**IMPLEMENTATION OF SECURE RESULT PROCESSING SYSTEM USING CLOUD COMPUTING**

**BY**

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**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background to the Study**

The advancement of cloud computing has significantly transformed data processing and storage, making it an essential technology for various sectors, including education. Secure results processing is a critical concern for academic institutions that handle sensitive student information, such as examination results, grades, and academic records. Traditional result processing methods often involve manual entry, paper-based documentation, and locally hosted software systems, which can be prone to security vulnerabilities, inefficiencies, and errors (Smith & Brown, 2022).

Cloud computing provides a scalable, cost-effective, and secure environment for processing and storing examination results. Institutions can leverage cloud-based solutions to ensure data integrity, confidentiality, and availability, reducing risks associated with unauthorized access, data breaches, and loss of records (Johnson *et al.,* 2021). Implementing a secure results processing system in cloud computing enhances automation, facilitates real-time access, and provides a centralized platform for academic institutions to manage student results efficiently.

Security in cloud computing remains a significant concern due to potential cyber threats such as hacking, data leakage, and unauthorized modifications. Therefore, adopting robust security measures such as encryption, multi-factor authentication, and role-based access control is necessary to ensure the confidentiality and integrity of academic records (Anderson & White, 2023). By integrating these security features, institutions can safeguard student data while leveraging the benefits of cloud computing.

Furthermore, the adoption of cloud-based result processing systems enhances accessibility and efficiency for both students and academic staff. Unlike traditional systems that require physical presence or on-premises infrastructure, cloud solutions enable students to access their results from anywhere, at any time, using secure login credentials. This level of convenience reduces administrative workload, minimizes delays in result dissemination, and ensures a seamless academic experience. Additionally, automated result processing eliminates human errors associated with manual data entry, leading to more accurate and reliable academic records (Williams *et al.,* 2021). Cloud-based result management systems also support interoperability, allowing seamless integration with existing institutional software, such as learning management systems and student information portals (Kumar & Lee, 2020).

In addition to improving efficiency, cloud-based result processing supports compliance with educational data protection regulations and institutional policies. Academic institutions must adhere to strict data governance frameworks to prevent unauthorized access and misuse of student records. By leveraging cloud computing, schools and universities can implement standardized security protocols, regular data backups, and real-time monitoring to detect and mitigate potential threats (El-Gazzar *et al.,* 2020). The implementation of cloud security frameworks ensures that student academic records are not only protected but also preserved in a structured and retrievable format for future reference.

Moreover, cloud computing promotes cost-effectiveness by reducing the need for expensive hardware infrastructure and minimizing the burden of maintaining on-premises data centers (Miller & Evans, 2022). With cloud-based systems, institutions can adopt a pay-as-you-go model, which allows them to scale their storage and processing capabilities based on demand. This financial flexibility enables educational institutions to allocate resources efficiently, ensuring that funds are directed toward improving academic programs and student support services (Hughes, 2019).

As cloud technology continues to evolve, its integration into academic result processing will play a crucial role in advancing digital transformation in education, ensuring transparency, security, and efficiency in academic record management. The growing adoption of artificial intelligence (AI) and machine learning (ML) in cloud-based systems further enhances result processing by enabling predictive analytics, automated grading, and personalized student feedback (Rahman *et al.,* 2023). Therefore, implementing a secure results processing system in cloud computing is not only a step toward improving academic administration but also a pathway to fostering a more technology-driven and efficient education system.

The Federal Polytechnic Mubi Staff School, like many other academic institutions, faces challenges in securely processing and managing examination results. This study aims to design and implement a secure cloud-based results processing system that mitigates security risks, improves efficiency, and ensures compliance with data protection regulations.

