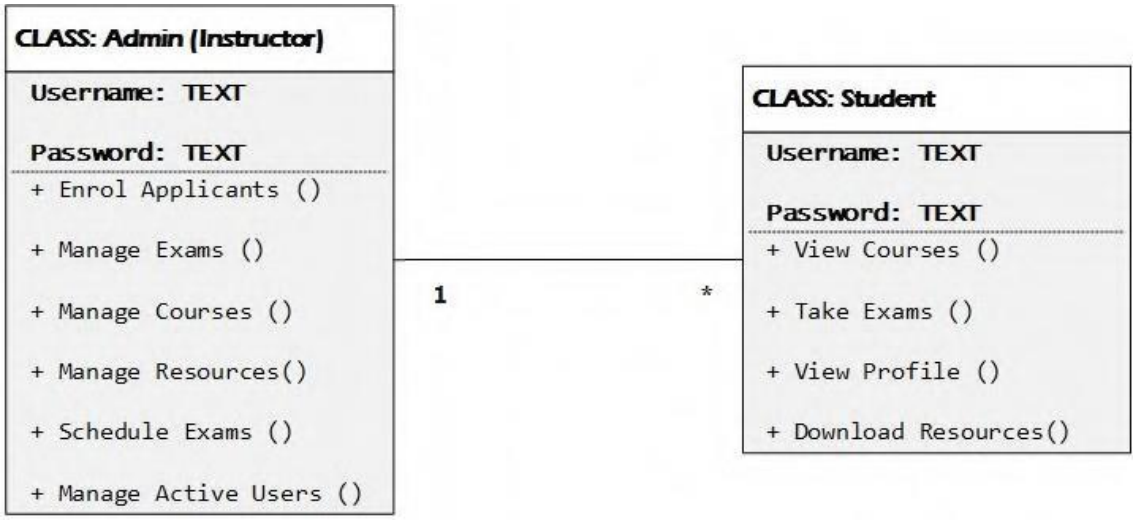

Figure 3: Class Diagram of the Proposed System.

Note:

1————————————* One --- many --- relation.

3.4 Design of the Proposed System

Database Design

The relational database model was used to design the database. The relational database server used to create the database is MySQL.

Table 1: Answers Table

Field Name	Character Length	Data Type
id	10	int
student_exam_id	11	int
exam_id	11	int
exam_schedule_id	11	int
question_id	11	int
Answer	255	varchar
Result	255	varchar

Table 2: Courses Table

Field Name	Character Length	Data Type
id	10	int
user_id	11	int
coursename	255	varchar
lecturer	255	varchar
description		text

Table 3: Exams Table

Field Name	Character Length	Data Type
id	10	int
user_id	11	int
course_id	11	int
examname	255	varchar
Duration	255	varchar
Status	255	varchar
description		text

Table 4: Exam Pass Codes Table

Field Name	Character Length	Data Type
id	10	int
exampasscode	255	varchar
student_id	11	int
exam_schedule_id	11	int
Status	11	int

Table 5: Exams Schedules Table

Field Name	Character Length	Data Type
id	10	int
exam_schedule_title	255	var
exam_id	11	int
exam_date_time		timestamp
exam_schedule_link	255	varchar
duration_hour	11	int
duration_mins	11	int
Status	11	int
description	255	varchar

Table 6: Questions Table

Field Name	Character Length	Data Type
id	10	int
used_id	11	int
examquestion		text
option1	255	varchar
option2	255	varchar
option3	255	varchar
option4	255	varchar
option5	255	varchar
option6	255	varchar
examid	11	int
qnum	11	int

Table 7: Resources Table

Field Name	Character Length	Data Type
id	10	int
user_id	11	int
course_id	11	int
resourcename	255	varchar
Filename	255	varchar
Type	255	varchar
description		text

Table 8: Scheduled Exams Table

Field Name	Character Length	Data Type
id	10	int
exam_id	11	int
Examdate		date
start_at		time
end_at		time
description		text

Table 9: Student Exam Schedules Table

Field Name	Character Length	Data Type
id	10	int
student_id	11	int
exam_id	11	int
exam_schedule_id	255	varchar
Status	255	varchar
exampasscode	255	varchar
start_at		timestamp
stop_at		timestamp
Duration	11	int
Result	255	varchar

Table 10: Users Table

Field Name	Character Length	Data Type
id	10	int
Name	255	varchar
email	255	varchar
Level	11	int
Password	255	varchar
remember_token	100	varchar

Table 11: User Information Table

Field Name	Character Length	Data Type
id	10	int
user_id	11	int
Photo	255	varchar
Regno	255	varchar
programme	255	varchar
Edulevel	255	varchar
Institution	255	varchar
phone_no	255	varchar
Status	11	int
activation_code	255	varchar
code_sent_time		timestamp

System Architecture

The architecture of the system design is 3-tier. The tiers are presentation tier, middle tier and data tier. The presentation tier is the user interface and it is designed using HTML. The middle tier connects the presentation tier and data tier together. The middle tier is also called application tier or business logic. The middle tier was designed using PHP and it runs on the server. The data tier is the part of the system that is responsible for storing data (database). The database management system used for developing this system is MySQL database server. Architecture of the system is shown below.

