

**E-TRACK: AN INTEGRATION OF A ROLE-BASED DOCUMENT TRACKING SYSTEM WITH SECURE ACCESS CONTROL FOR ACADEMIC INSTITUTIONS****Felma F. Pamat****ORCID ID - 0009-0005-3039-6784**

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**ABSTRACT**

Effective document management today is very essential for academic institutions to securely store, retrieve and monitor records. However, several institutions still employ manual document handling processes, that lead to delays, inefficient tracking and difficulties in retrieving records. This study aimed to design, develop and evaluate A Role-Based Document Tracking System for Christ the King College de Maranding, Inc. (CKCM). In particular, the system was designed to provide centralized document management, real-time tracking, secure access control, automated notifications and efficient document archiving. The researchers used the Waterfall Software Development Life Cycle (SDLC) Model which involves phases such as requirements gathering, analysis, system design, implementation, testing, deployment and maintenance. The developed system was evaluated by faculty members, IT professionals, administrative staff, faculty, and students using ISO 9126-1 Software Quality Standard. The evaluation results showed that the system achieved excellent scores for all quality attributes: reliability (4.70), efficiency (4.57), functionality (4.51), usability (4.70), maintainability (4.60), and portability (4.62), which are interpreted as highly satisfactory. The results show that the proposed Document Tracking System enhances monitoring, accessibility, security and processing efficiency of documents in the institution. The system minimizes delays caused by manual processes while offering accurate real-time tracking and secure record management. Thus, the implementation of E-Track can greatly optimize the administrative processes and support the digital transformation initiatives of academic institutions.

**Keywords:**

Document Tracking System, ISO 9126-1 Software Quality Standard, Student Document Monitoring, Role-based, Document Management, Waterfall Model, Academic Institutions, Electronic Document Tracking

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### INTRODUCTION

Proper document management is very important for educational institutions to store, retrieve and secure academic records thoroughly. Yet, most educational institutions opted for traditional manual-based methods considering that they generate huge volumes of data. Which lead to delays, lost papers and inefficiencies in service delivery. Institutions are implementing digital technologies to speed up document processing operations to meet the increased demand for precision, transparency and accessibility in the administration of student data. Electronic records, and document management systems have become reliable tools in academic institutions to improve accountability, increase operational efficiency, and support decision-making [4], [9].

The Electronic Document Management System (EDMS) and Document Tracking System (DTS) are two technologies that have significantly enhanced the document management. These systems automate the storing, tracking, retrieving and processing of documents. Through the use of database management, cloud computing and digital record-tracking technology. It also helped in reducing manual labor and increase the effectiveness of administrative procedures with features such as real-time tracking, document classification, secure access control and automatic alerts. Recent research indicates that digital document management solutions improve organizational effectiveness, increase security and enhance record accessibility [5], [11].

Several countries have successfully implemented digital document management technologies in educational institutions. One of it is the Management Information Systems which increased the efficiency of the administration and decision-making process by providing centralized access to data and information at institutions in China [10]. Similarly, the universities in the United Arab Emirates have adopted educational management information systems to enhance operational effectiveness and information accessibility [12]. Moreover, the growing adoption of digital transformation by the Philippine institutions has also resulted to improved efficiency, security, and user satisfaction on Electronic Document Management Systems and online portals to request academic records [1], [2]. Many educational institutions, however, still engage in manual document handling which makes record administration, tracking and document retrieval more difficult.

Manual processing of documents in registrar offices often causes delays, inefficient retrieval of records and difficulty in tracking document requests, which affect the quality of administrative services extended to students and faculty members [2]. Also, ineffective document workflows and poor digitization still hinder educational institutions in processing large volumes of documents [1]. These problems underscore the importance of a more reliable and efficient method of document management. This study recommends the development of a Document Tracking System for the Registrar's Office of Christ the King College de Maranding, Inc. (CKCM) to improve document tracking, accessibility, security and the overall efficiency of operations of the institution.

### LITERATURE

Educational institutions are increasingly using Electronic Document Management System (EDMS) and Electronic Records Management System (ERMS) to better organize the documents, improve accessibility and improve their operational effectiveness. The system greatly improved the academic management, administrative processes and student services because of the centralized document storage and retrieval [1]. This finding was also supported by a study stated that EDMS enhances service delivery, strengthens accountability and ensures faster access to records [11]. Additionally, ERMS helps in improving decision making processes through efficient records management and safe information management [4]. Similarly, the adoption of ERMS is greatly affected by Training, Managerial support and organizational readiness [5]. Also, it is highlighted that the Management Information Systems improve institutional performance through the provision of academic administration and quick access to information [10]. These systems give great advantages in terms of record keeping and operational efficiency. However, some studies have identified several shortcomings of these systems, such as resistance to technology adoption, lack of user training, infrastructural limits, and issues related to data security and privacy.

There is several research on application of online document request and tracking systems in educational institutions. An online academic document request system increased the efficiency, collaboration and security of registrar transaction administration [2]. This was validated as found that online request systems offer real-time tracking, secured document delivery and compliance with ISO 25010 software quality requirements [8]. As well as the importance of digitizing student records for better accessibility and reduced processing time [9], and electronic administration systems improve communication and quality of services provided by institutions [7]. Furthermore, it is found that firms are more effective with competent leadership and resource allocation for deploying information technologies [14]. While these technological improvements to transparency, monitoring and document accessibility have been made, the research has shown that there are enduring obstacles such as

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sporadic internet connectivity, insubstantial technical assistance, problems with system integration, and limited scalability to manage the increasing volumes of records.