**1.2 Problem Statement**

Despite the increasing adoption of digital solutions in education, many institutions still rely on outdated and insecure methods for processing student results. The key challenges include:

1. The reliance on manual result processing methods increases the risk of errors, data loss, and inefficiencies.
2. Traditional systems lack robust security mechanisms, making them vulnerable to cyber threats such as unauthorized access and data breaches.
3. There is no centralized system for result processing, leading to delays and inconsistencies in the dissemination of academic records.
4. Students and staff face difficulties in accessing results remotely due to the limitations of on-premise storage systems.
5. Compliance with data protection policies is often inadequate, exposing institutions to legal and ethical risks.

Implementing a secure cloud-based results processing system can address these challenges by providing a scalable, efficient, and secure platform for managing student academic records.

**1.3 Aim and Objectives**

The aim of this study is to implement a secure results processing system using cloud computing. The specific objectives include:

1. To design a cloud-based system that ensures the secure processing and storage of student results.
2. To implement robust security measures, including encryption and multi-factor authentication, to prevent unauthorized access.
3. To develop a user-friendly interface for students and staff to access results securely.
4. To evaluate the effectiveness of the system in enhancing data security, accessibility, and processing efficiency.

**1.4 Significance of the Study**

The implementation of a secure result processing system in cloud computing provides a reliable and efficient alternative to traditional methods, significantly reducing errors and security risks. By leveraging encryption, authentication mechanisms, and secure access controls, the system ensures that student academic records remain protected from unauthorized modifications or breaches. This enhances the credibility of the grading process and eliminates common issues associated with manual result processing, such as data loss, duplication, and unauthorized access.

Moreover, the system improves accessibility by allowing students and academic staff to retrieve results remotely via a secure cloud platform. Unlike conventional methods that require physical presence or paper-based documentation, a cloud-based solution ensures that results can be accessed anytime and anywhere, enhancing convenience and efficiency. Additionally, the system enforces compliance with data protection regulations, ensuring that sensitive student records are handled securely and in accordance with institutional policies and legal standards.

Beyond security and accessibility, the proposed system contributes to the advancement of cloud computing applications in academic institutions, promoting digital transformation in education. Automating result processing tasks reduces administrative burdens, allowing academic staff to focus on more critical responsibilities such as student engagement and curriculum development. By integrating cloud technology into academic record management, institutions can streamline operations, improve efficiency, and enhance overall educational service delivery.

**1.5 Scope of the Study**

This study focuses on the design, development, and implementation of a secure cloud-based results processing system for the Federal Polytechnic Mubi. The system includes result entry, verification, storage, and retrieval functionalities. Security measures such as encryption, authentication, and access control will be integrated to ensure data protection. The study does not cover non-academic data processing or unrelated cloud computing applications.

**1.6 Definition of Some Operational Terms**

**Access Control:** A security feature that restricts access to data based on user roles and permissions (Williams *et al.,* 2021).

**Authentication:** A process that verifies the identity of users before granting access to a system (Patil *et al.,* 2024).

**Cloud Computing:** A technology that enables remote storage, processing, and management of data over the internet instead of local servers or personal computers (Miller & Evans, 2022).

**Cyber Threats:** Malicious activities aimed at compromising digital systems and data (Smith, 2023).

**Data Security:** Measures taken to protect digital data from unauthorized access, corruption, or theft (Hughes, 2019).

**Encryption:** A security technique that converts data into a coded format to prevent unauthorized access (Kim & Lee, 2021).

**Results Processing System:** A digital platform used to compute, store, and manage students' academic results (Johnson & Brown, 2022).

# CHAPTER TWO

# LITERATURE REVIEW

**2.1 Introduction**

This chapter reviews existing literature on secure result processing systems in cloud computing. It explores fundamental concepts, theoretical frameworks, related works, advantages, challenges, and security measures in cloud-based academic result processing. The review provides insights into how cloud computing enhances data security, accessibility, and efficiency while addressing potential threats and implementation challenges.

