

**DESIGN AND DEVELOPMENT OF AN E-EXAM
PORTAL
(CBT)**

**(CASE STUDY OF COMPUTER SCIENCE
DEPARTMENT,
BAYELSA STATE POLYTECHNIC ALEIBIRI.)**

BY

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HND/COMP.SC/22/002

**A PROJECT SUBMITTED TO THE DEPARTMENT OF
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ABSTRACT

Today, CBT is widely recognized as one of the fastest-developing examination methods, primarily due to its inherent advantages of speed, accuracy, and enhanced security measures. The adoption of these digital assessment tools has been driven by the increasing need for more efficient and reliable examination processes in educational institutions worldwide (Terzis & Economides, 2011). The advent of computer-based testing (CBT) has revolutionized the examination process in higher education institutions worldwide. This study focuses on the design and development of an Electronic Examination (E-exam) portal for the Department of Computer Science at Bayelsa State Polytechnic Aleibiri, addressing the limitations associated with traditional paper-based examination methods. Electronic examination systems play a crucial role in modern educational institutions by leveraging Information and Communication Technology (ICT) to enhance the efficiency, accuracy, and security of the examination process. This E-exam portal aims to resolve numerous challenges inherent in manual examination procedures, offering immediate result generation with 99.9% accuracy and improved security measures. The project's primary objective is to assist the Examination Board of the Computer Science Department in organizing, conducting, and managing examinations through a reliable, fast, and durable online environment. This system addresses key issues prevalent in manual examination methods, such as delays in result processing, time-consuming question paper creation, tedious answer verification, potential record loss, and inefficient record retrieval. A significant advantage of this E-exam portal is its capacity to facilitate remote examination taking, allowing students to participate from distant locations. Furthermore, the immediate display of results post-examination helps alleviate student anxieties regarding potential marking discrepancies often associated with manual systems. Comparative analysis reveals a substantial efficiency gap between manual examination methods and the proposed online examination system, with respective margins of 70.5% and 20.5% (Tariemi, 2024). This stark contrast underscores the potential for significant improvements in examination administration through the implementation of the E-exam portal. In conclusion, this project aims to design and develop a comprehensive Electronic Examination portal that provides an intuitive interface for students to take tests and view their results instantly, using PHP, HTML, my SQL, thereby enhancing the overall examination experience and administrative efficiency within the department.

DECLARATION

I, Doutimifi Tariemi Godpower, Matriculation number HND/comp.sc/22/002 hereby declares that, the study on Design and Development of an E-Exam portal CBT (A case study of computer Science Department, Bayelsa State Polytechnic Aleibiri) is carried out by me in the department of computer Science in faculty of sciences, Bayelsa State Polytechnic Aleibiri.

Doutimifi Tariemi Godpower

(Researcher)

CERTIFICATION

This is to clarify that this project was undertaken by DOUTIMIFI, TARIEMI GODPOWER and supervised and approved as having met the requirement for the award of Higher National Diploma in the Department of computer Science, School of Applied Science, Bayelsa State Polytechnic Aleibiri.

Mr. Tarila Owoko
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Date _____

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DEDICATION

I dedicate this project to God Almighty for His provision and guidance for this project work and to my lovely Parents Mr.& Mrs. Doutimifi G.F for all their endless support and to my late Sister Doutimifi Briayelayefa you will always be in my memory.

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TABLE OF CONTENT

PRELIMINARIES:

- i. Cover Page
- ii. Title Page
- iii. Declaration
- iv. Approval Page
- v. Dedication Page
- vi. Acknowledgements Page
- vii. Abstract
- viii. Table Of Contents
- ix. List Of Tables
- x. List Of Figures

CHAPTER ONE:

- Introduction**
- a. Background to the study
 - b. Statement of the problem
 - c. Motivation for the study
 - d. Objectives of the study
 - e. Purpose of the study
 - f. Scope of the study
 - g. Significance of the study
 - h. Organization of the work
 - i. Definition of terms.

CHAPTER TWO: Literature Review

- 2.1. Review of Related literature (Sub-themes).

CHAPTER THREE: Research Methodology

- 3.1. Methodology
- 3.2. Choice of programming language
- 3.3. Requirement Analysis modeling
- 3.4. Data and process modeling
- 3.5. Design consideration (User interface design, data design and system design)
- 3.6. Design architecture/conceptual design, and detail design of the proposed system.

CHAPTER FOUR: Implementation and Evaluation

- 4.1. System hardware requirement
- 4.2. System software Requirement
- 4.3. Data Source (method of data collection)
- 4.4. Implementation procedure
- 4.5. Algorithm/Pseudo-codes
- 4.6. Sample implementation input snapshot
- 4.7. Sample implementation output snapshot
- 4.8. Evaluation of Results (Graphically or analytically)
- 4.9. Discussion of Results.

CHAPTER FOUR: Discussion and Conclusion

- 5.1. Summary of Findings
- 5.2. Conclusion
- 5.3. Limitation of the study
- 5.4. Recommendations
- 5.5. Contribution(s) to knowledge

REFERENCES (APA Style)

Appendices

CHAPTER ONE

1.0 INTRODUCTION

In the rapidly evolving landscape of educational assessment, Computer-based tests (CBTs) and Electronic Examination portals have emerged as revolutionary tools, transforming the way examinations are conducted, managed, and evaluated. This shift from traditional paper-based methods to digital platforms represents a significant advancement in educational technology, offering numerous benefits in terms of efficiency, accuracy, and security (Bennett, 2015).

Today, CBT is widely recognized as one of the fastest-developing examination methods, primarily due to its inherent advantages of speed, accuracy, and enhanced security measures. The adoption of these digital assessment tools has been driven by the increasing need for more efficient and reliable examination processes in educational institutions worldwide (Terzis & Economides, 2011).

One of the most significant advantages of CBTs is the reduced manpower required to handle examinations. Traditional paper-based exams often necessitated a large workforce for various tasks such as paper distribution, invigilation, and manual grading. In contrast, CBTs automate many of these processes, allowing institutions to allocate their human resources more efficiently (Ayo et al., 2007). This shift not only reduces the administrative burden but also minimizes the potential for human error in the examination process.

The widespread adoption of online examination systems by educational institutions has led to a dramatic reduction in the time required to compute and publish results. As noted by Fluck et al. (2009), electronic assessment systems can provide nearinstantaneous scoring for objective questions, significantly expediting

the evaluation process. This rapid turnaround not only benefits administrators but also reduces anxiety for students awaiting their results.

Another notable advantage of CBTs is the substantial reduction in paper usage. In an era of increasing environmental consciousness, the shift towards paperless examinations aligns with broader sustainability goals in education. Katz (2013) highlighted that this reduction in paper consumption not only conserves natural resources but also reduces the carbon footprint associated with the production and distribution of physical examination materials.

The importance of Electronic Examination portals and CBTs in the educational sector cannot be overstated, particularly in the context of exam preparation and administration. These digital platforms offer sophisticated tools for creating, managing, and distributing exam papers, significantly reducing the time and effort required compared to traditional methods. As Zhenming et al. (2003) demonstrated, web-based examination systems can efficiently handle various aspects of the examination process, from question bank management to exam scheduling and distribution.

Furthermore, the preparation of results reports, which traditionally required considerable time and effort when performed manually, is greatly expedited through electronic systems. Gikandi et al. (2011) emphasized that these digital platforms facilitate comprehensive data collection and analysis, enabling educators to generate detailed performance reports quickly and accurately. This efficiency not only saves time but also provides valuable insights that can inform pedagogical strategies and curriculum development.