Technology acceptability and user behavior models also have been used to analyze the utilization of information technologies in higher education. A study revealed that the intention to utilize Educational Management Information Systems is significantly affected by features such as perceived usefulness, ease of use, trust, and task-technology fit [6]. This conclusion was confirmed as the importance of institutional trust and digital preparation in successful digital transformation efforts was highlighted [15]. Likewise, the behavioral goals and enabling circumstances significantly influence undergraduates' system usage [12]. Moreover, it was discovered that users' adoption of digital platforms is greatly affected by the performance expectancy and effort expectancy [13]. Also, a study argued that technology adoption is improved when systems are reliable, easy to use and adequate training is provided [16]. Although digital record management systems are gaining popularity, many educational institutions experience problems such as large quantities of records, inadequate monitoring methods, delays in document retrieval, and lack of real-time tracking. To fill these gaps and improve the overall efficiency of administration, the study recommends to develop and implement a Document Tracking System for the Registrar's Office of Christ the King College de Maranding (CKCM) that has centralized document management, real-time tracking, secure access controls, notification automation, and effective document retrieval.

## **OBJECTIVES**

The major purpose of this project is to design, build and assess a performance of Document Tracking System (DTS) for Christ the King College de Maranding, Inc. (CKCM). It consists of the following:

- 1) To analyze the problems and limitations of the current manual document management and tracking method in the CKCM Registrar's Office.
- 2) To create a Document Tracking System that provides centralized storage, monitoring, and management of academic and administrative documents.
- 3) To provide a system that provides real-time document tracking tools that allow users to easily track the status and location of documents.
- 4) To put in place strong access controls and data protection measures to maintain the confidentiality, integrity, and security of student records and institutional documents.
- 5) To evaluate the efficiency of the suggested Document Tracking System in enhancing the speed, accuracy and accessibility of document retrieval and processing.
- 6) To evaluate the developed system in terms of functionality, usability, reliability, security, performance efficiency, and maintainability as per the software quality requirements of ISO 9126-1.

## **METHODOLOGY**

The study's methods will be discussed in this chapter, including the research design, research environment and research respondents.