## 2.2 Concept of Cloud Computing in Academic Institutions

Cloud computing is a technology that enables on-demand access to computing resources such as storage, servers, and applications over the internet (Mell & Grance, 2011). It has revolutionized data management in various sectors, including education, by providing institutions with scalable and cost-effective solutions for handling vast amounts of academic data (Patel *et al.,* 2022). In academic institutions, cloud computing is utilized for managing student records, e-learning platforms, and result processing, ensuring seamless access to critical information for both students and faculty members (Kumar & Lee, 2020).

Cloud-based result processing systems provide institutions with an efficient means of managing and disseminating student examination results securely. Unlike traditional manual result processing methods, which are prone to errors, delays, and data loss, cloud-based systems enhance automation, accuracy, and real-time access (Williams *et al.,* 2021). These systems allow students to access their academic results from any location using secure credentials, reducing the administrative burden on staff and eliminating the need for physical result sheets (Rahman *et al.,* 2023). As cloud technology continues to evolve, its role in academic institutions is expected to expand significantly. The adoption of Artificial Intelligence (AI) and Machine Learning (ML) in cloud-based educational platforms will enhance personalized learning experiences, automate administrative processes, and improve decision-making for academic staff (Patel et al., 2022). AI-powered cloud solutions can provide intelligent tutoring systems, predictive analytics for student performance, and automated grading systems, reducing the workload on educators (Rahman *et al.,* 2023).

The integration of cloud computing with the Internet of Things (IoT) is another emerging trend in academia. IoT-enabled cloud systems can support smart classrooms, real-time student attendance tracking, and remote laboratory access, improving the overall learning experience (Hashem *et al.,* 2015). These technologies will further enhance remote learning and digital education, enabling students to access high-quality educational content from anywhere in the world. Moreover, academic institutions will increasingly adopt blockchain technology alongside cloud computing to enhance data security and transparency in result processing and credential verification (Johnson et al., 2021). Blockchain-powered cloud platforms can provide tamper-proof digital certificates and transcripts, reducing fraud and improving the credibility of academic records (El-Gazzar *et al.,* 2020). As institutions continue to embrace cloud computing, the focus will shift towards sustainable and green cloud solutions that reduce energy consumption and carbon footprints. Cloud providers are investing in eco-friendly data centers powered by renewable energy, ensuring that educational institutions can benefit from environmentally responsible computing solutions (Williams *et al.,* 2021).

## 2.2.4 Cloud Computing and Secure Academic Result Processing

Academic institutions generate large volumes of student data, including examination results, transcripts, and attendance records. Traditional result processing methods, which rely on manual data entry and paper-based documentation, are prone to errors, inefficiencies, and security risks (Smith & Brown, 2022). Cloud-based result processing systems offer a secure and efficient alternative by automating result computation, storage, and retrieval while ensuring data integrity (Johnson *et al.,* 2021). Moreover, cloud computing enables institutions to implement advanced security measures such as role-based access control (RBAC), data encryption, and audit logging to prevent unauthorized access and ensure compliance with data protection regulations (El-Gazzar *et al.,* 2020). By adopting cloud computing, academic institutions can enhance transparency, streamline administrative processes, and provide students with real-time access to their academic records.

Cloud-based result processing also facilitates scalability and flexibility, allowing institutions to efficiently manage large datasets without the constraints of physical storage infrastructure (Hashem *et al.,* 2015). As student enrollment numbers grow, cloud platforms can dynamically scale storage and processing power to accommodate increasing data volumes. Unlike traditional systems that require periodic upgrades and maintenance, cloud solutions offer automatic updates and seamless integration with other academic management systems, reducing administrative burdens (Zhang *et al.,* 2020). Another key advantage is real-time access and remote availability. Cloud-based result processing platforms allow students, faculty, and administrative staff to securely access examination results and academic records from anywhere, eliminating the need for physical visits to administrative offices (Rahman *et al.,* 2023). This level of accessibility is particularly beneficial for distance learning institutions and universities with multiple campuses, as it promotes inclusivity and enhances the overall student experience. Additionally, automated notifications can be implemented to alert students of newly released results, minimizing delays in result dissemination (Williams *et al.,* 2021).