The management of exams and dissemination of results are significantly streamlined through Electronic Examination portals. These systems offer user-friendly interfaces that allow administrators to oversee all aspects of the

examination process from a centralized platform. As noted by Jimoh et al. (2012), this centralized management approach enhances coordination and reduces the likelihood of errors or inconsistencies in exam administration.

In contrast to the efficiency of digital systems, traditional methods of exam preparation and result processing were often time-consuming and labor-intensive. Manual preparation of exam papers, physical distribution to examination centers, and hand-grading of responses required substantial time and resources. Moreover, the compilation and publication of results were prone to delays and errors, often leading to frustration for both students and educators (Patterson, 2006).

However, it is important to acknowledge that the transition to CBTs and electronic examination portals is not without challenges. Bridgeman (2009) highlighted potential technical issues such as system failures or connectivity problems that could disrupt examinations. Additionally, the digital divide remains a concern, as not all students may have equal access to the necessary technology or reliable internet connections (Wei et al., 2011). These challenges underscore the need for careful planning and implementation strategies when adopting electronic examination systems.

In conclusion, the advent of Computer-based tests and Electronic Examination portals represents a significant leap forward in educational assessment. These technologies offer numerous advantages in terms of speed, accuracy, security, and resource efficiency. As educational institutions continue to embrace these digital solutions, we can expect further innovations that will shape the future of examinations and, by extension, the broader landscape of education in the digital age. However, successful implementation requires a balanced approach that addresses potential challenges and ensures equitable access for all students.

1.1 BACKGROUND OF THE STUDY.

An Electronic Examination portal, computer-based test is a web-based application that establishes a network between institution and candidate or students (Examinee). Institute's login into the site and input questions they want in the Examination, with the help of an Admin and these questions are displayed as a test or Exam to eligible students. The answers entered by the students are then assessed and their score is calculated and saved. Then the Score can be assessed by the department to determine the total number of students that pass the Examination and evaluate their performance.

An Electronic Examinations portal, computer-based test are conducted through the internet or in an intranet within the department to test a remote candidate. Candidate is given a limited time to answer the questions and after the time expires, the question page is disabled automatically and answers is sent to the Examiner.

The main objective of an Electronic Examination portal, computer-based test is to efficiently evaluate the candidate completely through a fully automated system that does not only save lot of time but also provides fast and accurate results.

Based on this study, department of computer Science is chosen as the case study,

Examination in the department is mostly conducted manually (Traditional method).

1.2 STATEMENT OF THE PROBLEM

Majority of the departments in Bayelsa State Polytechnic are dealing with Examination setting and arrangements due to the increase of students in the institution. The manual method, that is employed by the department has some challenges.

1. Delay in releasing results
2. Examination Malpractice
3. Changing of Results
4. Making Mistakes in computing results.

There is need for a more effective system to counter these challenges.

1.3 OBJECTIVES OF STUDY

The aim of this project is to create a user friendly, secure and responsive, Computerbased application, allowing users to create, delete and update names of their students, course, questions and print results.

1.4 SIGNIFICANCE OF THE STUDY

This project will bring to light, the importance of adopting an Electronic Examination portal, computer-based test and the need for the its adoption by the department. It will help the department solve the present challenges faced in terms

of saving time and cost of printing of papers, and by providing a system that processes give the uploaded questions and grade the students.

1.5 RESEARCH SCOPE

This study covers the design and development of an Electronic Examination portal, computer-based test (CBT) for department of computer Science; showing the process from the enrollment of the candidate to result notification and true performance and recording of the displayed results.

CHAPTER TWO 2.0 LITERATURE REVIEW

2.1 ELECTRONIC EXAMINATION PORTAL, COMPUTER-BASED TEST

An Electronic Examination portal, also known as an e-examination system or online assessment platform, is a comprehensive digital solution designed to facilitate the creation, administration, and management of examinations through web-based technologies in Bayelsa State Polytechnic, Aleibiri. These systems have revolutionized traditional assessment methods, offering significant advantages in terms of efficiency, accessibility, and data management (Ayo et al., 2007).

Electronic examination portals and computer-based tests represent a significant advancement in educational assessment methodologies. By leveraging the power of the internet and modern computing technologies, these systems offer numerous benefits in terms of accessibility, efficiency, and data management. However, their implementation also requires careful consideration of potential challenges and ongoing efforts to ensure fairness and reliability in the assessment process.

As technology continues to evolve, we can expect these systems to become even more sophisticated, potentially revolutionizing not just how we conduct examinations, but also how we approach learning and assessment as a whole in the digital age.

Computer-Based Tests (CBTs), a crucial component of electronic examination portals, represent a paradigm shift in assessment methodologies. CBTs leverage digital technologies to administer tests, replacing conventional paper-and-pencil examinations with computerized versions that can be taken on various devices, including desktop computers, laptops, and in some cases, tablets or smartphones (Clariana & Wallace, 2002).

The concept of computer-based testing has its roots in the 1960s, coinciding with the development of the first computer-assisted instruction systems. However, the widespread adoption of CBTs and electronic examination portals is a more recent phenomenon, driven by advancements in internet technology, database management systems, and the increasing ubiquity of personal computing devices (Bunderson et al., 1989).

Initially, CBTs were primarily hosted on standalone personal computers (PCs) or within closed Local Area Networks (LANs). This setup limited their accessibility and scalability. As internet technologies matured and became more reliable, there was a gradual shift towards web-based testing platforms. This transition marked a significant milestone in the evolution of electronic examination systems (Bennett, 2015).

The shift from LAN-based to web-based systems has been particularly noteworthy. Terzis and Economides (2011) highlight that this transition has dramatically improved the accessibility of CBTs, allowing users to participate in examinations from virtually anywhere in the world with an internet connection. This development has broken down geographical barriers and democratized access to standardized testing.

Components of Electronic Examination Portals:

1. **User Interface:** A responsive and intuitive interface accessible via web browsers, allowing examinees to take tests from any location with internet access (Nikou & Economides, 2016).
2. **Question Bank:** A secure database storing a large pool of questions, often categorized by subject, difficulty level, and question type (Oluwatosin & Samson, 2013).

3. **Test Generator:** An algorithm-driven system that creates tests based on predefined parameters such as difficulty level, topic coverage, and time constraints (Fluck et al., 2009).
4. **Proctoring Tools:** Features to ensure the integrity of the examination process, which may include webcam monitoring, screen sharing, or AI-powered behavior analysis (Dawson, 2016).
5. **Scoring and Analysis:** Automated systems for grading objective questions and tools for analyzing test results and generating reports (Gikandi et al., 2011).
6. **Administration Panel:** A backend system for educators and administrators to manage users, create and schedule exams, and oversee the entire testing process (Jimoh et al., 2012).

Advantages of Electronic Examination Portals and CBTs:

1. **Improved Accessibility:** Examinees can take tests from any location with internet access, breaking geographical barriers (Terzis & Economides, 2011).
2. **Enhanced Security:** Digital systems offer advanced security measures like encryption and dynamic question selection, reducing the risk of cheating and question paper leaks (Oluwatosin & Samson, 2013).
3. **Immediate Feedback:** Many CBT systems provide instant scoring for objective questions, allowing students to receive immediate feedback on their performance (Nikou & Economides, 2016).

4. **Cost-Effective:** Over time, electronic systems can significantly reduce costs associated with printing, distribution, and manual grading of paper-based tests (Fluck et al., 2009).
5. **Data Analytics:** These systems facilitate the collection and analysis of comprehensive data on student performance, enabling educators to identify trends and areas for improvement (Gikandi et al., 2011).
6. **Environmental Impact:** By reducing paper usage, electronic examination systems contribute to environmental conservation efforts (Katz, 2013).