Research Design

Figure 1. Project Detailed Design

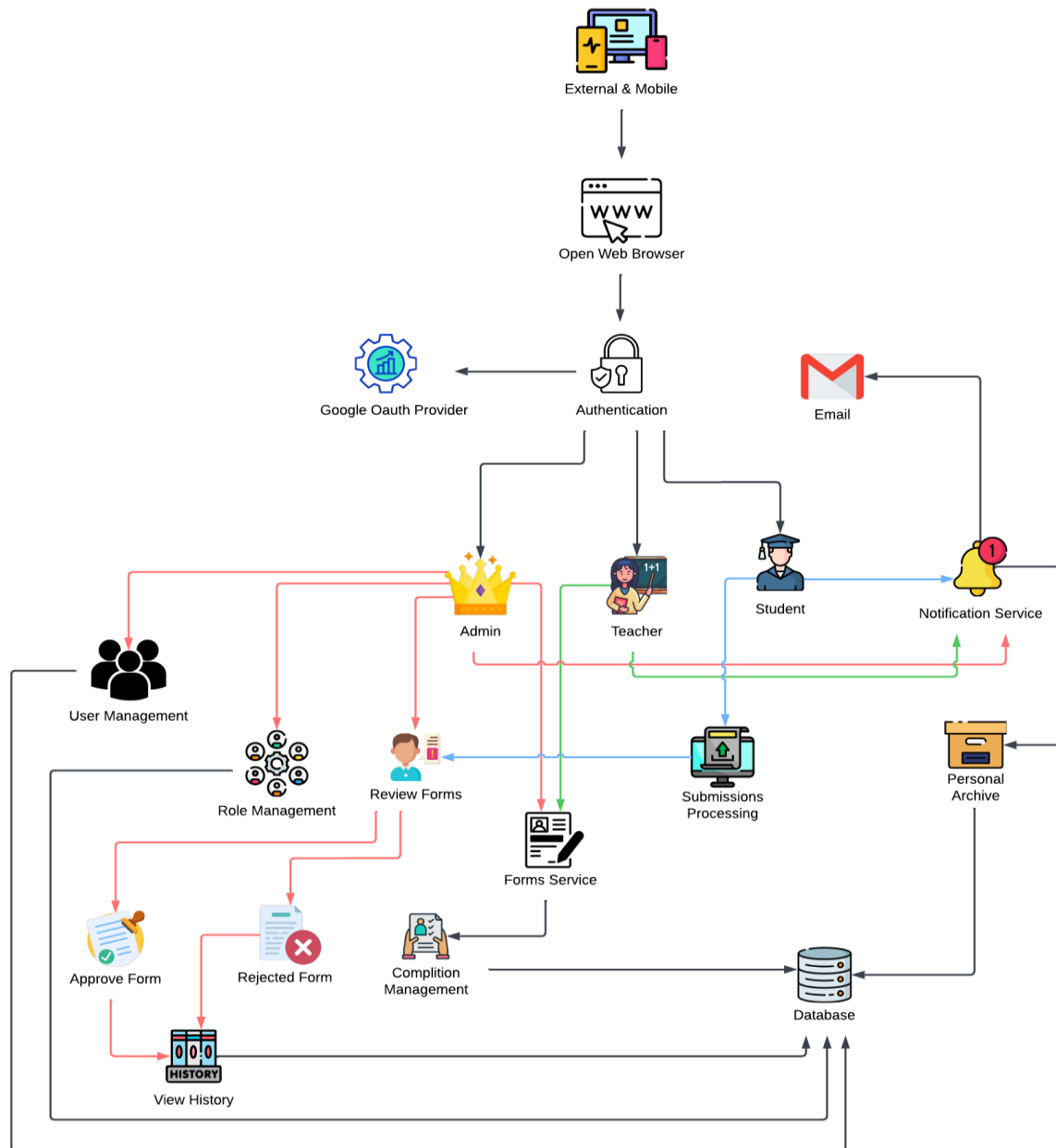
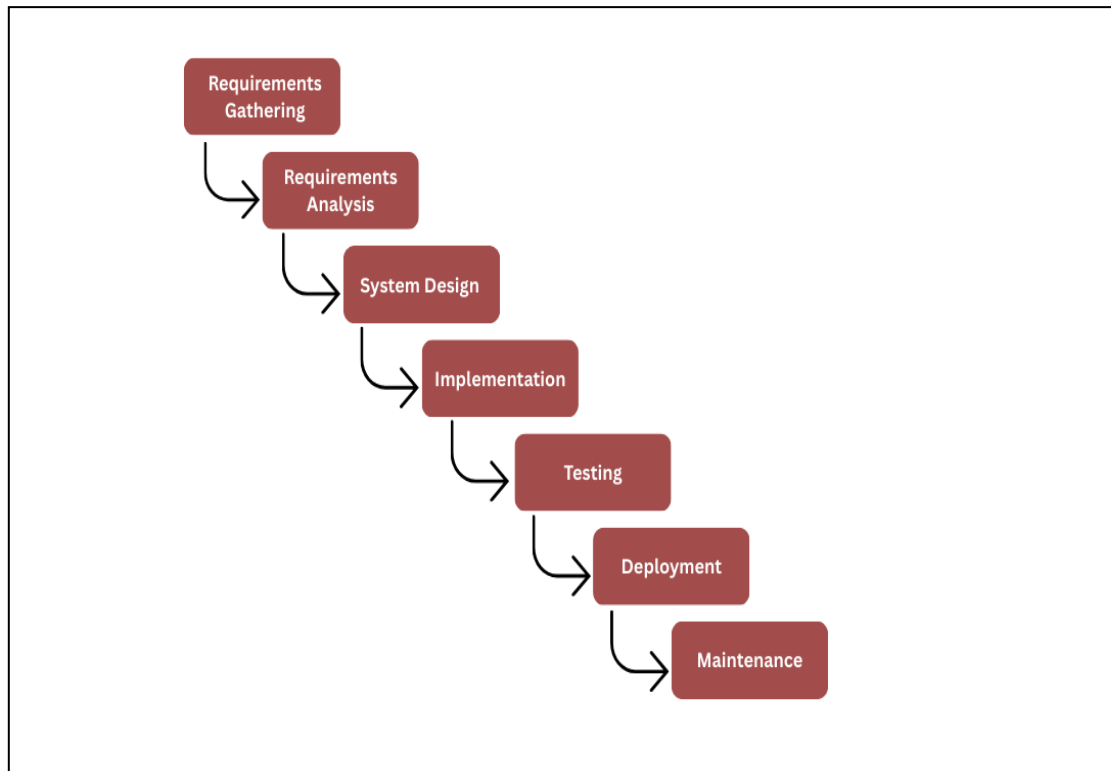


Figure 1 illustrates the detailed design of the CKCM Document Tracking System, such as interactions between user roles, services, and system components. Users access the system via web browsers on external devices or mobile platforms, beginning with authentication through the institutional email or a Google OAuth provider. During the post-authentication, users are categorized into three roles: Admin, Teacher, and Student. The Admin is responsible for user and role management, form reviews, and the ability to approve or reject submissions, with all actions logged in the history. Teachers and Students utilize the Forms Service to create, submit, and process documents, which are managed by the Submissions Processing module. The Completion Management system tracks approved or completed forms, storing them in the central database, which feeds into the Personal Archive for individual user access. The Notification Service plays a crucial role in keeping users informed about

updates, submissions, and actions needed, promoting effective communication among all stakeholders. The overall design focuses on role-based access, centralized document management, and automated notification systems for improved interaction and efficiency.

#### Architectural Design (SDLC Waterfall Model)



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and ensure systematic progression and thorough validation. Its features of precise documentation requirements and strict adherence to phase sequences perfectly match the project's demands for document workflow and security management. Clear requirement definitions underpin core functions including document release and approval; the dedicated testing phase reduces the number of bugs; efficient resource allocation improves project management performance. This also improves the teamwork and helps in long term maintenance of the system. Finally, it is able to provide the target system that is reliable and easy to use.

The system development research design, the Waterfall Model, includes:

**Requirements Gathering.** The first phase of developing the CKCM document tracking system for a university's registration office is the requirements gathering stage. Its core task is to collect and document system requirements, and align the demands of two groups of stakeholders such as academic affairs registration staff and system end users, and to address their practical challenges. Three tasks are completed within this stage: identifying user requirements, defining system functions, and delineating the project's scope and constraints. The goal of this stage is to avoid miscommunication between the supply and demand side, to direct the development work to follow and to build a suitable, user-friendly system. The core values are then realized by aligning the expectations of the user, supporting efficient resource allocation and reducing the risk of rework.