Disaster recovery and data redundancy are also significant benefits of using cloud computing for result processing. Unlike traditional storage methods that are vulnerable to physical damage, cyberattacks, or accidental data loss, cloud-based systems employ automated backups and redundancy mechanisms to ensure data availability even in cases of unexpected failures (El-Gazzar *et al.,* 2020). Institutions can rely on cloud providers' data recovery solutions to restore lost or corrupted records, thereby enhancing data security and operational continuity (Anderson & White, 2023). Additionally, compliance with data protection regulations is a crucial factor in academic result processing. Many cloud service providers comply with international standards such as the General Data Protection Regulation (GDPR) and the Family Educational Rights and Privacy Act (FERPA), ensuring that student data is handled securely and transparently (Almorsy *et al.,* 2016). By leveraging cloud-based solutions, institutions can establish access control mechanisms, audit trails, and user authentication protocols to prevent unauthorized modifications and breaches, safeguarding the credibility of academic records (Johnson *et al.,* 2021).

Looking ahead, advancements in Artificial Intelligence (AI) and Blockchain Technology are expected to further enhance secure academic result processing in the cloud. AI-driven analytics can help detect anomalies in result processing, flagging potential errors or inconsistencies before they are finalized (Patel *et al.,* 2022). Meanwhile, blockchain technology can introduce tamper-proof ledgers for academic records, ensuring that grades and transcripts cannot be altered without authorization, thereby enhancing trust in result authenticity (Williams *et al.,* 2021).

**2.3 Theoretical Framework**

Several theories support the adoption of cloud computing for academic result processing, including the Diffusion of Innovation (DOI) Theory and the Technology Acceptance Model (TAM).

**2.3.1 Diffusion of Innovation (DOI) Theory**

Rogers' (1995) **Diffusion of Innovation (DOI) Theory** explains how new technologies spread within organizations and societies. It suggests that innovations are adopted through five stages: knowledge, persuasion, decision, implementation, and confirmation. Cloud-based result processing systems align with this theory as institutions transition from traditional manual methods to modern digital solutions. The increasing need for secure and efficient result processing has driven many educational institutions to adopt cloud technology (El-Gazzar et al., 2020).

**2.3.2 Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM), developed by Davis (1989), explains how users accept and use new technologies. The model identifies two key factors influencing adoption: perceived usefulness and perceived ease of use. Academic institutions adopt cloud-based result processing systems due to their efficiency, accessibility, and ability to reduce administrative workload. Studies have shown that institutions with well-structured cloud adoption policies experience improved data security, reduced errors, and enhanced service delivery (Johnson *et al.,* 2021).

**2.4 Related Works on Secure Result Processing in Cloud Computing**

Several studies have explored the application of cloud computing in secure academic result processing. Researchers have investigated various aspects, including security mechanisms, efficiency improvements, data integrity, and accessibility in cloud-based result management systems.

Smith and Brown (2022) examined the implementation of a secure cloud-based examination result processing system to enhance data security and minimize errors associated with manual result computation. Their study highlighted the importance of encryption and access control in preventing unauthorized alterations to student records.

Furthermore, the researchers emphasized that cloud-based result processing reduces administrative workload by automating result entry and retrieval. By implementing multi-layer encryption techniques, academic institutions can ensure that student results remain confidential and protected from cyber threats. The study also suggested that integrating biometric authentication could further enhance security and prevent unauthorized access.

Additionally, Smith and Brown (2022) noted that adopting a cloud-based system improves scalability, allowing institutions to manage increasing student populations without compromising system efficiency. Their findings suggested that real-time access to results via secure portals enables students to retrieve their grades instantly, promoting transparency and reducing disputes related to grade processing delays.

Johnson et al. (2021) proposed a cloud-based framework for academic record management, incorporating blockchain technology to ensure data integrity. Their study found that blockchain’s immutable ledger significantly reduced the risk of data tampering in cloud environments.