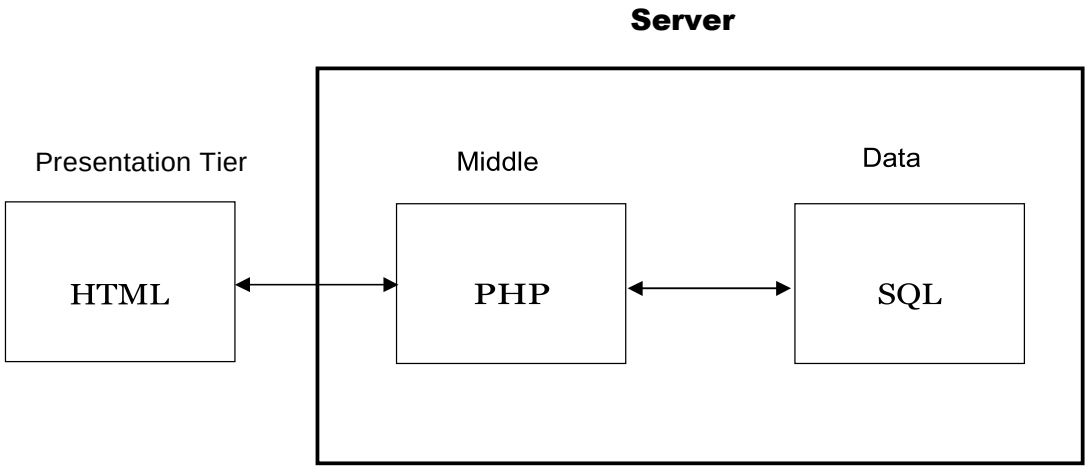

Figure 4: System Architecture

Input Design

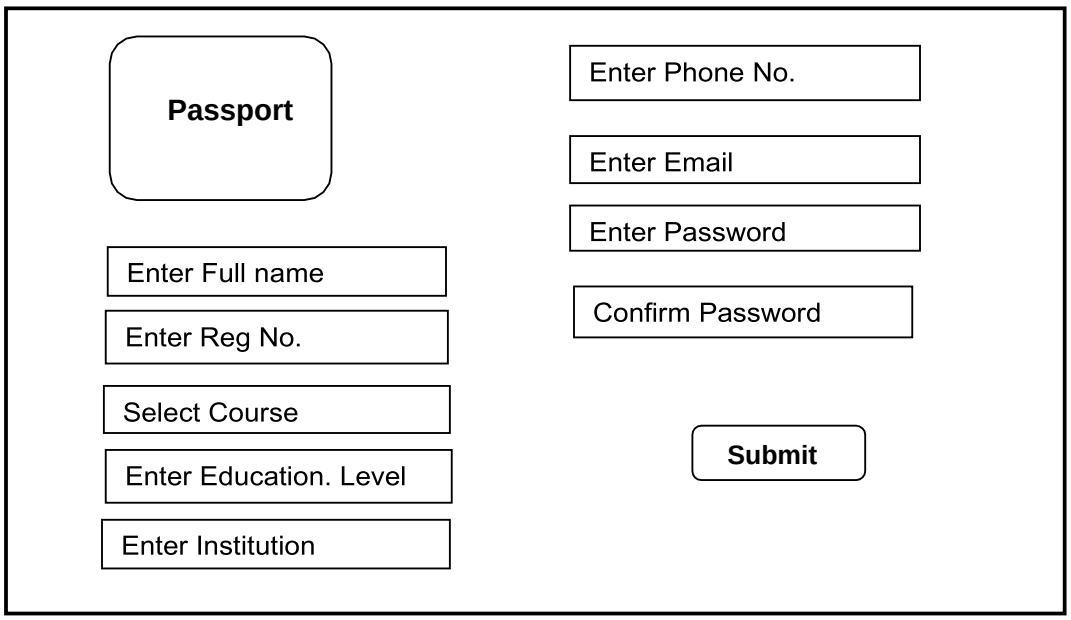

Figure 5: Enrolment Form

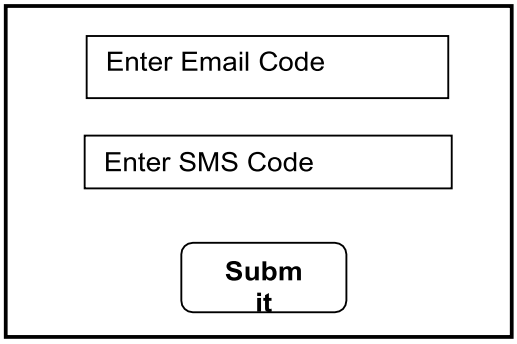

Figure 6: Verification Form

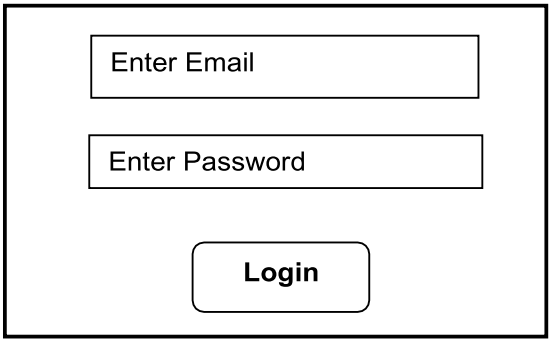

Figure 7: Login Form

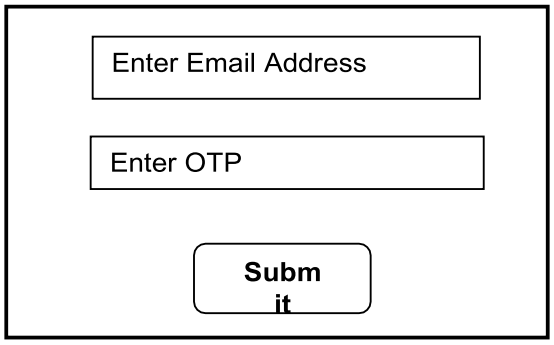

Figure 8: Authentication Form

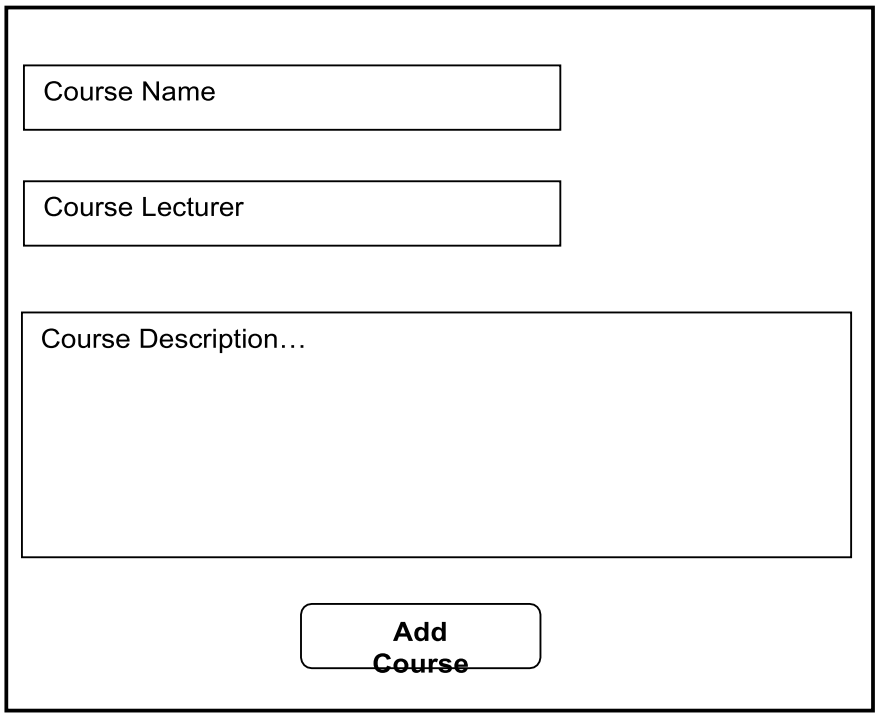

Figure 9: Manage Course Form

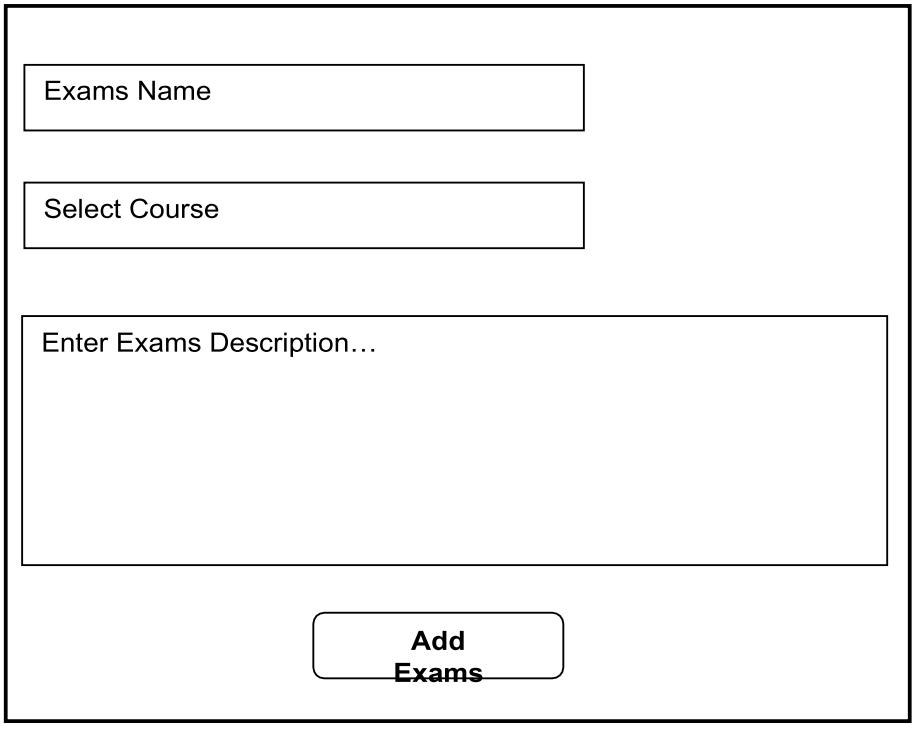