**Requirement Analysis.** This phase serves as the core foundation of the entire development workflow for the CKCM document tracking system developed in this study, that is designed for school registration offices. The core goals of this phase are to collect, analyze and document system requirements, and align those requirements with the operational needs of school registration offices. We invited all relevant stakeholders to participate in this phase, and collected information on user expectations, system constraints, and work processes via four

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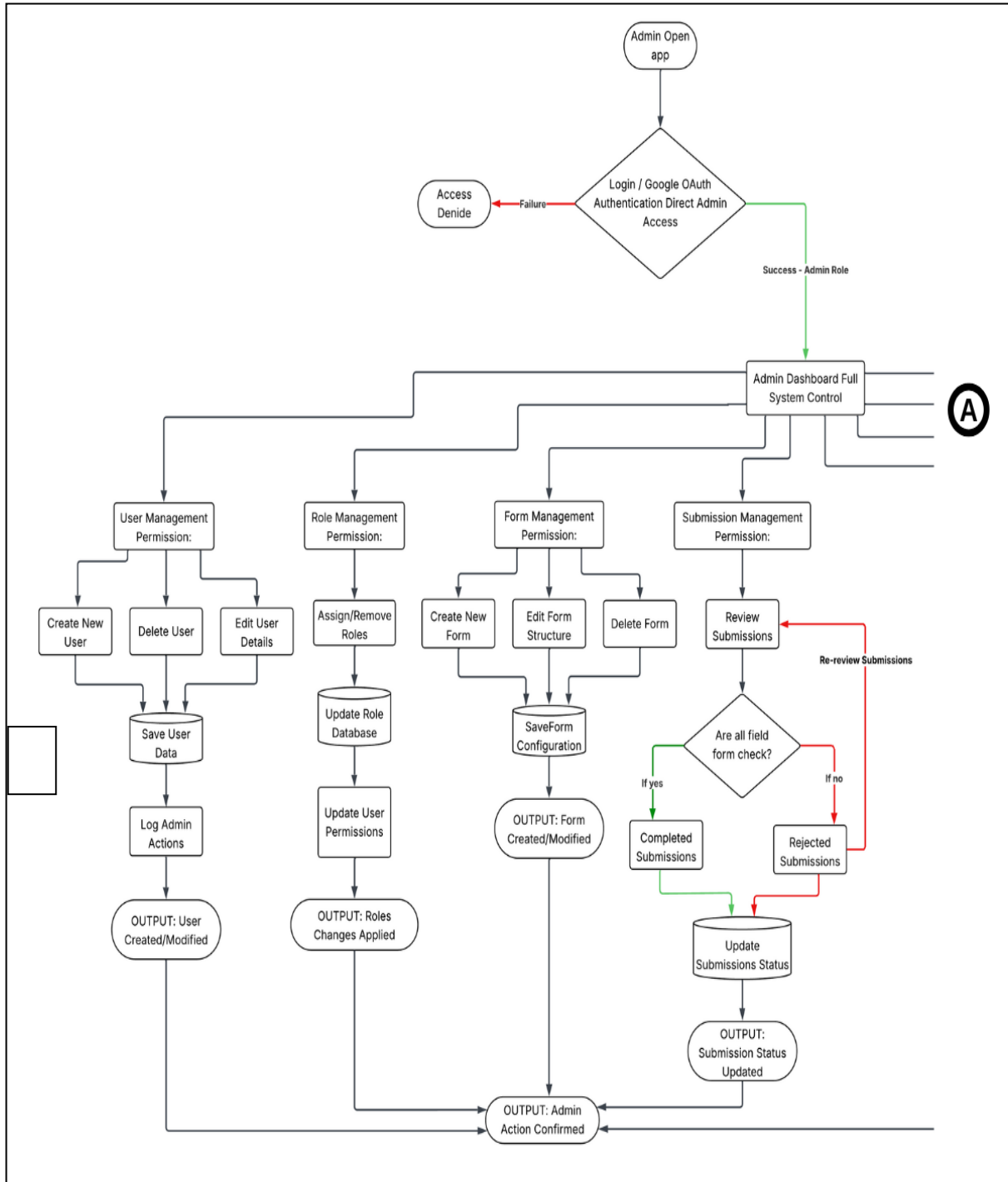
methods: interviews, surveys, on-site observations, and document reviews. We then assessed the system's feasibility, prioritized core functions, and ultimately produced a Software Requirements Specification (SRS) that lists all functional and non-functional requirements, to guide the subsequent design and implementation of the system.

The researchers have completed the software and hardware full-stack technology selection for its independently developed document tracking system. The implementation of the front end is using a responsive and easy-to-use interface with HTML, CSS and Tailwind CSS. The backend is implemented in PHP and Javascript for the basic functions of the system. MySQL is implemented by the data layer to store and manage the data. VS Code supports the entire development process, from coding to testing and maintenance. This combination of technologies makes the system efficient, reliable, easy to maintain, and flexible for iterative updates, and it can support the three core business functions of document processing, document tracking, and user management. This study first clarifies the core hardware requirements for this support system: dedicated web servers and database servers equipped with high-performance processors, sufficient RAM, and SSD storage. It then supplements a full-chain supporting guarantee scheme: network security is enabled by firewalls and VPNs; data protection relies on cloud storage with recovery options and backup servers; continuous operation is sustained by UPS and adaptive cooling systems. This configuration can not only support routine operation and maintenance, but also guarantee the system's long-term functioning. It can accommodate massive volumes of data, reduce downtime, and provide users with stable and continuous access permissions.