Challenges and Considerations:

While electronic examination portals and CBTs offer numerous benefits, they also present certain challenges:

1. **Technical Issues:** System failures, internet connectivity problems, or software glitches can disrupt examinations (Bridgeman, 2009).
2. **Digital Divide:** Not all students may have equal access to the necessary technology or a reliable internet connection, potentially creating inequalities (Wei et al., 2011).
3. **Security Concerns:** While digital systems offer enhanced security in many ways, they also introduce new vulnerabilities such as hacking attempts or sophisticated cheating methods (Dawson, 2016).
4. **Adaptation:** Both educators and students may require time and training to adapt to the new testing format (Jimoh et al., 2012).

5. Test Anxiety: Some students may experience increased anxiety when taking tests on a computer, potentially affecting their performance (Stowell & Bennett, 2010).

Future Trends:

As technology continues to evolve, we can expect further advancements in electronic examination portals and CBTs:

1. Adaptive Testing: Implementation of more sophisticated adaptive testing algorithms that adjust question difficulty based on the examinee's performance in real-time (van der Linden & Glas, 2010).
2. Integration of Artificial Intelligence: AI could be used for more accurate proctoring, personalized learning paths, and advanced data analytics (Luckin et al., 2016).
3. Virtual Reality (VR) and Augmented Reality (AR): These technologies could be incorporated to create more immersive and interactive assessment experiences, particularly useful for practical or skill-based examinations (Merchant et al., 2014).
4. Blockchain for Credential Verification: Blockchain technology could be used to securely store and verify academic credentials, reducing fraud and simplifying the verification process for employers and institutions (Grech & Camilleri, 2017).

2.3 GLOBAL VIEW OF AN E-EXAM PORTAL, COMPUTER-BASED TEST

(CBT)

2.3.1 Global Benefits of Exam portal.

There are a lot of benefits of using an E-Exam portal, computer-based test, some includes.

2. **Cost-effective:** Reduced costs for paper, printing, and transportation.
 - a. **Increase Reach:** Global accessibility, the students can write the Exam from anywhere at any time as it is web-based application.
 - b. **Time-Saving:** Students can see their results almost immediately after they are done with the Exam.
 - c. **Improved Security:** It helps to ensure that all the crucial Student details are well secured.
 - d. **Environmentally Friendly.**

2.3.2 Global Issues Associated With E-exam portal.

1. **No Partial Credit:** In an Online Exam there is no room for explaining the answer or getting partial credit, because the answers in the online Exams can only be right or wrong.
2. **Examination Integrity:** Cheating by the students is one of the issues that are always encounter in an online Exam. So, the chances of cheating during an online

Exam by Students are very hard to get rid of unless an invigilator is physically present monitoring the students taking the Exam.

3. **Security Risk:** Theft is another vital issue that is linked with online Examination. An unauthorized person who does not have access to the system usually hack password, emails to access information that is useful to him/her.
4. **Connectivity Issues:** Connectivity can be a serious issue of online Exam. A Student's internet connection either in a school, lab, or at home can drop at any time for different reasons. In some cases, this could cause the student to lose work or submit Exams that are incomplete.
5. **Computer hardware and software Failure:** This can be subjected to crashing in the Exam setting, so time can be wasted when computers have to restart or changed and at times Exams can be forfeited.
6. **Virus Attack:** A virus is simply a piece of code that is capable of copying itself and has a harmful effect and such as corrupting the system or destroying the vital data. There are hackers and they mainly achieve their aim through sending an infected file to a user which include an executed virus.

2.4 REVIEW OF RELATED LITERATURE

The development and implementation of electronic examination systems and computer-based tests (CBTs) have been the subject of extensive research and study in recent years. As educational institutions and assessment bodies seek to leverage

technology to improve the efficiency, security, and accessibility of examinations, numerous scholars have contributed valuable insights into this evolving field.

Bugeja (2006) highlighted both the opportunities and challenges presented by internet technologies in education. While acknowledging the vast possibilities opened up by the internet for classroom instructors, Bugeja also cautioned that technology could potentially become a barrier to teaching if not implemented thoughtfully. This dual nature of technology in education underscores the importance of careful planning and execution when developing electronic examination systems.

Connors (2007) emphasized the potential of new technologies to enhance the learning experience. According to Connors, these technologies can create a more exciting and motivating environment for students, suggesting that electronic examination systems may not only streamline the assessment process but also engage students more effectively.

A significant contribution to the field was made by Guzman and Cenejo (2005), who developed an online examination system called SIETTE (System of Intelligent Evaluation Using Tests for Tele Education). This system incorporated advanced features such as random question selection, resumption capabilities, and random question distribution. These features address key concerns in online testing, such as exam security and fairness, by reducing the likelihood of cheating through question predictability.

In the context of large-scale examinations, Ayo et al. (2007) proposed a model for electronic examinations, developed and tested at Covenant University in Nigeria. This model was specifically designed to address the challenges associated with conducting entrance examinations for Nigerian universities through the Joint Admission Matriculation Board (JAMB). The researchers found that their

electronic examination system offered significant advantages over traditional methods, particularly in terms of accuracy, security, and cleanliness of execution.

Jim and Sean (2006) explored the evolution of electronic assessment, tracing its development from internet-based e-assessments to more comprehensive online examination systems. Their work highlighted the potential for electronic examination portals to offer more diverse and accurate assessment methods compared to traditional approaches, particularly for entrance examinations and other high-stakes tests.

Patterson (2006) conducted a post-examination survey to assess student experiences with online examinations. The findings were overwhelmingly positive, with a large majority of students reporting ease of access, user-friendly interfaces, and minimal difficulties in completing comprehensive exams online. Notably, 87% of respondents supported the future use of online assessments for comprehensive exams. Patterson also found that web-based exams reduced stress for students by allowing them to choose the time and location for taking the exam. However, the study acknowledged ongoing challenges related to test item security and the need for procedures to minimize collaboration and cheating in high-stakes online examinations.

Addressing the needs of diverse learners, Al-Bayati and Hussein (2008) developed a generic software package for electronic examinations specifically oriented towards hearing-impaired (HI) persons. This innovative approach involved translating exam materials into sign language and finger spelling, demonstrating the potential for electronic examination systems to enhance accessibility and inclusivity in education.

Zhenming et al. (2003) developed a web-based examination system based on a browser/server framework, capable of conducting exams and auto-grading for both

objective questions and practical tasks such as programming and software operation. This system has been successfully applied in various educational contexts, including university courses and nationwide examinations in China, showcasing the scalability and versatility of well-designed electronic examination portals.

Kashid et al. (2002) proposed another web-based online examination system that supports various question types and can be accessed via the internet, making it suitable for both local and remote examinations. Built using open-source technologies such as AJAX, PHP, HTML, and MySQL, this system demonstrates the potential for cost-effective and flexible electronic examination solutions.

Addressing the critical issue of exam security, Levy and Tamim (2007) proposed a method integrating random fingerprint biometric user authentication during online exams. This approach aims to control cheating in e-learning environments, highlighting the ongoing efforts to enhance the integrity of electronic examinations.

In conclusion, the literature reveals a rich tapestry of research and development in the field of electronic examination systems and CBTs. From enhancing accessibility and reducing stress for students to improving security and efficiency in large-scale assessments, these technologies offer significant advantages over traditional examination methods. However, challenges remain, particularly in the areas of test security and cheating prevention. As technology continues to evolve, future research will likely focus on addressing these challenges while further improving the user experience and educational outcomes associated with electronic examinations.