Figure 10: Manage Exams Form

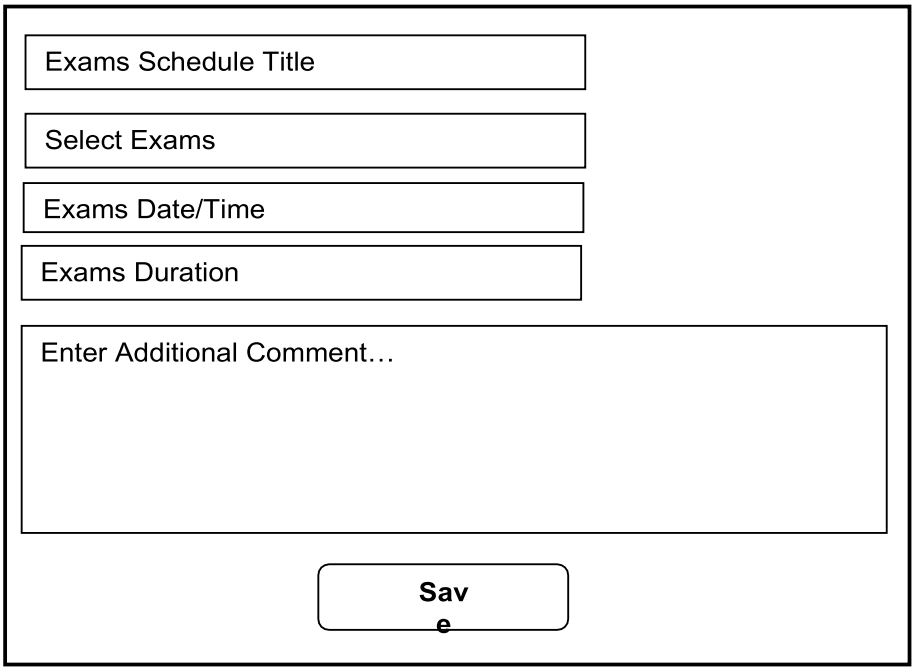

Figure 11: Schedule Exams Form

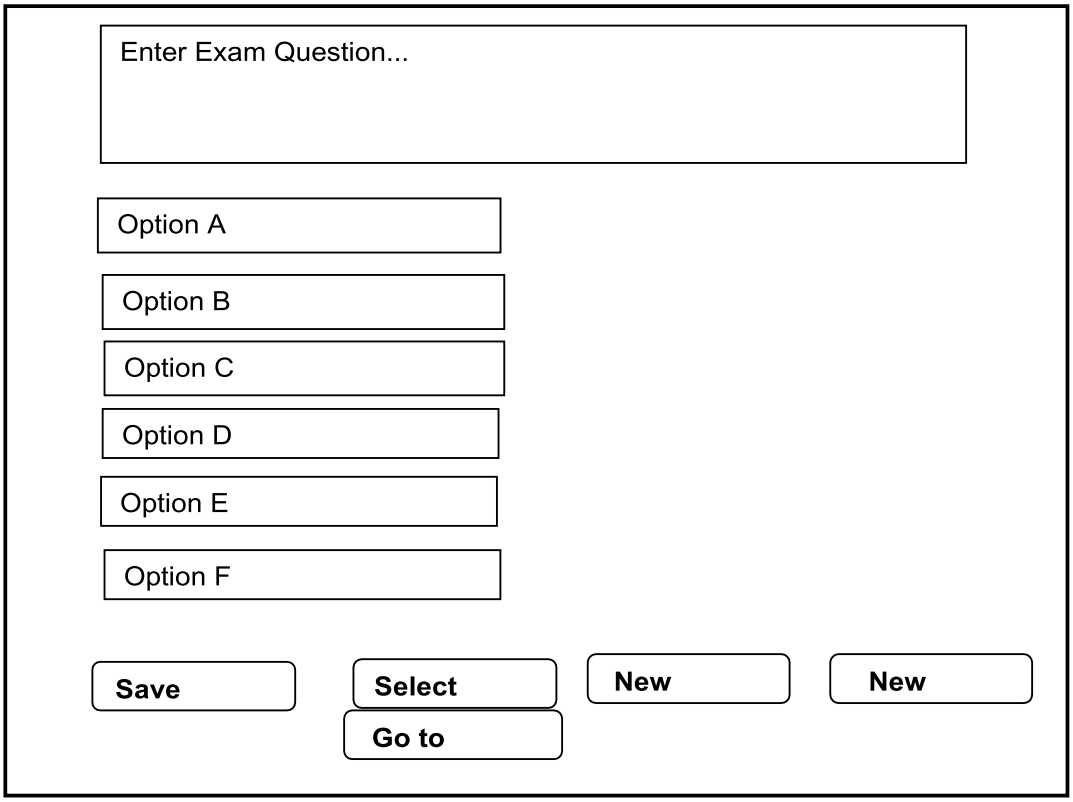

Figure 12: Manage Exams Question Form

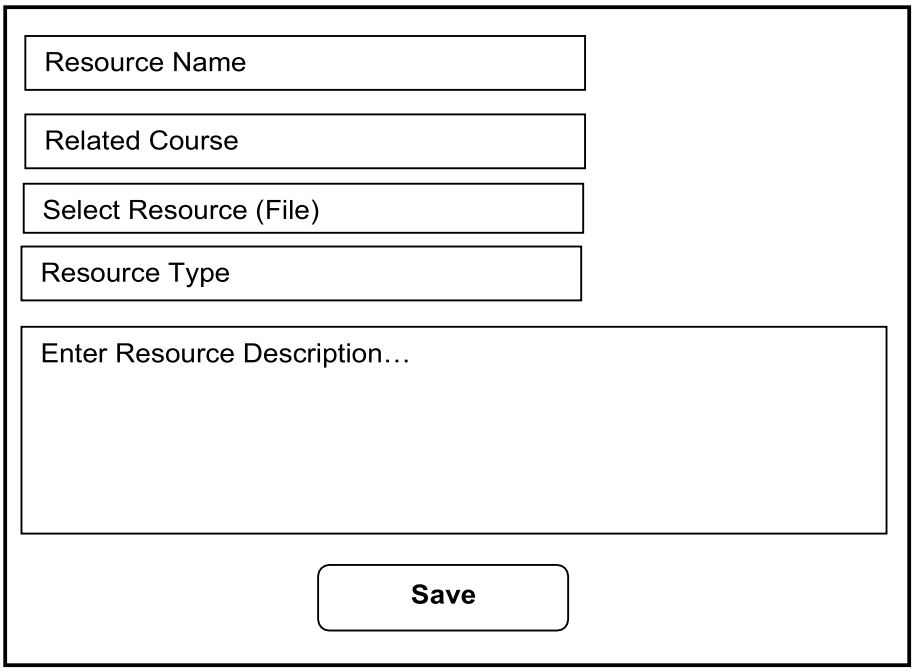

Figure 13: Manage Resource Form

Output Specification Design

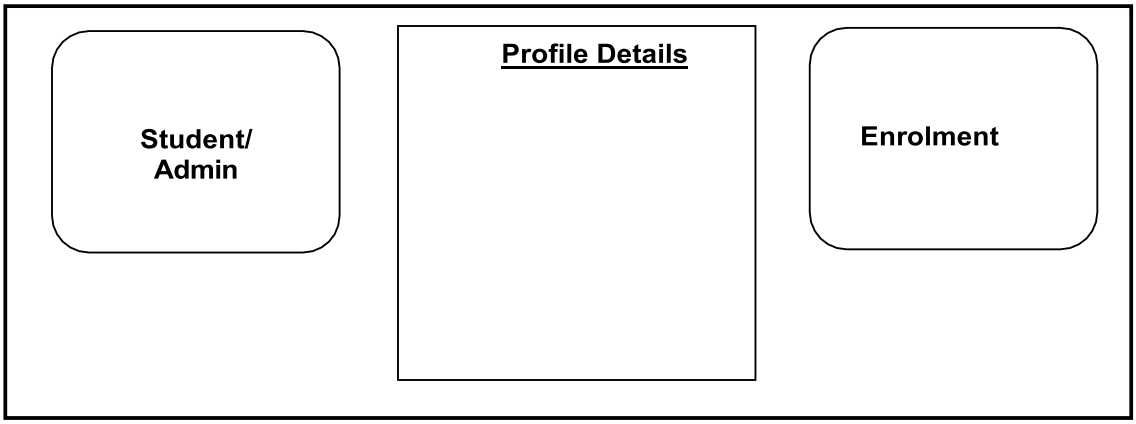

Figure 14: Profile Page Screen

Student Name	Student Reg. No.	Student Program	Student Email	Education Level	Institution	Status	Action