By utilizing a decentralized approach, blockchain technology ensures that all modifications to academic records are permanently logged and verified across multiple nodes. This prevents unauthorized alterations and provides a verifiable audit trail for educational institutions. The study highlighted that blockchain-integrated result processing improves institutional credibility and fosters trust among students and faculty members.

Additionally, Johnson et al. (2021) demonstrated that blockchain technology enables automatic verification of credentials, reducing fraud associated with fake academic certificates. The study recommended further research on integrating artificial intelligence with blockchain to detect anomalies in student records, thereby enhancing accuracy and security in academic result processing.

El-Gazzar et al. (2020) developed a role-based access control (RBAC) model for securing academic result processing in cloud computing. The study emphasized that restricting access based on user roles (students, lecturers, administrators) enhances data confidentiality and prevents unauthorized modifications.

The researchers implemented an access control system that assigned specific permissions based on institutional roles. This ensured that lecturers could input grades while students could only view their final results, preventing accidental or intentional data alterations. The study found that RBAC significantly reduced security breaches caused by misconfigured access permissions.

Moreover, the study recommended integrating two-factor authentication (2FA) with RBAC to further strengthen access control mechanisms. El-Gazzar et al. (2020) concluded that combining RBAC with encryption protocols provides a multi-layered security approach, making cloud-based result processing systems more resilient against cyber threats.

Zhang et al. (2020) investigated the scalability of cloud-based result processing systems in large universities. Their findings indicated that cloud computing provides flexible and scalable infrastructure to handle growing student populations without compromising processing speed or data security.

The study highlighted that cloud-based result processing reduces delays by enabling parallel data processing across multiple servers. This significantly improves system responsiveness during peak result release periods. Zhang et al. (2020) demonstrated that using elastic cloud resources allows institutions to scale infrastructure dynamically based on workload demands.

Furthermore, the researchers found that cloud-based result systems reduce infrastructure costs, as institutions no longer require extensive on-premises hardware. The study suggested that combining cloud computing with machine learning algorithms could enhance result prediction models, providing early academic performance insights to educators.

Rahman et al. (2023) explored how cloud computing improves result accessibility for students and faculty. The study revealed that cloud-based result systems enable real-time access, eliminating geographical barriers and reducing administrative workload.

The researchers found that cloud-based platforms provide secure result retrieval via web and mobile applications, increasing convenience for students who may be off-campus. By integrating responsive design and user-friendly interfaces, institutions can improve student engagement and ease of access to academic records.

Additionally, Rahman et al. (2023) emphasized that cloud computing supports accessibility features such as voice-based navigation and text-to-speech functionality, making result processing systems more inclusive for students with disabilities. Their study recommended continuous improvements in accessibility features to ensure equal access to academic results for all students.

Patel et al. (2022) integrated artificial intelligence (AI) with cloud-based result processing to detect anomalies and inconsistencies in academic records. Their model used machine learning algorithms to identify potential errors before result publication, improving accuracy and reliability.

The study highlighted that AI-powered result verification can automatically flag unusual grading patterns, preventing errors caused by manual data entry mistakes. By utilizing predictive analytics, academic institutions can identify students at risk of failing and provide early interventions to support academic success.

Furthermore, Patel et al. (2022) demonstrated that AI-driven result processing reduces administrative burden by automating result compilation and generating comprehensive performance reports. Their findings suggested that future research should explore the integration of AI chatbots for automated student inquiries regarding academic results.

### ****2.5 Summary of Related Works****

The reviewed studies highlight key advancements in secure result processing in cloud computing. Researchers emphasize the importance of **encryption, access control, scalability, AI-driven anomaly detection, and blockchain integration** in improving academic result security and efficiency. Future studies may focus on refining cloud security mechanisms to counter evolving cyber threats and enhance trust in cloud-based academic systems.