2.5 HISTORY OF BAYELSA STATE POLYTECHNI. (case study)

The Bayelsa State Polytechnic Aleibiri, was established in 2014 by the Bayelsa State Government through the Bayelsa State Polytechnic establishment law,2014.

The Law was passed by the state House of Assembly and assented to by the Executive governor of the State, His Excellency (Hon) Henry Seriake Dickson on the 30th day of April, 2014. The Bayelsa State Polytechnic Amendment law, 2018 was also amended and enacted by the State House of Assembly and signed into Law on 2th August 2018.

The Polytechnic was setup primarily to produce middle and higher-level technical manpower for the nation's economy. The institution provides courses of instruction, research and training in science, commerce and management, engineering and in other such fields of applied learning relevant to the industrial development of the state and Nigeria in area of industrial, Agricultural production. The Polytechnic currently has the following schools and departments.

1. School of Commerce and Managements.

Departments:

Accountancy

Mass communication

2. School of Engineering Technology.

Departments:

Computer Engineering Technology.

Electrical/Electronic Engineering Technology.

3. School of Applied sciences.

Departments:

Computer science

Statistics.

4. School of Foundation Studies.

Departments:

General Studies.

Law.

Interim joint Matriculation Board (IJMB).

Institute of continuing Education (ICE) SSCE/GCE.

5. Other Academic Units.

Entrepreneurship development center.

Students Industrial Work Experience.

Academic planning/Quality Assurance units.

All complete programs have been fully accredited by the National Board for Technical Education (NBTE) The institution has a Library that provides reading materials and space for students and staff and conserves information to support the Academic and research programs of the Polytechnic, this Polytechnic is one of the few Tertiary institutions in Nigeria with a functional e-library.

CHAPTER THREE 3.0 SYSTEM ANALYSIS AND DESIGN

3.1 METHODOLOGY OF THE STUDY:

The method used in this project is the Waterfall model. The computer-based test (CBT) design was presented using; Use case diagrams architectural diagrams and data flow diagram. The design was based on the user's and system requirements of the cbt. 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 function. The data flow diagram illustrated in figure 1 shows the relationship among the entities in the computer-based test (Cbt) system. The entity "STUDENT" can take Examination after he or she gain access to the system. The "ADMINISTRATOR" can upload questions to he answered by the student into CBT database using any Preferred questions format, set the Examination instructions and configure the correct options or sets of options for the Questions. The entity "ADMINISTRATOR" is burdened with responsibility of inserting Students and setting the default password for the user's of the system. The Entity "DATABASE" Stores user's information, the questions, results of the Examination. The timing system logs off a student upon expiration of duration for the Examination.

3.2 METHOD OF DATA COLLECTION

The method used to achieve the development of this project work is based on the fact that must be applied to overcome the manual assessment system used by the department of computer Science, Bayelsa State Polytechnic, this type of data gathering methodology used is Observation.

Observation: is used to get a scope of work and transaction on the actual activity.

I Observed how the school activities when it comes to assessment of their students.

3.3 COMPUTER-BASED TEST (CBT), DEVELOPMENT LIFE CYCLE.

The waterfall model is a traditional (SDLC) introduced and popularized in (1970s Royce) The model has reported to achieved great success on many large projects in time past. This model was adopted for the development of this project because it ensures a linear deployment of software where the requirements specification of the software is well understood.

The requirements of CBT were well-defined and so could be easily monitored during development using the waterfall model. The model views to process of software development in five stages.

I. Requirement Analysis and Definition

II. System And Software Design

III. Implementation And Testing IV. Integration And System Testing V.
Operation Maintenance.

The activities in one phase will be completed before moving to the next phase.

3.3.1 Requirement Analysis and Definition.

The users (Students and Administrator) of the system were consulted in order to establish the goals, requirements, and services that the end-user requires and expects from the system.

This includes proper stating of the nature scope and uniqueness of the problem. The problem on which this project is based is the design and development of a computerbased test (CBT) that does not suffer the setbacks of the existing Manuel method of writing examination.

3.3.2 System and Software Design

The requirement specifications from the first phase were studied and a system design was prepared to help in specifying hardware and software requirements and also help in defining the overall system architecture. This involves the use of Data flow

Diagrams, Activity Diagram and Use Case Diagram.

3.3.3 Implementation and Testing

The phase involved the development of the system by developing the graphical user interface, implementing the model using visual studio and creating the system database using MYSQL.

3.3.4 Integration and System Testing

In this stage every unit of the program was tested and integrated as a complete system in order to ensure the system works according to required specifications.

3.3.5 Operations And Maintenance

This is final phase of development in which all necessary maintenance activities were carried out in order to see that the software continues to work even there is a new development in the future.

Figure 1: Waterfall Model for the cbt Development life cycle.

Figure 1: Activity Diagram for CBT development life cycle.

CHAPTER FOUR

4.0 DEVELOPMENT/DISCUSSION

This chapter focuses on the development of the system, the features of the implementation language used in this research work is PHP and MySQL will be discussed. The system testing, strategies, the target computer requirements are well as the software maintenance problems that would arise in the system would be discussed.

4.1 Restatement of the problem

The challenges faced with the pencil-paper test (ppt) or traditional method is over whelming, they include;

✓ Exam Malpractice ✓

Delay in Releasing Results ✓

Inaccuracy in marking.

4.2.1 Exam Malpractice

Examination Malpractice refers to any dishonest or unethical behavior by Students, teachers, or Exam officials to gain an unfair advantage in an Examination. There are different forms of Examination Malpractice;

1. **Cheating:** Using unauthorized materials or assistance during Exam.

2. **Plagiarism:** Copying someone else's work and presenting it as your own.
3. **Impersonation:** Taking an Exam on behalf of someone else.
4. **Collusion:** Joining other students to cheat.
5. **Leakage:** Distribution of Exam questions before the test.

In general, each action that will give one unfair advantage maybe considered as Examination Malpractice either inside or outside the classroom.

4.2.2 Delay in Releasing Results

Exam results for many students have been delayed because of concern over the way some final papers were marked.

Unusually, the external examiners refused to 'sign-off' the results for one particular course offered by the school, because it did not have full confidence in the manner in which the papers were marked internally by the school. These papers will now be remarked by another academic, for moderation. The results will be published after; the delay affects many graduates' students.

This Challenges do not help in the educational sector in Nigeria, Computer-based test are economical, accurate and time saving. The Department of Computer Science can adopt this system to solve challenges mentioned above.

4.3 System Transformation Plan (Process Used)

The changeover is the process whereby the new system is taken to usage. However, the type of changeover used in this research work is parallel changeover which means both Old and New Systems will run at the same time for a period of time, this will enable the identification of any errors that maybe associated with the new system and also to ensure that the system meets its requirement.

4.4 System Installation

The various operations required for the successful installation of the system and database as well as its development are explained.

4.4.1 System And Database Installation

After the system has been tested for some period of time, and found to be working smoothly as expected, the system will be ready for installation and implementation.

For the system to be install successfully the following are needed;

Computer system required for installing the New System.

- a) Minimum of windows XP or higher version OS (Operating System)
- b) The Implementation of the enhanced Online Admission System.

4.4.2 Installing the Program Folder/Files.

★ Open the directory containing the program file "cbt1"

★ Copy the entire folder to the **C/xampp/htdocs**

★ Close

4.4.3 Running the Software System

★ Open a web browser and type C: localhost/cbt1

★ The computerized System home page will automatically be displayed.

4.5 Description of Method Used

Documentation method is a secondary Method of data gathering which involves the use of handbooks, internet, journals and Projects, this method of data collection was used because it serves as a basis of reference to existing research work.