Figure 15: View All Students Listing

Course Name	Lecturer	Description

Figure 16: View List of Courses

Exam Name	Course Name	Exams Description	No. of Questions	Action

Figure 17:View List of Exams

Exam Schedule Name	Exam Name	Course Name	Schedule Description	Schedule link	Exam Date	Duration	Action

Figure 18:View List of Exams Schedules

Resource Name	Related Course	Resource Description	Action

Figure 19:View List of Resources

Program Design

The program was designed using top-down approach. The whole system was broken down into its components parts and designed in modules.

Program Procedure Chart (Admin)

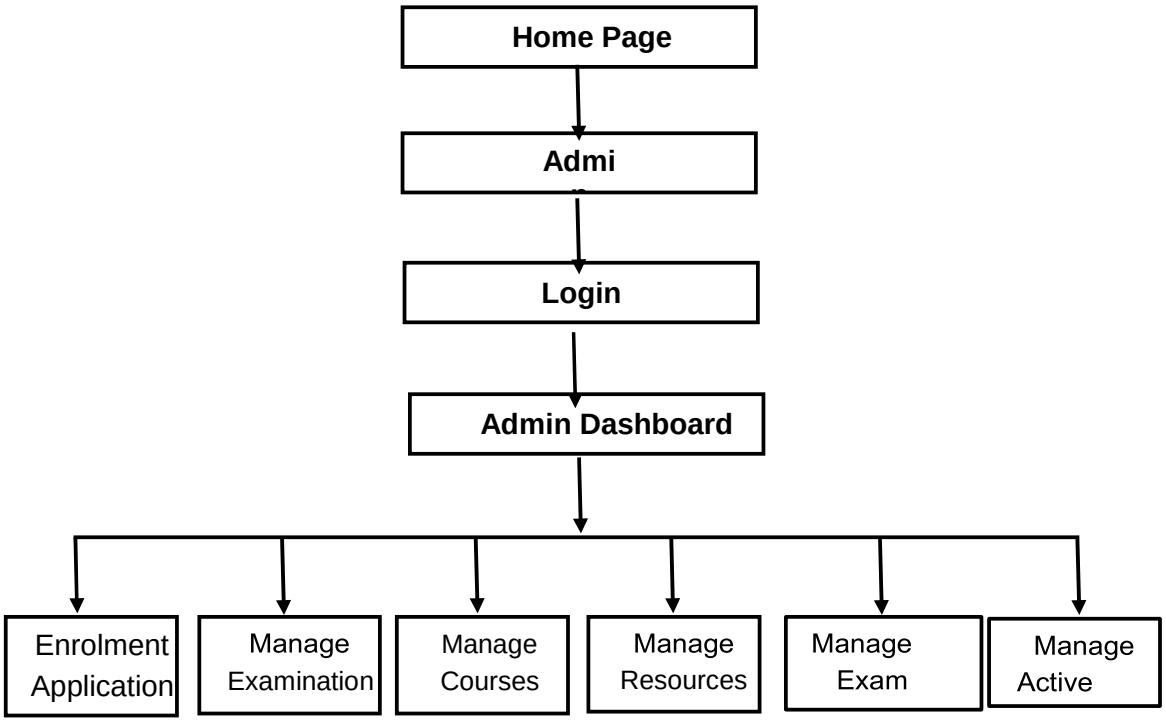

Figure 20: Program Procedure Chart (Admin)

Program Procedure Chart (User/Guest)

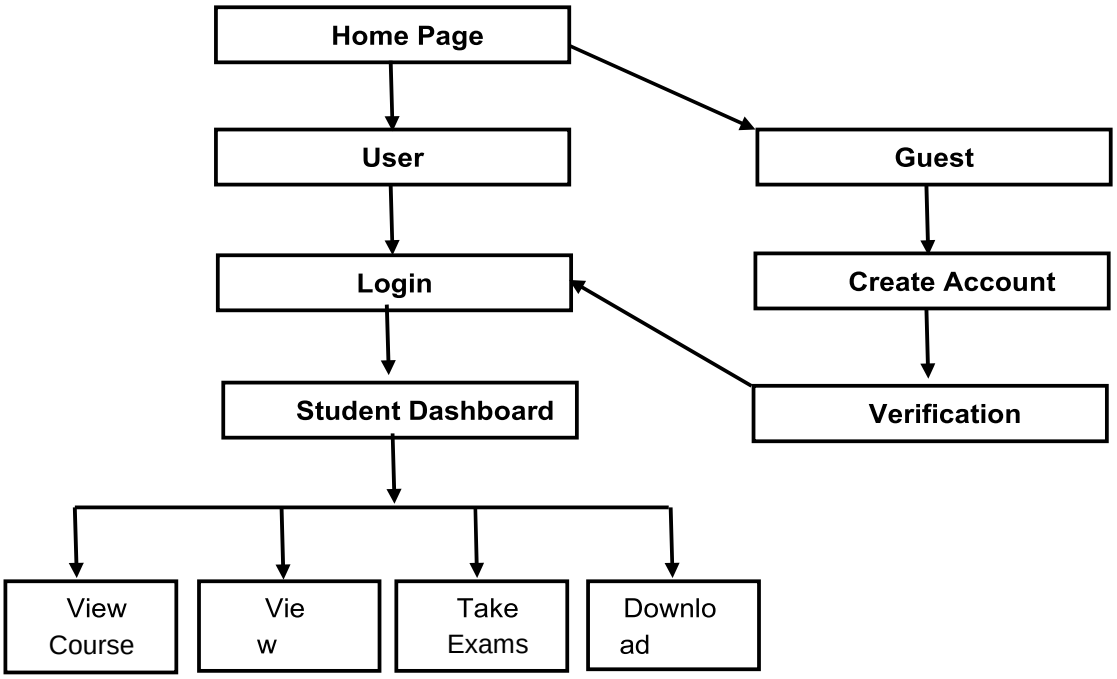

Figure 21: Program Procedure Chart (User/Guest)

Program Flow Chart to Gain Access into The System

The system requires a user authentication for all the users of the system (candidate, instructor/administrator), if successful, the user will access the CBT (Computer Based Testing) System limiting each user to his privilege.