# CHAPTER THREE

# SYSTEM ANALYSIS AND DESIGN

## 3.1 Introduction

This chapter contains the system design, the disadvantages of the existing system, the advantages of the proposed system over the existing system, the system requirements (Hardware and Software), the design and the system architecture.

## 3.2 Disadvantages of the Existing System

While traditional manual result processing systems have been used for years in educational institutions, they come with several inefficiencies and limitations. These disadvantages are particularly evident when compared to modern cloud-based solutions.

1. **Inefficiency in Data Management:** The manual processing of student results is time-consuming and labor-intensive. It requires multiple steps, including data collection, entry, verification, and storage, which increases the workload on staff and delays the release of results.
2. **High Susceptibility to Errors:** Manual data entry is prone to human errors, such as miscalculations, incorrect data recording, and typographical mistakes. These errors can compromise the accuracy of student results, leading to disputes and potential academic setbacks.
3. **Lack of Security and Data Integrity:** The traditional system relies heavily on physical records or local storage, making it vulnerable to unauthorized access, data loss, and manipulation. There is also a risk of records being altered or tampered with, leading to concerns about result authenticity.
4. **Limited Accessibility and Scalability:** With a manual system, accessing student records requires physical presence or on-premise infrastructure. This restricts the ability of students, faculty, and administrative staff to access results remotely, making it difficult to manage large volumes of data efficiently.
5. **Lack of Transparency and Auditability:** Manual processing lacks built-in tracking mechanisms, making it difficult to audit changes or identify errors. This can lead to inconsistencies and a lack of trust in the result management process.

### ****3.3 Advantages of the Proposed System****

The introduction of a secure cloud-based result processing system offers significant improvements over traditional manual methods.

1. **Enhanced Efficiency and Automation:** The cloud-based system automates result processing tasks such as data entry, computation, storage, and retrieval, significantly reducing processing time and administrative workload.
2. **Improved Accuracy and Error Reduction:** Automated data entry and validation mechanisms help minimize human errors, ensuring that student results are calculated and stored correctly. Built-in algorithms verify data accuracy before final submission.
3. **Strengthened Security and Data Protection:** The system integrates robust security features, including encryption, multi-factor authentication, and access controls, to safeguard student data from unauthorized access, cyber threats, and data breaches.
4. **Remote Accessibility and Scalability:** A cloud-based system allows faculty and students to access results securely from any location with an internet connection. This flexibility supports institutions with multiple campuses and growing student populations.
5. **Real-Time Updates and Modification Handling:** The system provides a streamlined approach for making corrections or modifications. Changes can be tracked and approved electronically, ensuring transparency while maintaining the integrity of records.
6. **Auditability and Transparency:** With built-in logging and audit trails, the cloud-based system keeps records of every change made, ensuring accountability and preventing unauthorized modifications. This fosters trust in the result processing system.
7. **Cost-Effectiveness and Resource Optimization:** By leveraging cloud computing, institutions can reduce infrastructure costs related to data storage and maintenance while improving overall system performance.

## 3.4 Software Development Model

To ensure a systematic and structured development process, the Waterfall model is adopted for the implementation of the secure result processing system. The model follows a linear and sequential approach, consisting of the following key phases:

#### **3.4.1 Requirements Gathering and Analysis**

In this phase, the project team collaborates with stakeholders, including administrators, faculty members, and IT professionals, to define the system requirements. Key activities include:

1. Identifying pain points in the current result processing system.
2. Establishing security requirements, such as encryption and access control.
3. Defining system functionalities, including automated grading, report generation, and cloud integration.
4. Understanding compliance requirements for data protection and academic regulations.