4.6 Major Finding and Solution

➤ **Internet:** Using the internet, we were able to find information relating to CBT such as what CBT is all about, statement of the problems like forms of Examination Malpractice, incidence of Exam malpractice, etc.

➤ **Past Project work:** Research were made using related project such as Design and Implementation of an online Examination system (OPOOLA,

MATTHEW,2021) where a lot cited from the project on the literature review
Chapter two.

➤ **Textbook:** Some textbooks were also used as PHP for beginners, learn
Database design in 30 days, etc.

4.7 Navigation of The System

Table 4.1: Navigation of the system

TEST	PAGE	EXPECTED	ACTUAL RESULT	COMMENT
Home page	All pages	Grant system access to user	As expected	Successful
Index	All pages	Grant system access to user	As expected	Successful
Dashboard	All pages	Grant system access to user	As expected	Successful
Register	All pages	Grant system access to user	As expected	Successful
Question	All pages	Grant system access to user	As expected	Successful
Compuer	All pages	Grant system access to user	As expected	Successful
File org.	All pages	Grant system access to user	As expected	Successful
DBMS	All pages	Grant system access to user	As expected	Successful
Result	All pages	Grant system access to user	As expected	Successful
History	All pages	Grant system access to user	As expected	Successful
High scoring	All pages	Grant system access to user	As expected	Successful
Log out	All pages	Grant system access to user	As expected	Successful

Forgot password	All pages	Grant system access to user	As expected	Successful
username	All pages	Grant system access to user	As expected	Successful
Page links	All pages	For expected page with required function/view to open	As expected	Successful

4.8 Validation of the system

Table 4.2 Validation of the System

INPUT	CONDITION	VALIDATIONS	EXPECTED RASULT	ACTUAL RESULT	COMMENT
Select list	Login/register	Login is required	Please select an item in the list	As expected	Successful
Text box 1	Enter E-mail	E-mail is required	The username or paaswod is incorrect	As expected	Successful
Text box 3	Password	Password is required	The username or paaswod is incorrect	As expected	Successful
Text box 4	Name of institution	Name of institution is required	Please fill out this field	As expected	Successful

4.9 System Test Strategies

This stage involves with testing and debugging of the programs and general processes involved in achieving the objectives of the system requirement. System testing is conducted on a complete integrated system to evaluate the system's compliance with its specified requirements. During the System testing, the focus is on the software design, behavior and even what is expected of the user. So, we can say that system testing phase are investigatory testing phase of the software development cycle.

4.10 System Requirements

It considers the requirements that must be met by the target system to enable the developed software application function as expected.

Table 4.3: Software Requirements for Target computer System

Component	Requirement
Operating system	Windows 10
Database	MySQL 5
Web server	XAMPP server

Table 4.4 Hardware Requirements

Component	Requirement
RAM	256MB of RAM
Hard disk	10GB of hard disk space
Processor	AMD 1.40GHz

4.11 Functional Requirement

Functional requirements capture what the system is expected to do or the intended services, task or functions that the system is requirement of the proposed system.

The following functional requirement of the proposed system.

1. The system is capable of allowing user to register.
2. The system enables Admin to update the question that user will do Exam on it.
3. The system will automatically display the result that student scored after the Exam.
4. The system will not allow student to start an Exam with an Email address.
5. The system allow Admin to change or add Name and password.

4.12 Non-Functional Requirements

Non-functional requirements are those requirements that are shown on the software but do not perform any operations.

1. Time

4.13 Conceptual Design of The System

The conceptual design of the E-exam portal, CBT was carried out using the activity diagram and use case diagram.

4.13.1 Use Case Diagram

The use case diagram is a UML diagram that shows the users of the System and various interaction that exists between the user and the system.

Figure 4.11.1 Use Case diagram showing the interaction between the Admin (Lecturer) and the system.

Figure 4.11.2: Use Case diagram showing the interaction between the user (Student) and the system

4.11.2 Activity Diagram for The Cbt System

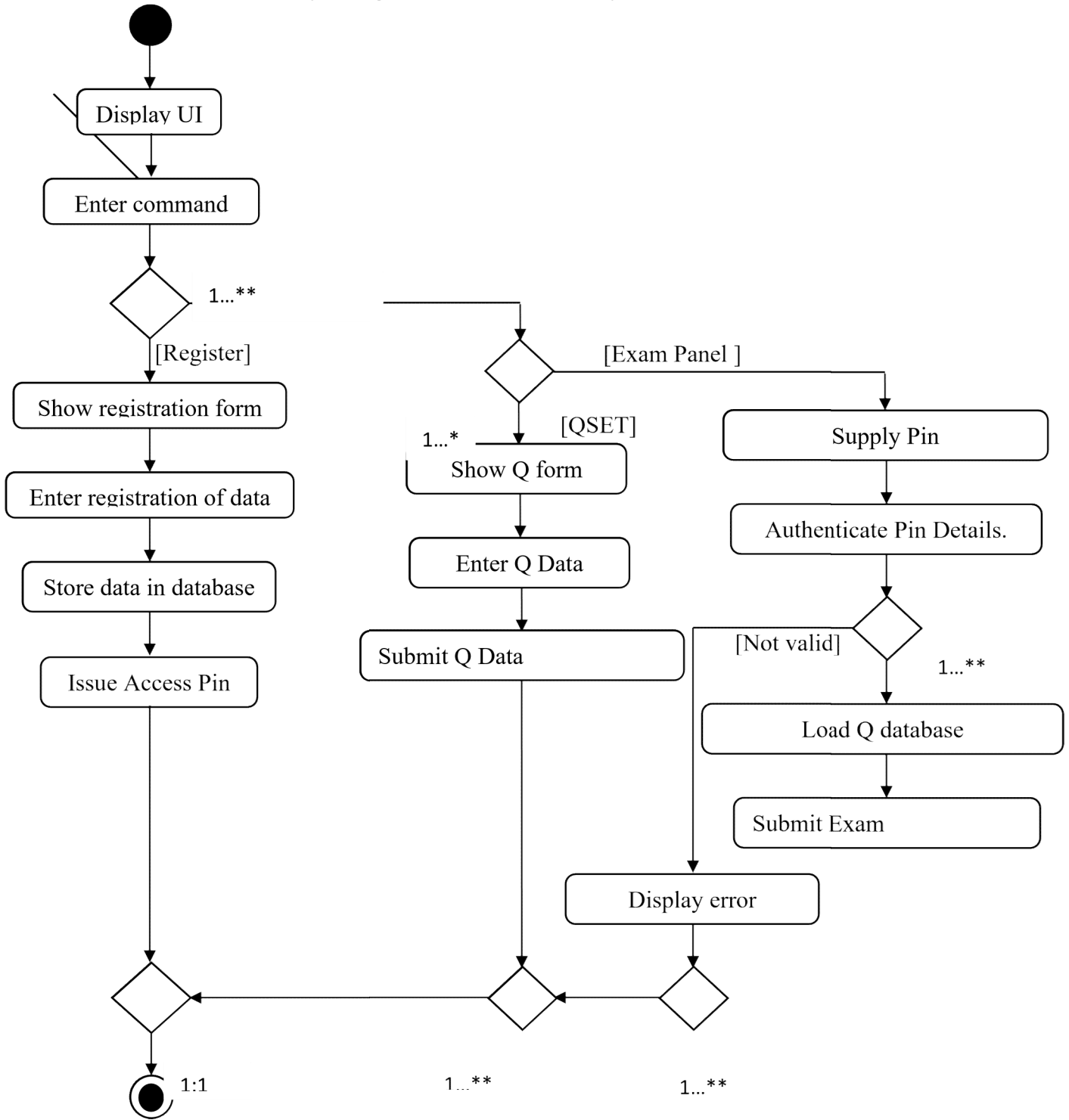


Figure 4.11.3: The Activity Diagram

The activity diagram are graphical representations of workflow depicting stepwise and actions with support for choice, iteration and concurrency. In the unified modeling language, activity diagrams can be used to describe the business and operational step by step workflow of components in a system.