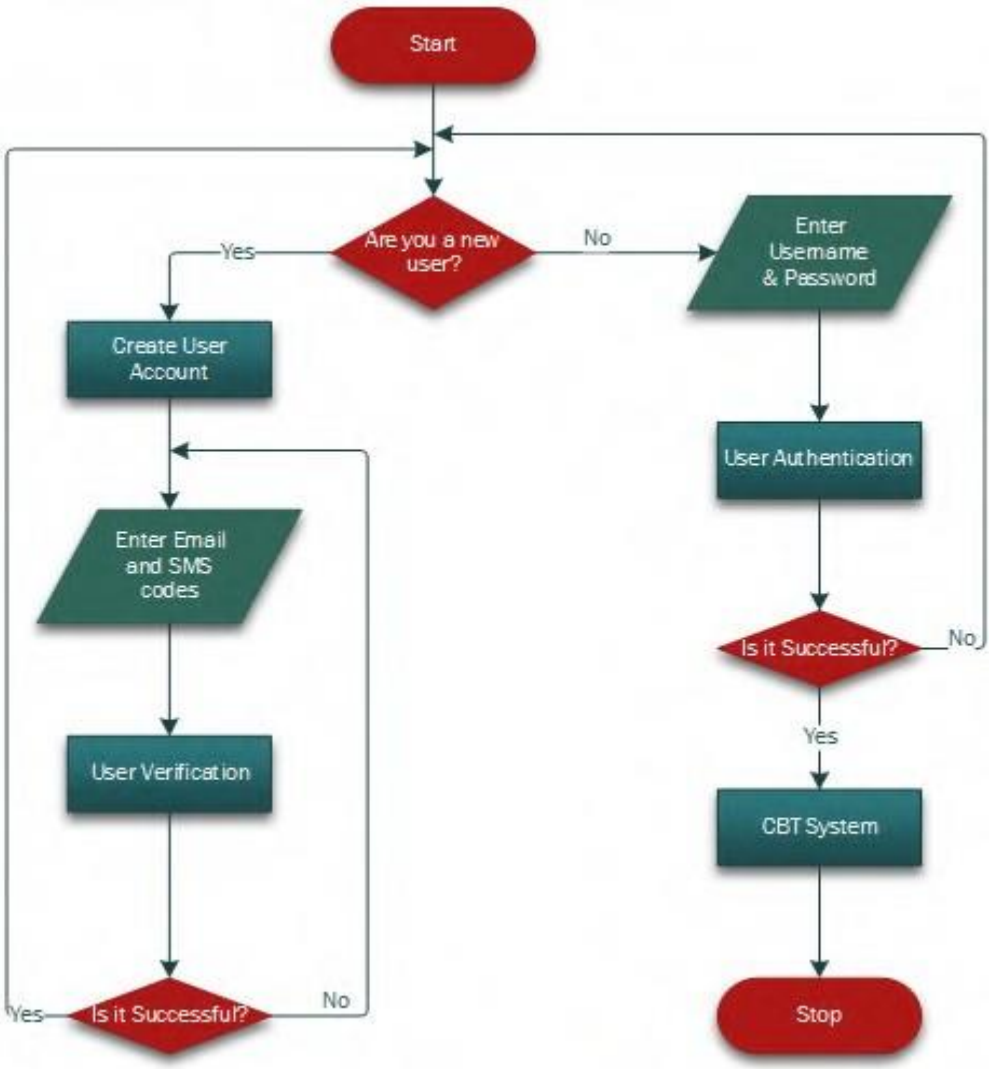

Figure 22: Program Flow Chart to Gain Access into the System

For a new user, after filling and submitting his registration details, he/she would be sent two codes (Email code and SMS code), in which both codes have to be entered into the system before the student can be granted access to make use of the platform.

Program Flow Chart to Take an Exam

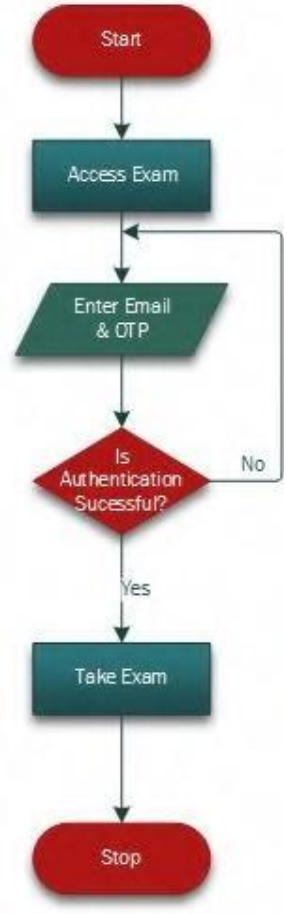

Figure 23: Program Flow Chart to Take an Exams

CHAPTER FOUR: SYSTEMS IMPLEMENTATION

4.1 Introduction

Implementation of the system is concern with the preparation of resources (hardware and software) that are required for effective functionality of a newlydesigned system, testing these resources to ensure that they meet the designedobjective and eventually change over to the new system.

4.2 Choice of Development Environment

Rapid PHP is the IDE used in implementing the client code and the web service code of this application. Rapid PHP editor is a faster and more powerful PHPeditor for Windows, combining features of a fully-packed PHP IDE with thespeed of the Notepad. Rapid PHP is the most complete all-in-one software forcoding PHP, HTML, CSS, JavaScript and other web development languageswith tools for debugging, validating, reusing, navigating and formatting yourcode. With Rapid PHP editor one can code smarter, save time and increase

productivity. It supports tabbed browsing, offering flexibility when workingwith multiple documents at once. The application has a handy code explorerthat will facilitate code search, especially functions, classes, variables and othercommands of each supported language. The program includes small wizards forcreating CSS documents and the structure of HTML documents. Theprogramme has some other powerful features like auto-completion, codehighlightingin bright colours, syntax correction, and the ability to visualize your own projects within the editor.

The scripting language selected to accomplish actualize the project is PERSONAL HOMEPAGE PREPROCESSOR popularly known as PHP. This choice was informed by the following features of the PHP scripting language:

i. It is Open Source, and closely integrated with MySQL database

ii. It has an inbuilt XML parser.

iii. It is light weight and does not consume much server resources to renderpage

iv. Easy syntax flow supports

Deployment Platform

The program source code is deployed on Windows 10 Operating System. The web service code and the database is deployed on XAMMP which contains both Apache server and MySQL relational database server.

4.3 Implementation Architecture

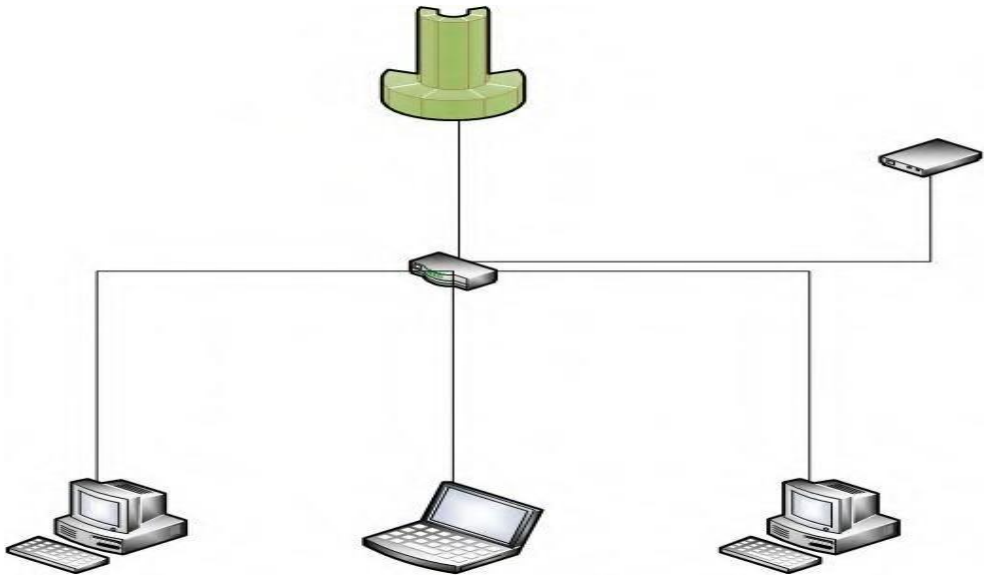

Figure 24: Implementation Architecture

In the proposed implementation architecture, the presentation layer is designed using HTML as the User Interface, the application layer is designed using PHPthat runs on the server and the data layer is designed using MySQL databaseserver (XAMPP control panel) is installed in the computer system. Also, router is use to create a network in which other computer systems can join and a modem is used to provide internet service that would facilitate the sending of notifications (SMS and Email). Thecomputer system captures users detail, allows the creation

of Exams and saves the information in the CBT System information database, where each computer system can easily access the database information.