**System Design.** Based on the requirements gathered in the initial phase, the project team has developed the architectural design and detailed specifications for the document tracking system, and established the system structure, components, interfaces and data flows. This design constitutes the core of the development of the document tracking system and defines six core dimensions, including system architecture and user experience. It can satisfy various design goals, such as efficient communication and data security, and ultimately enhance user satisfaction, ensure the smooth operation of business activities and support the long-term growth and adaptive adjustment of the system.

### **Hierarchy Input Process Output (HIPO)**

The HIPO (Hierarchy plus Input-Process-Output) model is a critical analytical model for system analysis and design, especially for Document Tracking System. This model organizes the hierarchical architecture of a system, show the interaction logic between its components, and visualize the entire workflow of document submission, processing, storage, retrieval and tracking in a clear way. It helps development teams to gain a comprehensive understanding of the entire workflow, align on the system goals, identify inefficient points for performance optimization, and build a streamlined, efficient and customized system that closely meets user needs.



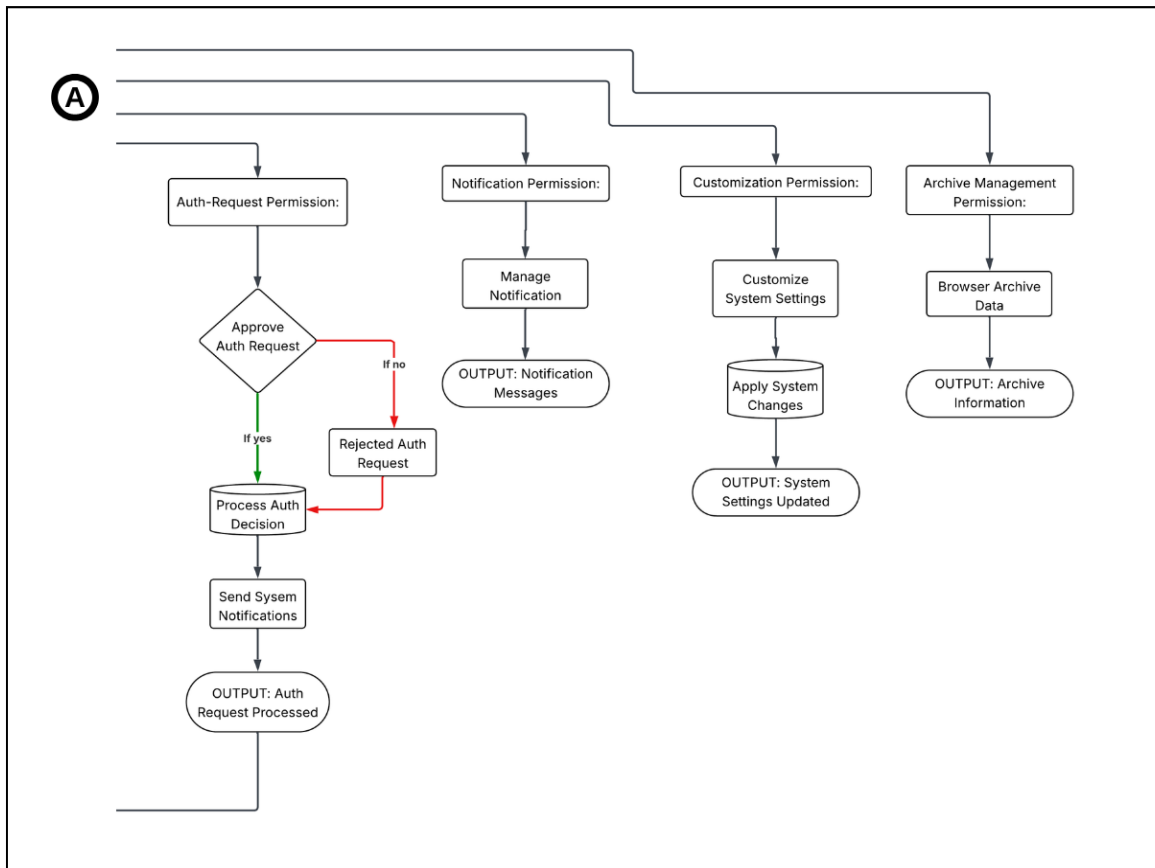
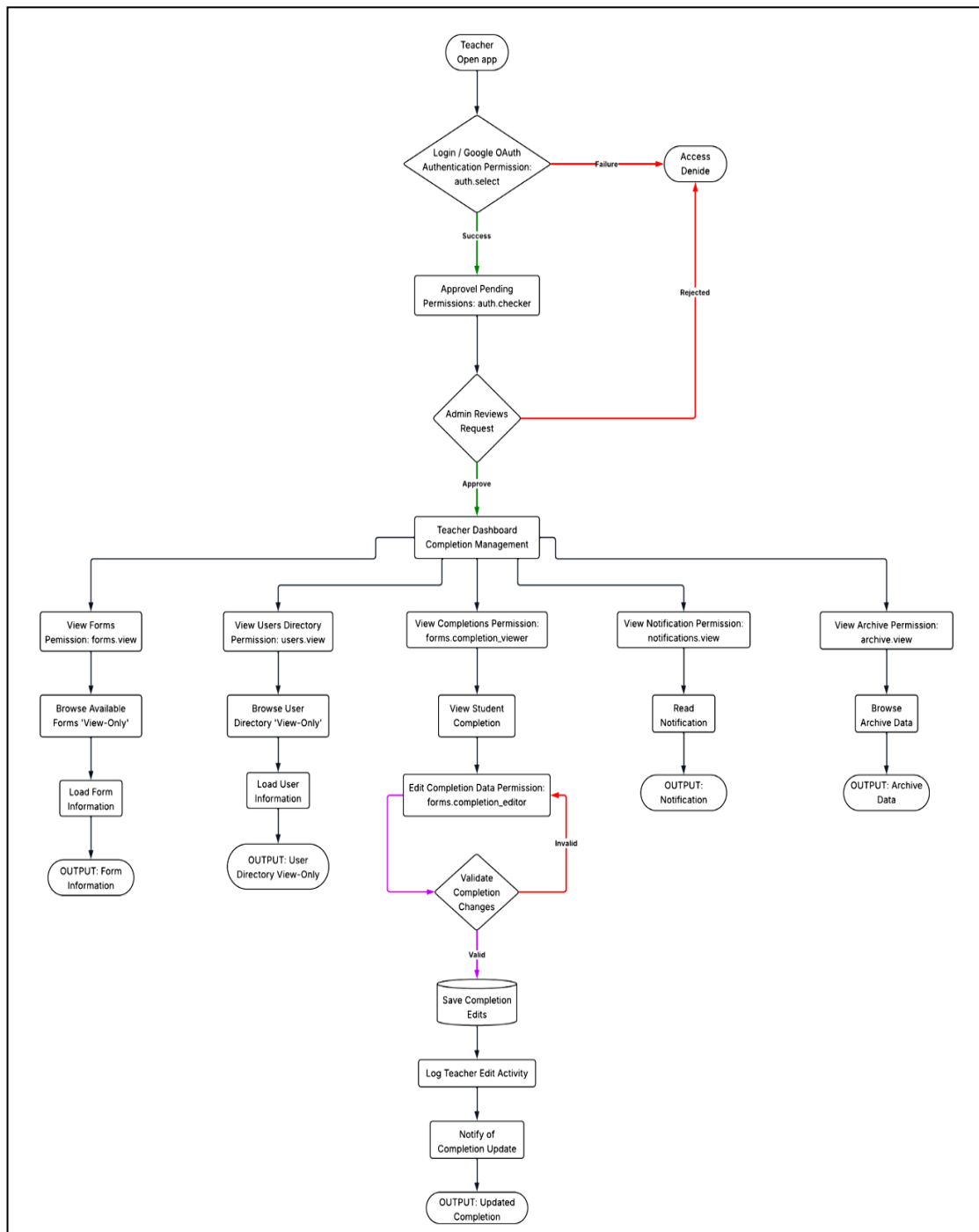