4.12 Input And Output of The System

The programming language used in the department of this project are Hypertext preprocessor (PHP) and MySQL and HTML languages.

❖ PHP is general purpose server-side scripting language originally designed for web development to produce dynamic web pages. The following features makes PHP a prepared implementation language for this project.

- PHP has a root in C and C++.
- PHP can run on both UNIX and Windows. Hence it is compatible across various operating systems.
- PHP has powerful output buffering that further increase over the output.
- PHP can be used with large number of relational database management systems, runs on all of the most popular web servers and it is available to many different operating systems.

- PHP is fully an object-oriented programming language and its platform independence and speed on LINUX Servers help to build large and complex web applications.

❖ MySQL is relational database management system written in C and C++ that runs as a server providing multi user access to a number of databases. MySQL is used basically to create a relational database structure on server in order to store data or automate procedures. The following features makes MySQL also a preferred implementation language in this research work.

- MySQL is designed to make it relatively easy to add other storage engines. This is useful if you want to provide an SQL interface for an in-house database.
- It provides transactional and non-transactional storage engines, used very fast B-tree disk tables with index compression and a fast thread -based memory allocation system.
- It provides the server as a separate program for use in a client/server networked environment and as a library that can be embedded (linked) into stand- alone applications, such applications can be used in isolation or in environments where no network is available.

4.13 Database Design

The proposed system makes use of a relational database to store and maintain records.

The database consists of five (5) relational tables discussed below:

USERS

FIELD	DATA TYPE	DESCRIPTION
E-mail	Int (50)	ID auto-increment
username	Varchar (50)	Username
Password	Varchar (50)	Password
Status	int (25)	Exam status

ANSWER KEY

FIELD	DATA TYPE	DESCRIPTION
Id	Int (50)	ID auto-increment
A1	Varchar (50)	OPTION 1
A2	Varchar (50)	Option2
A3	Varchar (50)	Option3
A4	Varchar (50)	Option4
Q set	Text	

EXAMS

FIELD	DATA TYPE	DESCRIPTION
ID	INT (50)	AUTO_INCREMENT FIELD
NAME	Varchar (50)	Full name
Score	Varchar (50)	Exams score
Passcode	Varchar (50)	Access code

QUESTION

FIELD	DATA TYPE	DESCRIPTION
ID	Int (11)	Auto_Increment
Question	Varchar (500)	Question set
A	Varchar (123)	Option one
B	Varchar (123)	Option two
C	Varchar (123)	Option three
D	Varchar (123)	Option four
Num assign	Int (20)	Question number assign
Qset	Text	Exam name/type
Answer key	Text	Answer set for option

CODES

FIELD	DATA TYPE	DESCRIPTION
Id	Int (50)	ID auto-increment
name	Varchar (50)	Full name
Passcode	Varchar (10)	Passcode
Validity	int (5)	Validity
Qset	Text	Question set type

4.14 Design (Screen Short of the pages with Explanation)

Implementation of the interfaces entails the process of translating detailed plans of the developed system into an actual operation. It deals with setting developed system into a functioning mode and implementing the procedure of converting the existing system of operation into the newly developed system. The newly developed system consists of the following interfaces.



The screenshot displays the login interface for the Bayelsa State Polytechnic Online (CBT) Exam Portal. At the top left is the institution's logo. Below it, the text "Bayelsa State Polytechnic Online(CBT) Exam Portal" is centered. The login form has a blue header with the text "Log In". A pink instruction box reads "Enter email, pasword and select user type to login." Below this are two input fields: "email" with a person icon and "password" with a lock icon. Underneath the password field are radio buttons for "User Type" with options "Administrator" and "User". A blue "Login" button is positioned at the bottom left of the form.

Figure 4.1 Homepage

This interface above shows the home page or login page of the E-exam portal, CBT

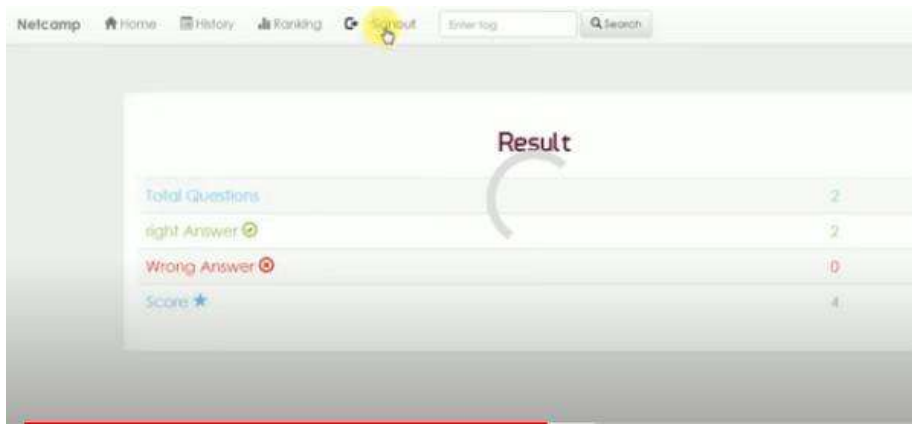


Figure 4.2 Users Result

The interface above shows all the users total answered questions in the exam



Figure 4.3 Ranking

This interface above shows all the users that scored based on ranking.

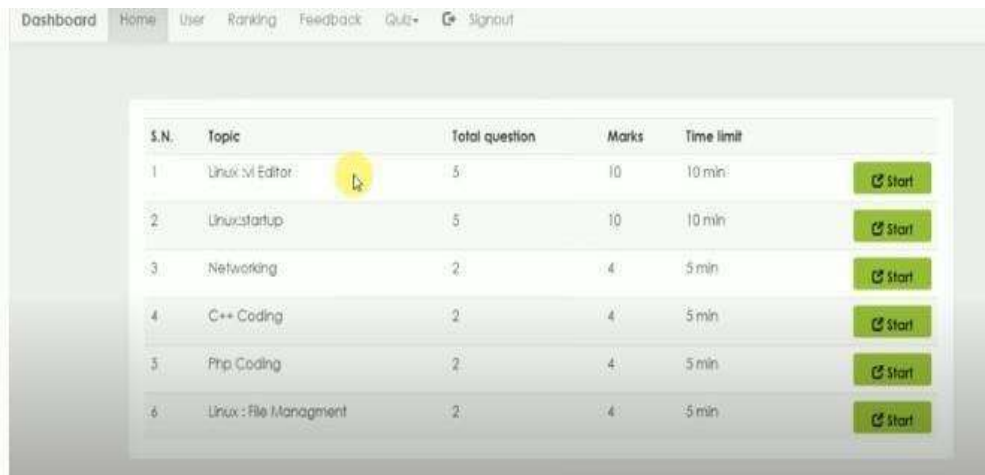


Figure 4.4 Selecting Course

The interface above shows where the user will take the courses one after the other and start exam.