4.4 Software Testing

The unit testing approach was adopted in testing the codes written. The procedure adopted for the unit test is;

1. The module interface is tested to ensure that information properly flows into and out of the program unit under test.
2. The local data structure is examined to ensure that data stored temporarily maintained its integrity during all steps in an algorithm's execution.
3. All the statements are executed at least once and error handling paths are tested

4.5 Documentation

Documentation is very important in the development of any software application. This is because documentation makes the software applicationeasier to all users, and if an application is not well documented it becomesdifficult to use.

Hardware Requirements

The software application designed needed the following hardware for effective operation of the newly designed system:

i. Pentium IV and above system.
ii. The Random-Access Memory (RAM) should be at least 500MB
iii. Enhanced Keyboard.
iv. At least 80GB hard Disk.
v. E.G.A/V.G.A, a coloured Monitor.
vi. An uninterruptible Power Supply (UPS) Units
vii. Voltage Stabilizer: This facilitates the regulation of voltage needed by the computer system in order to avoid electrical damage of the system.

Software Requirements

The software requirements for this system include:

i. A Windows XP/ Vista/Window 7 / 8/10 Operating System.

ii. Structured Query Language (MySQL)

iii. PHP console

iv. HTML

v. Apache server

CHAPTER FIVE: SUMMARY AND CONCLUSION

5.1 Summary

In this paper, a CBT system is developed and proposed for adoption in Cisco Networking Academy – Prof. Iya Ababukar CRC, study centre. The information system is an examination system that delivers questions set by the Instructor to the student; generates and send the report of the results of students who take the examination via an Email and SMS platform. Challenges including examination malpractices, delay or postponements of assessments due to maintenance processes, and regular subscription of internet data access by students will automatically be eliminated following the adoption of this system. The cost implication of conducting a mass-driven examination which will incurred extensive internet usage via the existing system will drastically and significantly reduced as there will be no need to access online questions anymore.

The system is designed using Object Oriented Analysis and Design and Unified Modelling Language was used to bring the view to real life situation. Top down approach was adopted as the implementation approach for this project research. This involves breaking complex system into subsystems and then into modules for easy study and understanding. The system architecture is basically divided into three basic parts. The first is the front end that shows the user interface designed with PHP, HTML and JavaScript, the back end which hold the database server and different tables, at the middle is the internet Information Service or application server using the Apache server; which provides the connectivity between the front end and the back end. The user interfaces are interactive and provisions are made for security of data stored. The use of the system is relatively simple and the I.T knowledge requirement for its usage is relatively minimal.

The system is reusable, meaning that it can be further expanded or more other features can still be added into the system to strengthen and better the system.

5.2 Conclusion

Having developed the computer based examination system, it is subjected to modification on its features as time goes on. This system through its interactive interface can minimize the internet usage of Cisco Networking Academy Centres, save cost for students as there is no need for regular data purchase, and rescheduling of examinations due to occurrence of downtime in the current system. This is a very creative web-based application that can store the record of each student and it can also be recall when necessary reference is needed. As a result of the multifactor authentication feature of the system, the system can guarantee that the right student would have access to the system and take an assessment.

5.3 Recommendations

The author wishes to make the following recommendation:

i. Review the scope so as to widen the present study to ensure improvement in the existing.

ii. Implementation of the system because its effectiveness can go a long way towards improving of the credibility of the Cisco Networking Academy Training Courses.

iii. Other Cisco Networking Academy Training Centres can adopt and modify the system since it was found to be cost effective.

References

Akinsanmi O.A, Olatunji, T.R., &Soroyewun, M.B. (2010). Development of an E-AssessmentPlatform for Nigerian Universities, *Research Journal Applied Sciences, Engineering and Technology*; 2(2): 170-175, ISSN: 2040-7467.

Alabi, A. T., Isaa, A. O., & Oyekunle R. A., (2012). The Use of Computer Based Testing Method for the Conduct ofExaminations at the University of Ilorin, *International Journal of Learning & Development*, ISSN 2164-4063 (2012);Vol. 2, No. 3.

Al-Bayati, M.A., &Hussein, K.Q. (2008). "Generic Software of e-Exam Package for Hearing Impaired Persons (Mathematics as Case Study)", 2nd Conference on Planning & Development of Education and Scientific Research in the Arab States, page 955-962.

Ayo C. K. (2007). The Prospects of e-Examination Implementation in Nigeria. Turkish Online *Journal of Distance Education-TOJDE*2007; 8: Article 10.

Ayo C. K., Akinyemi I.O., Adebiyi, A.A., and Ekong, U.O. (2007). The Prospects of E-ExaminationImplementation in Nigeria, Department of Computer and Information Sciences,Covenant University, Ota, NIGERIA. *Turkish Online Journal of Distance Education-TOJDE,* October 2007. ISSN 1302-6488; Vol 8, No. 4(10), 125-135.

Bobiles, K. (2016). CCNA Routing and Switching Refresh [News Blog Post]. Retrieved from https://learningnetwork.cisco.com/blogs/community_cafe/2016/10/20/ccna-refresh

Bodmann, S. M. &Robinson, D. H. (2004). Speed and Performance Differences among Computer-Based and Paper-Pencil Tests. *Journal of Educational Computing Research*, 31(1), 51 – 60.

Cisco Technology News Site. (2013). *Cisco Evolves Associate-Level Certifications, Redesigns CCNA Routing and Switching Certification to Support Next-Generation Job Roles* [Press release]. (2013, March 26).Retrieved October 21, 2016.

Clariana, R., and Wallace, P. (2002). Paper-Based Versus Computer-Based Assessment: Key Factors Associated with the Test Mode Effect.*British Journal of Educational Technology,* 33 (5): 593-602.

Gary, V. M., Jones, P., McNeil, H.P., &Kumar, R.K. (2008). Integrated Online Formative Assessments in the Biomedical Sciences for Medical Students: Benefits for Learning, BMC Med Educ, 8:52.

Havens, A. (2002). *Examinations and Learning: An Activity – Theoretical Analysis of the Relationship between Assessment and Learning*. Retrieved October 20, 2016 fromhttp://www.leeds.ac.uk/educol/documents/00002238.html

He, L. (2006). "A novel web-based educational assessment system with Bloom's Taxonomy",Current Developments in Technology-Assisted Education. 1861-1865.

Huszti, A.,&Petho, A. (2008). “A Secure Electronic Exam System”, Informatika a felsőoktatásban. 1-7.

Ipaye, B. (2009). “E-Learning in a Nigerian Open University”, National Open University of Nigeria. 1-11.

Jim, R. & Sean, M. (2006). Literature Reviews of E-assessment, Futurelab Series,Report 10: Retrieved from http://hal.archives-ouvertes.fr/docs/00/19/04/40/PDF/ridgway-j-2004-r10.pdf

Karadeniz, S. (2009). The Impacts of Paper, Web and Mobile Based Assessment on Students’ Achievement andPerceptions.*Scientific Research and Essay,* 4(10): 984 – 991. Retrieved December 15, 2016 fromhttp://www.academicjournals.org/sre

Levy, Y.,&Ramim, M.M.(2007). “A Theoretical Approach for BiometricsAuthentication of E-Exams”, Nova Southeastern University, USA. 93-101.

Lynch, E. (1997). Equivalence of Computer Versus Paper-and-Pencil Academic Testing in AnIntroductory PsychologyCourse (Doctoral dissertation, Arizona State University). *Dissertation Abstracts, 58-03A,* 0833.