Figure 3. Hierarchical Input Process Output (ADMIN)

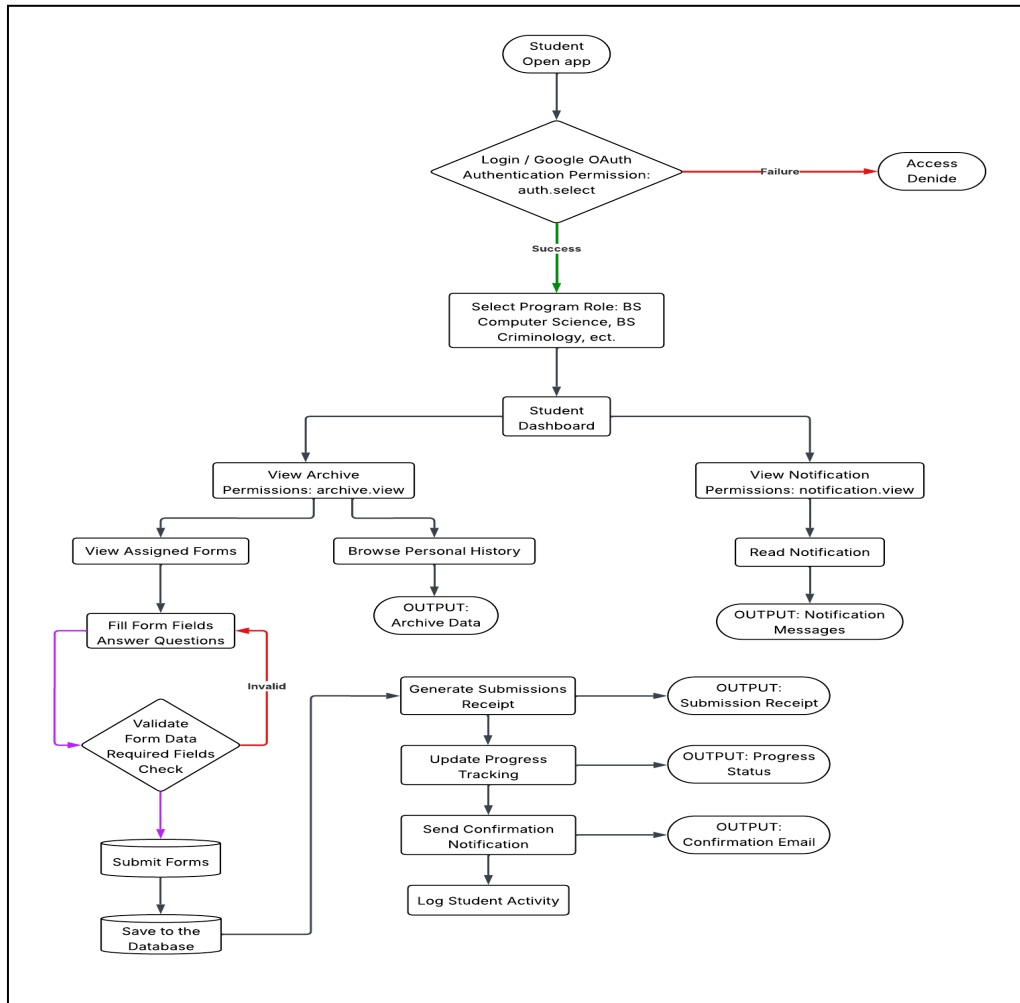
The Hierarchy Input Process Output (HIPO) diagram for the administrator account system proposed in this paper first clarifies the system’s access authentication logic: Google OAuth login is adopted as the unified authentication entry. A successful login grants full operational permissions for the system dashboard, while a failed login leads to direct access denial. It then sorts out the 8 permission modules within the dashboard one by one: First, user management, which supports adding, deleting, and modifying users, with all operations fully traceable. The second one is role management, you can add/remove roles and the permission library is updated synchronously. The third is form management, you can add/delete/modify forms and the configurations are saved synchronously. The fourth is submission management, you can review forms and update their processing statuses. The fifth one is authorization request permission, which deals with all kinds of authorization applications and sends approval notifications. The sixth one is notification permission, you can configure and push system notifications. Seventh, custom permission, which allows modifying system settings to optimize user experience. Eighth, archive management permission, which supports managing archived data to enable full-process traceability. This HIPO diagram clearly presents the complete process through which administrator operations are transformed into various system outputs, helping the system’s management deliver its core values of controllability, high efficiency, and transparency.