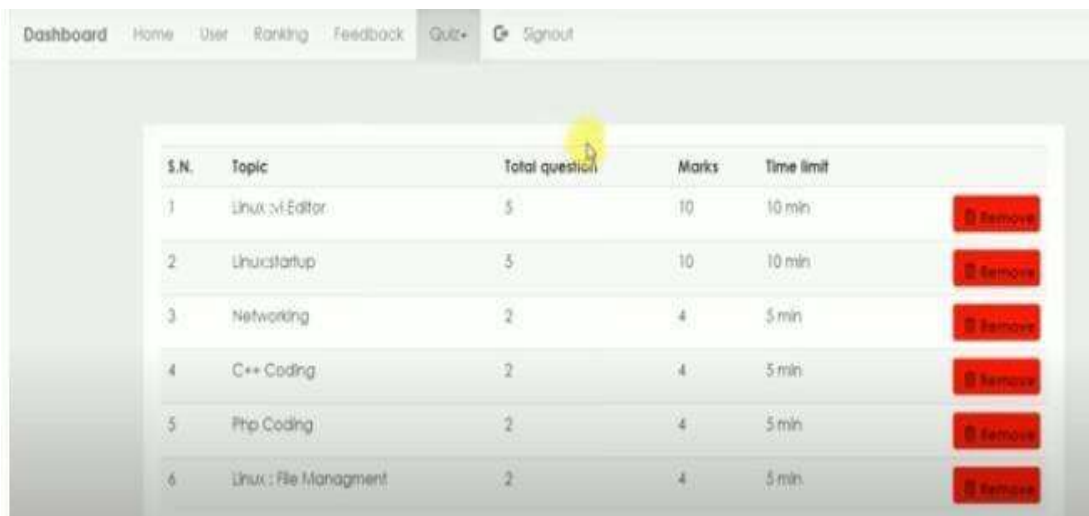


Figure 4.5 Delete Exam

This interface above shows where Admin will delete or remove the existed exam.

CHAPTER FIVE RECOMMENDATIONS, SUMMARY AND CONCLUSION

5.1 SUMMARY

The research work has simply been about designing of E-EXAM PORTAL, Computer-based test (CBT) for Department of computer Science, Bayelsa State Polytechnic Aleibiri, as a case study. The advantages of a CBT database have been stated clearly which support the need for an E-Exam system.

In Summary, the Objectives of this study was to eliminate the associated with the existing Manuel system as earlier stated in the problem Definition in chapter one, with the provision of a system that is readily available, portable in terms of disk size and provide portals with ability to make entry into the system if place on server.

5.2 CONCLUSION

The proposed E-exam portal and CBT system offer a powerful solution for modernizing the examination process in educational institutions. Its user-friendly design, robust security features, and potential for future development make it an attractive option for departments and institutions looking to enhance their assessment methodologies. By addressing the challenges of implementation thoughtfully and leveraging the system's flexibility for continuous improvement, institutions can significantly enhance the efficiency, security, and effectiveness of their examination processes, ultimately contributing to improved educational outcomes.

5.3 RECOMMENDATION

1. The System is an increment one, new features can be added to make it more durable and effective, therefore the scope should be reviewed so as to improve the System to ensure improvement.
2. Other Schools and Departments can adopt and modify the System since it was found to be cost effective and accurate.
3. The system should be Implemented because its effectiveness can go a long way towards improving the credibility of the Department of computer Science,
Bayelsa State Polytechnic Aleibiri.

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Yin Xiaoling, Xia Qishou¹, Fan Xunli. Analysis and Study of Volume Pattern in Network Test System Computer