Marson, B. J., Patry, M., & Berstein, D. J. (2001). An Examination of the Equivalence Between Non-Adaptive ComputerBased and Traditional Testing. *Journal of Educational Computing Research, 24*(1), 29–39. doi:10.2190/9EPM-B14RXQWT-WVNL

Rashid, N.B.A., Majid, O.M., &Yen, C.S. (2002). “E-LearningManagement System for SecondarySchool in Malaysia”, International ConferenceonTheChallenge of Learning&Teachingin a BraveNew World: Issues& opportunitiesin BorderlessEducation. The JB Hotel, Hatyai, Thailand. 1-10.

Rehmani, A. (2003). *Impact of Public Examination System on Teaching and Learning in Pakistan.* Retrieved November 10, 2016 from http://www.aku.edu/AKUEB/pdfs/pubexam.pdf

Schramm,T. (2008), “E-Assessments and E-Exams for Geomatics Studies”, Department of Geomatics Hafen City University Hamburg Hebebrandstraße 1,22297 Hamburg, Germany.

Shah, J. H. (2002). *Validity and Credibility of Public Examinations in Pakistan*. An Unpublished Thesis Submitted for the Degree of Ph. D., in the Department of Education, Islamia University Bahawalpur, Pakistan.

Zhenming, Y., Liang, Z., & Guohua, Z. (2003), “A Novel Web-Based Online Examination System for Computer Science Education”, 33rd ASEE/IEEE Frontiers in Education Conference, S3F-7-S3F-10.