**Figure 4. Hierarchical Input Process Output (TEACHER)**

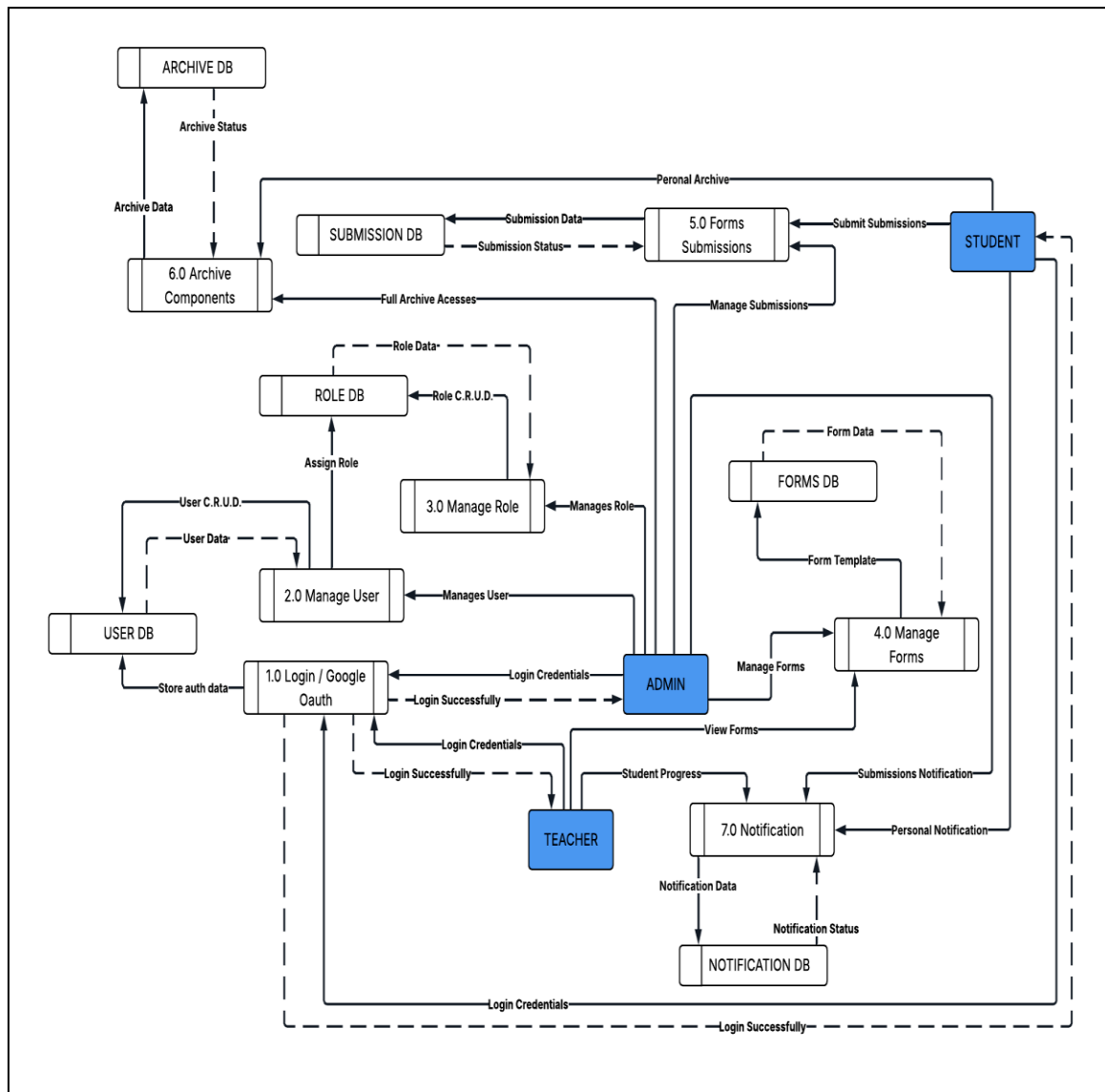
The HIPO diagram of the teacher account system designed in this paper serves the core purpose of clearly illustrating the activities and permission agreements of the teacher dashboard, with its core focus falling on three major areas: access control, data management, and completion tracking. First, this paper sorts out the full-link access branch process that spans from a teacher submitting a login request to the teacher successfully entering the core dashboard, and clarifies the verification rules for each node in the process. It then breaks down the specific functions of the 6 teacher permissions configured in the dashboard item by item, with each permission strictly aligning with the input-processing-output logic of HIPO standards. The 6 permissions are: viewing forms, viewing the user directory, viewing completion status, editing completion data, viewing notifications, and accessing archives. Among these, the operation of editing completion data requires additional verification to