#### **3.4.2 System Design**

Based on the gathered requirements, the system is designed with the following components:

1. **User Interface (UI):** A web-based dashboard for students, faculty, and administrators to access results securely.
2. **Database Structure:** A cloud-based database architecture designed to store student records securely while enabling efficient data retrieval.
3. **Security Framework:** Implementation of encryption protocols, authentication mechanisms, and access control to safeguard sensitive information.
4. **Result Processing Engine:** An algorithmic module responsible for automatic result computation, error validation, and report generation.
5. **Integration with Existing Systems:** The system is designed to integrate with learning management systems (LMS) and student portals for seamless data exchange.

#### **3.4.3 Implementation**

This phase involves:

1. Developing the front-end interface using web technologies (HTML, CSS, JavaScript).
2. Implementing back-end logic using secure programming frameworks such as Django, Flask (Python), or Node.js.
3. Deploying the cloud-based database on platforms such as AWS, Google Cloud, or Microsoft Azure.
4. Implementing security measures, including encryption (AES, SSL/TLS) and authentication (OAuth, Multi-Factor Authentication).

#### **3.4.4 Testing**

Before deployment, rigorous testing is conducted to ensure the system meets performance, security, and functionality standards. Testing includes:

1. **Unit Testing:** Checking individual components, such as login authentication and result computation.
2. **Integration Testing:** Verifying data flow between different system modules.
3. **Security Testing:** Assessing vulnerabilities and ensuring encryption effectiveness.
4. **User Acceptance Testing (UAT):** Allowing faculty and students to test the system and provide feedback before full deployment.

#### **3.4.5 Deployment and Maintenance**

Once testing is completed, the system is deployed to the cloud and made accessible to users. Ongoing maintenance includes:

1. **Monitoring for security threats and system performance.**
2. **Regular software updates and patches to enhance functionality.**
3. **Collecting user feedback for future improvements**



Figure 3.1: Waterfall model

## 3.5 Method of Data Collection

There are two main sources of data collection in carrying out this study, information was basically obtained from the two sources which are the primary and secondary source.

**Primary Source:** Primary source of data that will be used in this study will be personal interview and observation.

**Secondary Source:** The secondary data used in the study will be obtained from magazines, Journal, newspapers, library source and most of the information from the library research has been covered in my literature review in the previous chapter of this project.

## 3.6 System Design

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. The system design of the secure results processing system in a cloud computing environment defines the architecture, components, and security measures needed for efficient and tamper-proof academic record management. It follows a three-tier cloud-based architecture, comprising a presentation layer (user interfaces for students and faculty), an application layer (result processing, authentication, and encryption modules), and a data layer (secure cloud storage and databases).

## 3.6.1 Algorithm diagram

**Use Case Diagram**

A use case diagram at its simplest is a representation of a user’s interaction with the system and depicting the specifications of a use case. A use case diagram shows the system and the various ways that they interact with the system as shown in Figure 3.2.

**RESULT PROCESSING SYSTEM**

Login

Add Class

Add Student

Add Result

Admin

View Result

Print Result

Logout

Student

Add Subject

Figure 3.2: Use Case Diagram

## 3.6.2 System Architecture

**System Architecture** refers to the structural design of a system, defining how different components interact to achieve functionality, performance, and security. It provides a **blueprint** for organizing hardware, software, data flow, and user interactions.

**Student**

**admin**

System Database

**Result processing system**

Figure 3.3: System Architecture

## 3.6.3 Database Tables/Queries Structures

The database is used to store all information that pertain the result processing records. Below are the database table for the new system.

**Table 3.1: Admin Details**

**Top of Form**

| **Name** | **Type** | **Extra** |
| --- | --- | --- |
| id Primary | int(11 | AUTO\_INCREMENT |
| Name | varchar(50) |  |
| Password | varchar(50) |  |

**Table 3.2: Class** Top of Form

| **Name** | **Type** | **Extra** |
| --- | --- | --- |
| id Primary | int(11) | AUTO\_INCREMENT |
| Classname | varchar(250) |  |
| Section   Index | varchar(250) |  |
| Date | timestamp |  |