APPENDIX A

Source Codes

```
<?php
use Illuminate\Http\Request;

/*
|--------------------------------------------------------------------------
| Application Routes
|--------------------------------------------------------------------------
|
| Here is where you can register all of the routes for an application.
| It's a breeze. Simply tell Laravel the URIs it should respond to
| and give it the controller to call when that URI is requested.
|
*/

/**
 * ROOT ROUTE
 */
Route::get('/', 'EntryController@navigate');

Route::group(['middleware' => 'auth'], function () {

        Route::get('user.home', 'EntryController@dashboard');
        Route::get('user.enroll', 'EntryController@studentApplicationListing');
        Route::post('user.enroll', 'EntryController@processingapp');

        //Active Student Listing
        Route::get('user.activestudent', 'EntryController@ActiveStudentListing');

        //handle the courses
        Route::get('user.courses/{id?}', 'CourseController@courses');
        Route::post('user.courses/{id?}', 'CourseController@courses');
        Route::put('user.courses/{id?}', 'CourseController@courses');
        Route::delete('user.courses/{id?}', 'CourseController@courses');

        //Handle the exams management aspect
        Route::get('user.exams/{id?}', 'ExamController@index');
        Route::post('user.exams/{id?}', 'ExamController@store');
        Route::put('user.exams/{id?}', 'ExamController@update');
        Route::delete('user.exams/{id?}', 'ExamController@destroy');


        Route::get('user.exams.markcomplete/{id?}', 'ExamController@markcomplete');

        //Handle the exams Questions Setup management aspect
```

```
        Route::get('user.exams.setup/{id}', 'ExamQuestionController@index')->where(['id' =>
'[0-9]+']);
        Route::post('user.exams.setup/{id}', 'ExamQuestionController@store')->where(['id' =>
'[0-9]+']);
        Route::put('user.exams.setup/{id}', 'ExamQuestionController@update')->where(['id' =>
'[0-9]+']);
        Route::delete('user.exams.setup/{id}', 'ExamQuestionController@destroy')->where(['id'
=> '[0-9]+']);


        //Handle the exams  schedule  management
        Route::get('user.examshedule/{id?}', 'ExamSchedulerController@index');
        Route::post('user.examshedule/{id?}', 'ExamSchedulerController@store');
        Route::put('user.examshedule/{id?}', 'ExamSchedulerController@update');
        Route::delete('user.examshedule/{id?}', 'ExamSchedulerController@destroy');

        //Exam session id Serve Section
        Route::get('user.examshedule/generate/{id?}',
'ExamSessionController@generatePCodes');
        Route::get('user.examshedule/view/{id?}', 'ExamSessionController@viewPCodes');









        //Handle the  resources  management  aspect
        Route::get('user.resources/{id?}', 'RMgtController@index');
        Route::post('user.resources/{id?}', 'RMgtController@store');
        Route::put('user.resources/{id?}', 'RMgtController@update');
        Route::delete('user.resources/{id?}', 'RMgtController@destroy');
        Route::post('user.resources/download/{id?}', 'RMgtController@download');


        Route::get('user.verify', 'EntryController@verify');
        Route::post('user.verify', 'EntryController@verify');


        // Route::get('admin.exams', '');

        /**
         * Route to Manage Student Controller
         */
        Route::get('/profile', 'UserController@profile');
        Route::get('/profile/{id}', 'UserController@singleProfile')->where(['id' => '[0-9]+']);
        Route::get('/profiles', 'UserController@profilelisting');
});
```

```
	//Exam Serve Section USING ONLY SESSION MANAGEMENT
	Route::get('user.examsrunning/{examstring?}', 'ExamSessionController@index');

	Route::post('user.examsrunning/{examstring?}',
'ExamSessionController@processRequest');

	Route::put('user.examsrunning/{examstring?}',
'ExamSessionController@processExamsResult');

/**
 * Route to Enroll the new Student
 */
Route::post('enroll', 'ManageStudentController@enroll');
Route::get('testsms', 'ManageStudentController@testSMS');



Route::get('enroll', 'ManageStudentController@enrollGet');

Route::get('student/{id?}', function($id=0){
	echo "$id";
});

<?php

namespace App\Http\Controllers;

use Illuminate\Foundation\Bus\DispatchesJobs;
use Illuminate\Routing\Controller as BaseController;
use    Illuminate\Foundation\Validation\ValidatesRequests;
use Illuminate\Foundation\Auth\Access\AuthorizesRequests;
use Illuminate\Foundation\Auth\Access\AuthorizesResources;

class Controller extends BaseController
{
   use AuthorizesRequests, AuthorizesResources, DispatchesJobs, ValidatesRequests;
}

<?php

namespace App\Http\Controllers;

use Illuminate\Http\Request;

use App\Http\Requests;
use Auth;
use App\Course;
```

```
class CourseController extends Controller
{
        public $total_student ;
    public $total_student_count ;
    public $total_active = 0;



        function construct()
        {
                // $this->middleware($this->guestMiddleware(), ['except' => 'logout']);
                $this->middleware('auth');

                // global $total_student, $total_student_count;
                $this->total_student  =  \App\User::where('level',3)->get();
                $this->total_student_count  =  count($this->total_student);

                foreach($this->total_student as $student){
                if(\App\UserInfo::where('user_id', $student->id)->first()->status==1){
                        $this->total_active++;
                }
        }
        }

    /**
     * Courses to manage/create and view of courses
     */
    public function courses(Request $request, $id=0)
    {

        $request->session()->forget('flash_message');

        if($request->isMethod('post')){

                $this->validate($request,[
                'coursename' => 'required|max:255',
        'lecturer' => 'required|max:255',
        'description' => 'required|min:6',
                ]);

                $courseName = $request->input('coursename');
                $courseLecturer = $request->input('lecturer');
                $courseDescription = $request->input('description');

                Course::create([
                        'coursename' => $courseName,
                        'lecturer' => $courseLecturer,
                        'description' => $courseDescription,
                        'user_id' => Auth::user()->id,
                        ]);
```

```
            $request->session()->put('flash_message', 'Course Created Successfully');
        }

        if($request->isMethod('put')){

            $this->validate($request,[
            'coursename' => 'required|max:255',
        'lecturer' => 'required|max:255',
        'description' => 'required|min:6',
            ]);

            $courseName = $request->input('coursename');
            $courseLecturer = $request->input('lecturer');
            $courseDescription = $request->input('description');
            $courseId = $request->input('courseid');

            $thisCourse = Course::find($courseId);

            $thisCourse->coursename = $courseName;
            $thisCourse->lecturer = $courseLecturer;
            $thisCourse->description = $courseDescription;
            $thisCourse->save();

            $request->session()->put('flash_message', 'Course Updated Successfully');
        }

        if($request->isMethod('delete')){
            $courseId = $request->input('courseid');
            $thisCourse = Course::find($courseId);
            $thisCourse->delete();
            $request->session()->put('flash_message', 'Course Deleted Successfully');
        }

        // get all courses
        $allCourses = Course::all();

        if($id>0){

            $thisCourse = Course::find($id);

            return view('user.courses', ['user'=>Auth::user()])->with('userpassport',
Auth::user()->getInfo()->photo)
                    ->with('total_active_student', $this->total_active)
                    ->with('total_student', $this->total_student_count)->with('all_course',
$allCourses)->with('current_course', $thisCourse);
        }else{

        return view('user.courses', ['user'=>Auth::user()])->with('userpassport', Auth::user()-
>getInfo()->photo)
```

```
                        ->with('total_active_student', $this->total_active)
                        ->with('all_course', $allCourses)->with('total_student', $this-
>total_student_count);
            }
    }


}

<?php

namespace App\Http\Controllers;

use Illuminate\Http\Request;

use App\Http\Requests;
use Auth;

class EntryController extends Controller
{

        function construct()
        {
                // $this->middleware($this->guestMiddleware(), ['except' => 'logout']);
                // $this->middleware('auth');
        }

    /**
     * This method checks if the user is authenticated and determine if to  allow
     * @return Mixed [Nothing if its not authenticated, redirects to verification page if not
verified]
     */
    public function checkEntryNavigation($request = null)
    {
        // dd($request->requestUri);
        if(Auth::check()){

            $this_user = Auth::user();

            // If student
            if($this_user->level == 3){
                // var_dump($this_user->getInfo())
                if($this_user->getInfo()->status == 4){

                    return 'user.verify';
                    // dd($this_user->getInfo()->regno.' || YES HERE');
                }
            }

            return 'user.home';
```

```
        }

        return 'welcomeindex';
    }

    /**
     * [navigate description]
     * @param Request $request [description]
     * @return [type]          [description]
     */
    public function navigate(Request $request)
    {
            $result = $this->checkEntryNavigation($request);

        // dd($result);

        if($result == 'user.verify' || $result == 'user.home'){


            return redirect($result);
        }
        else{
           return view($result);//welcomeindex in this case
        }
    } // End of method navigate

    /**
     * Approves the Student
     * @param Request $request [description]
     * @return [type]          [description]
     */
    public function processingapp(Request $request)
    {
        $user_id = $request->input('user_id');
        $this_user = \App\User::find($user_id);
        $this_user_info = $this_user->getInfo();

        if($this_user_info->status !=4){
            $this_user_info->status = 1;
            $this_user_info->save();
            $request->session()->put('flash_message', 'Verified Student Successfully Approved');

            return redirect('user.enroll');
        }else{
            $request->session()->put('flash_message_error', 'Only Verified Student Can Be
Approved');
            return redirect('user.enroll');
        }
    }
```

```
    /**
     * Verfies the Student's Identity
     * @param Request $request [description]
     * @return [type]          [description]
     */
    public function verify(Request $request)
    {


        if($request->isMethod('post')){
            $ecode  = $request->input('ecode');
            $pcode  = $request->input('pcode');

            $activationcode = strtoupper("$ecode$pcode");

            // echo "ACC-ACT-CODE: " . Auth::user()->getInfo()->activationcode;
            // echo 'STR-ACT-CODE: '. $activationcode;
            // dd("CHECK");

            if(Auth::user()->getInfo()->activationcode == $activationcode){
                $user_User_info = Auth::user()->getInfo();
                $user_User_info->activationcode = null;
                $user_User_info->status = 3; // Verified But Awaiting approval by admin
                $user_User_info->save();

                $request->session()->put('flash_message', 'Successfully Verified, Continue While
Awaiting Approval');

                return redirect('user.home');

            }else{
                $request->session()->put('flash_message_error', 'ERROR: Please Re-Check And Re-
Verify');
            }
        }

        if(Auth::check()){
            if(Auth::user()->getInfo()->status == 3){
                return redirect('user.home');
            }
        }else{
            return redirect('/');
        }


        return view('user.verify', ['user'=> Auth::user()]);
    }

    /**
     * Displays the dashboard
```

```
     * @return [view] [view displaying the dashboard]
     */
    public function dashboard()
    {
        $allResource = \App\Resource::all();

        if(Auth::user()->getInfo()->status == 4){
            return redirect('user.verify');
        }

            $user_info = \App\UserInfo::where('user_id', Auth::user()->id)->where('status', '!=', 4)-
>first();
            $total_student = \App\User::where('level',3)->get();

            $total_student_count = count($total_student);
            $total_active = 0;
            foreach($total_student as $student){
                    if(\App\UserInfo::where('user_id', $student->id)->first()->status==1){
                            $total_active++;
                    }
            }

            // $total_pending_enrollment = $total_student - $total_active_student;


                return view('user.dashboard')->with('userpassport', $user_info->photo)
                            ->with('total_active_student', $total_active)
                            ->with('total_student', $total_student_count)->with('all_resource',
$allResource);

    }

    public function profile(Request $request)
    {
            return view('user.profile');
    }


    /**
     * Displays the listing of student application
     */
    public function studentApplicationListing(Request $request)
    {
        //Only allow an admin User to View this page
        if(Auth::user()->level != 1){
            return redirect('user.home');
        }

        $user_info = \App\UserInfo::where('user_id', Auth::user()->id)->first();
        $total_student = \App\User::where('level',3)->get();
```

```
    $total_student_count = count($total_student);
    $total_active = 0;
    foreach($total_student as $student){
        if(\App\UserInfo::where('user_id', $student->id)->first()->status==1){
            $total_active++;
        }
    }

    // $total_pending_enrollment = $total_student - $total_active_student;
        // foreach ($total_student as $studen) {
        //     var_dump($studen->name);
        // }
    // var_dump($total_student);
    // dd("CHECK");
    return view('user.studentlisting')->with('userpassport', $user_info->photo)
            ->with('total_active_student', $total_active)
            ->with('total_student', $total_student_count)
            ->with('student_users', $total_student);

}


/**
 * Displays the listing of Active student
 */
public function ActiveStudentListing(Request $request)
{
        //Only allow an admin User to View this page
    if(Auth::user()->level != 1){
                return redirect('user.home');
        }

        $user_info = \App\UserInfo::where('user_id', Auth::user()->id)->first();
        $total_student = \App\User::where('level',3)->get();

        $total_student_count = count($total_student);
        $total_active = 0;
        foreach($total_student as $student){
                if(\App\UserInfo::where('user_id', $student->id)->first()->status==1){
                        $total_active++;
                }
        }

        //get all student (user with level 3)
    $user_stud = \App\User::where('level',3)->get();
    //get all their user id in an array
    $user_stud_array =[];
    foreach ($user_stud as $each_user_stud) {
        $user_stud_array[]=$each_user_stud->id;
```

```
        }

        // get all the active student via the info table
        $active_user_stud_info_array = \App\UserInfo::where('status', 1)->whereIn('user_id',
$user_stud_array)->get();

        // get their corresponding user_id
        $active_user_stud_array =array();
        foreach ($active_user_stud_info_array as $each_value) {
           $active_user_stud_array[]=$each_value->user_id;
        }

        //retrieve all user object having those id
        $total_student = \App\User::whereIn('id',$active_user_stud_array)->get();

        // display and return the view
                return view('user.studentlisting')->with('userpassport', $user_info->photo)
                                ->with('total_active_student', $total_active)
                                ->with('total_student', $total_student_count)
                ->with('student_users', $total_student)->with('title', 'Examination Assessment System
 :: Active Student Listing')->with('changeheading', 'Active Student Listing');

    }
}
```


View publication stats