APPEX (SOURCE CODE)

```
<?php
include_once      'config/Database.php';
include_once 'class/User.php';

$databse = new Database();
$db = $databse->getConnection();

$user = new User($db);

if(!$user->loggedIn())      {
header("Location: index.php");
}
include('inc/header.php');
?>

<title>Online Exam System with PHP & MySQL</title>
<script src="js/jquery.dataTables.min.js"></script>
<script src="js/dataTables.bootstrap.min.js"></script>
<link rel="stylesheet" href="css/dataTables.bootstrap.min.css" />
<script src="js/enroll.js"></script>
<script src="js/general.js"></script>
<?php include('inc/container.php');?>
<div class="container" style="background-color:#f4f3ef;">
```

```
<h2>Online Exam System</h2>
```

```
<?php include('top_menus.php'); ?>
```

```
<br>
```

```
<h4>User List</h4>
```

```
<br>
```

```
<div>
```

```
<table id="examEnrollListing" data-exam-id="<?php echo $_GET['exam_id']; ?>" class="table table-bordered table-striped">
```

```
<thead>
```

```
<tr>
```

```
<th>Id</th>
```

```
<th>Name</th>
```

```
<th>Email</th>
```

```
<th>Gender</th>
```

```
<th>Mobile</th>
```

```
<th>Result</th>
```

```
</tr>
```

```
</thead>
```

```
</table>
```

```
</div>
```

```
<div id="userDetails" class="modal fade">
```

```
<div class="modal-dialog">
```

```
<div class="modal-content">
  <div class="modal-header">
    <button type="button" class="close" data-dismiss="modal">&times;</button>
    <h4 class="modal-title"><i class="fa fa-plus"></i> User Details</h4>
  </div>
  <div class="modal-body">
    <table id="" class="table table-bordered table-striped">
      <thead>
        <tr>
          <th>Id</th>
          <th>Name</th>
          <th>Email</th>
          <th>Gender</th>
          <th>Mobile</th>
          <th>Address</th>
          <th>Created</th>
        </tr>
      </thead>
      <tbody id="userList">
      </tbody>
    </table>
  </div>
</div> </div>
```

```
</div>
```

```
<div id="questionsModal" class="modal fade">
```

```
<div class="modal-dialog">
```

```
<form method="post" id="questionsForm">
```

```
<div class="modal-content">
```

```
<div class="modal-header">
```

```
<button type="button" class="close" data-dismiss="modal">&times;</button>
```

```
<h4 class="modal-title"><i class="fa fa-plus"></i> Edit questions</h4>
```

```
</div>
```

```
<div class="modal-body">
```

```
<div class="form-group">
```

```
<div class="row">
```

```
<label class="col-md-4 text-right">Question Title <span  
class="textdanger">*</span></label>
```

```
<div class="col-md-8">
```

```
<input type="text" name="question_title" id="question_title"  
autocomplete="off" class="form-control" />
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<div class="form-group">
```

```
<div class="row">

  <label      class="col-md-4      text-right">Option      1      <span
class="textdanger">*</span></label>

  <div class="col-md-8">

    <input      type="text"      name="option_title_1"      id="option_title_1"
autocomplete="off" class="form-control" />

  </div>
</div> </div>

<div class="form-group">

  <div class="row">

    <label      class="col-md-4      text-right">Option      2      <span
class="textdanger">*</span></label>

    <div class="col-md-8">

      <input      type="text"      name="option_title_2"      id="option_title_2"
autocomplete="off" class="form-control" />

    </div>

  </div>

</div>

<div class="form-group">

  <div class="row">

    <label      class="col-md-4      text-right">Option      3      <span
class="textdanger">*</span></label>

    <div class="col-md-8">

      <input      type="text"      name="option_title_3"      id="option_title_3"
autocomplete="off" class="form-control" />

    </div>

  </div>

</div>
```

```
</div>
```

```
</div> </div>
```

```
<div class="form-group">
```

```
<div class="row">
```

```
<label class="col-md-4 text-right">Option 4 <span class="textdanger">*</span></label>
```

```
<div class="col-md-8">
```

```
<input type="text" name="option_title_4" id="option_title_4" autocomplete="off" class="form-control" />
```

```
</div>
```

```
</div> </div>
```

```
<div class="form-group">
```

```
<div class="row">
```

```
<label class="col-md-4 text-right">Answer <span class="textdanger">*</span></label> <div class="col-md-8">
```

```
<select name="answer_option" id="answer_option" class="form-control">
```

```
<option value="">Select</option>
```

```
<option value="1">1
```

```
Option</option> <option value="2">2
```

```
Option</option> <option value="3">3
```

```
Option</option> <option value="4">4
```

```
Option</option>
```

```
</select>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<div class="modal-footer">
```

```
<input type="hidden" name="id" id="id" />
```

```
<input type="hidden" name="exam_id" id="exam_id" />
```

```
<input type="hidden" name="action" id="action" value="" />
```

```
<input type="submit" name="save" id="save" class="btn btn-info" value="Save" />
```

```
<button type="button" class="btn btn-default" data-dismiss="modal">Close</button>
```

```
</div>
```

```
</div>
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<?php include('inc/footer.php');?>
```

```
<?php include_once  
'config/Database.php'; include_once  
'class/User.php'; include_once  
'class/Exam.php';
```

```
$database = new Database();  
$db = $database->getConnection();
```

```
$user = new User($db);  
$exam = new Exam($db);
```

```
if(!$user->loggedIn()) {  
header("Location: index.php");  
}  
include('inc/header.php');  
?>
```

```
<title>Online Exam System</title> <script
src="js/jquery.dataTables.min.js"></script>

<script src="js/dataTables.bootstrap.min.js"></script>
<link rel="stylesheet" href="css/dataTables.bootstrap.min.css" />
<script src="js/user_exam.js"></script>
<script src="js/general.js"></script>
<?php include('inc/container.php');?>
<div class="container" style="background-color:#f4f3ef;">
<h2>Online Exam System</h2>
<?php include('top_menus.php'); ?>
<br>
<h4>Enroll To Exam</h4>
<br>
<div>

<div class="row">
<div class="col-md-3"></div>
<div class="col-md-6">
<select name="exam_list" id="exam_list" class="form-control input-lg">
<option value="">Select Exam</option>
<?php echo $exam->getExamList(); ?>
</select>
<br />
```

```
</div>
```

```
<span id="exam_details"></span>
```

```
<div class="col-md-3"></div>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<?php include('inc/footer.php');?>
```

```
<?php include_once
```

```
'config/Database.php'; include_once
```

```
'class/User.php';
```

```
$database = new Database();
```

```
$db = $database->getConnection();
```

```
$user = new User($db);
```

```
if(!$user->loggedIn()) {
```

```
header("Location: index.php");
```

```
}
include('inc/header.php');
?>

<title>Online Exam System</title>
<script src="js/jquery.dataTables.min.js"></script>
<script src="js/dataTables.bootstrap.min.js"></script>
<link rel="stylesheet" href="css/dataTables.bootstrap.min.css" />
<script src="js/exam.js"></script>
<script src="js/general.js"></script>
<?php include('inc/container.php');?>
<div class="container" style="background-color:#f4f3ef;">
<h2>Online Exam System</h2>
<?php include('top_menus.php'); ?>
<br>
<h4>Exam</h4>
<div>
<div class="panel-heading">
<div class="row">
<div class="col-md-10">
<h3 class="panel-title"></h3>
</div>
<div class="col-md-2" align="right">
```

```
</div>
```

```
<button type="button" id="addExam" class="btn btn-info" title="Add Exam"><span class="glyphicon glyphicon-plus"></span></button>
```

```
</div>
```

```
</div>
```

```
<table id="examListing" class="table table-bordered table-striped">
```

```
<thead>
```

```
<tr>
```

```
<th>Id</th>
```

```
<th>Exam Title</th>
```

```
<th>Duration (Minute)</th>
```

```
<th>Total Question</th>
```

```
<th>R/Q Mark</th>
```

```
<th>W/Q Mark</th>
```

```
<th>Status</th>
```

```
<th>Questions</th>
```

```
<th>Enroll Users</th>
```

```
<th></th>
```

```
<th></th>
```

```
</tr>
```

```
</thead>
```

```
</table>
```

```
</div>
```

```
<div id="examModal" class="modal fade">
```

```
<div class="modal-dialog">
```

```
<form method="post" id="examForm">
```

```
<div class="modal-content">
```

```
<div class="modal-header">
```

```
<button type="button" class="close" data-dismiss="modal">&times;</button>
```

```
<h4 class="modal-title"><i class="fa fa-plus"></i> Edit Exam</h4>
```

```
</div>
```

```
<div class="modal-body">
```

```
<div class="form-group">
```

```
<label for="project" class="control-label">Examm Title</label>
```

```
<input type="text" class="form-control" id="exam_title" name="exam_title" placeholder="Exam title" required>
```

```
</div>
```

```
<div class="form-group">
```

```
<label for="project" class="control-label">Duration</label>
```

```
<select name="exam_duration" id="exam_duration" class="form-control">
```

```
<option value="">Select</option>
```

```
<option value="1">1 Minute</option>
```

</div>

<option value="2">2 Minute</option>

<option value="3">3 Minute</option>

<option value="4">4 Minute</option>

<option value="5">5 Minute</option>

<option value="30">30 Minute</option>

```
<option value="60">1 Hour</option>
<option value="120">2 Hour</option>
<option value="180">3 Hour</option>
</select>
</div>

<div class="form-group"
<label for="project" class="control-label">Total Question</label>
<select name="total_question" id="total_question" class="form-control">
<option value="">Select</option>
<option value="1">1 Question</option>
<option value="2">2 Question</option>
<option value="3">3 Question</option>
<option value="4">4 Question</option>
<option value="5">5 Question</option>
<option value="10">10 Question</option>
<option value="25">25 Question</option>
<option value="50">50 Question</option>
<option value="100">100 Question</option>
<option value="200">200 Question</option>
<option value="300">300 Question</option>
</select>
</div>
```

```
<div class="form-group"
<label for="project" class="control-label">Marks For Right Answer</label>
<select name="marks_right_answer" id="marks_right_answer"
class="formcontrol">
<option value="">Select</option>
<option value="1">+1
Mark</option> <option value="2">+2
Mark</option> <option value="3">+3
Mark</option> <option value="4">+4
Mark</option> <option value="5">+5
Mark</option>
</select>
</div>
```

```
<div class="form-group"
<label for="project" class="control-label">Marks For Wrong
Answer</label>
<select name="marks_wrong_answer" id="marks_wrong_answer"
class="formcontrol">
<option value="">Select</option>
<option value="1">-1 Mark</option>
<option value="1.25">-1.25 Mark</option>
<option value="1.50">-1.50 Mark</option>
```

```
<option value="2">-2 Mark</option>
```

```
</select>
```

```
</div>
```

```
<div class="form-group"
```

```
<label for="status" class="control-label">Status</label>
```

```
<select name="status" id="status" class="form-control">
```

```
<option value="">Select</option>
```

```
<option value="Created">Created</option>
```

```
<option value="Pending">Pending</option>
```

```
<option value="Started">Started</option>
```

```
<option value="Completed">Completed</option>
```

```
</select>
```

```
</div>
```

```
</div>
```

```
<div class="modal-footer">
```

```
<input type="hidden" name="id" id="id" />
```

```
<input type="hidden" name="action" id="action" value="" />
```

```
<input type="submit" name="save" id="save" class="btn btn-info" value="Save" />
```

```
<button type="button" class="btn btn-default" data-dismiss="modal">Close</button>
```

```
</div>
```

</div>

</form>

</div>

</div>

</div>

<?php include('inc/footer.php');?>