Bottom of Form

**Table 3.3: Subject**

Top of Form

| **Name** | **Type** | **Extra** |
| --- | --- | --- |
| id Primary | int(11) | AUTO\_INCREMENT |
| Subject title   Index | varchar(250) |  |
| Subject code | varchar(250) |  |
| Date | timestamp |  |

Bottom of Form

**Table 3.4: Result**

Top of Form

| **Name** | **Type** | **Extra** |
| --- | --- | --- |
| id Primary | int(11) | AUTO\_INCREMENT |
| Student\_Index | varchar(250) |  |
| Class\_id | varchar(250) |  |
| Subject\_id | varchar(250) |  |
| Marks | varchar(250) |  |
| Date | Time stamp |  |

**Table 3.5: Student Records**

Top of Form

| **Name** | **Type** | **Extra** |
| --- | --- | --- |
| id Primary | int(11) | AUTO\_INCREMENT |
| Student name   Index | varchar(250) |  |
| Roll ID | varchar(250) |  |
| Email | varchar(250) |  |
| Gender | varchar(250) |  |
| DOB | varchar(250) |  |
| Class\_id | varchar(250) |  |
| Status | varchar(250) |  |
| Date | Time stamp |  |

## 3.6.4 Database Entity Relationship Diagram

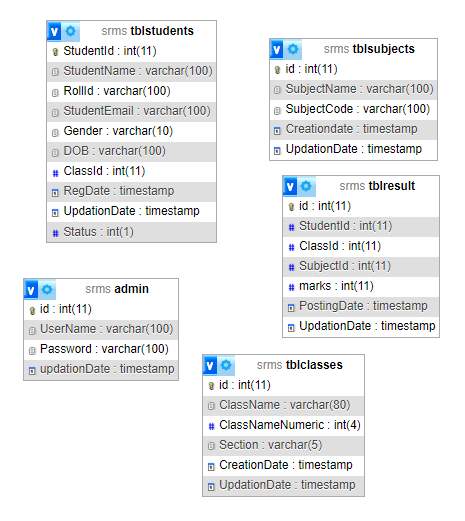


Figure 3.4: Database Entity Relationship Diagram

## 3.6.5 Input and Output Design

**ADD CLASS**

Class Name

Class Numeric value

Section

**ADD CLASS**

Figure 3.5: Add Class

**LOGIN**

**LOGIN**

**LOGIN**

Figure 3.6: Login form

**ADD SUBJECT**

Subject title

Subject code

**ADD SUBJECT**

Figure 3.7: Add Subject

**ADD RESULT**

Select Class

**ADD AREA**

Select Student

Subject 1

Subject 2

Subject 3

Marks

Marks

Marks

Subject 4

Subject 5

Subject 6

Marks

Marks

Marks

Subject 7

Subject 8

Subject 9

Marks

Marks

Marks

Figure 3.8: Add Result

**3.6.6 Report Layout**

### STUDENT RESULT DETAILS

**Student Name:** ABBAS HARUNA

**Student Roll Id:** 2025

**Student Class:** First(C)

| **#** | **Subject** | **Marks** |
| --- | --- | --- |
| **1** | English | 98 |
| **2** | Music | 88 |
| **3** | Science | 90 |
| **Total Marks** | | **276** out of **300** |
| **Percentage** | | **92 %** |
|  | | |

Figure 3.9: Student Result

## 3.7 System Requirement Specification

## 3.7.1 Hardware Requirements

The software to be design needs the following hardware for an effective operation of the newly designed system.

1. A system running on intel, P(R) duo core with higher processor
2. The-Random Access Memory (RAM) should be at least 512MB.
3. At least 20-GB hard disk.
4. A monitor.

## 3.7.2 Software Requirements

The software requirements include:

1. A window 7 or higher version of operating system.
2. XAMP or WAMP for Database
3. PHP
4. MySQL
5. Browser

## 3.7.3 Personnel Requirement

Any computer literate who has a technical knowhow of internet surfing can use the system because it is user friendly.

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