guarantee data integrity: invalid edits are directly rejected, while valid edits are automatically logged, and a confirmation notification is sent to the teacher who performed the operation. The ultimate implementation goal of this complete set of designs is to achieve controllable access, full-process transparency, and traceable accountability.



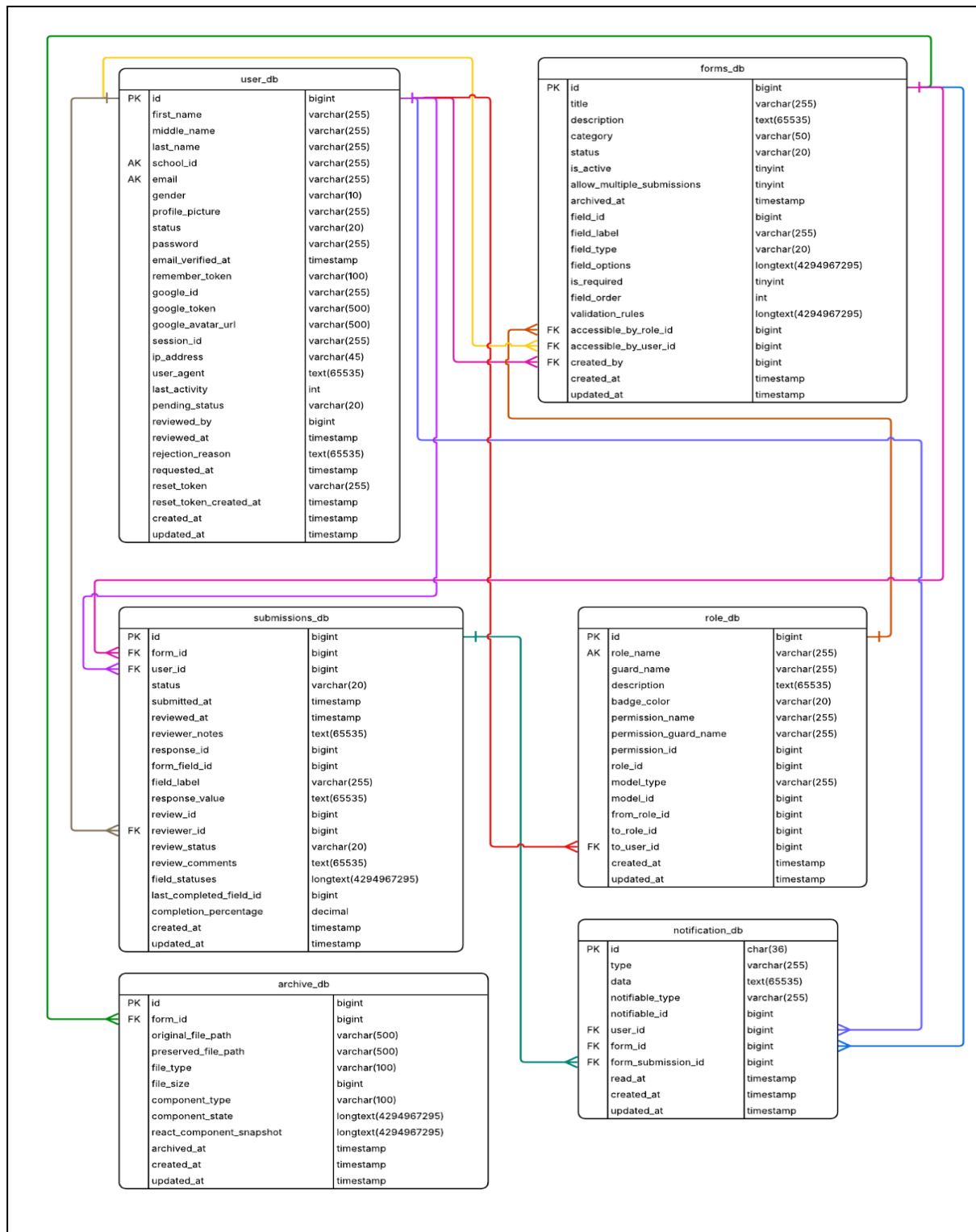
**Figure 5. Hierarchical Input Process Output (STUDENT)**

Figure 5 presents the Hierarchy Input Process Output (HIPO) diagram of the student account, which covers the complete business workflow spanning from application login to data submission. The student completes identity verification via Google OAuth, after which users operate the dashboard and submit forms; once form submissions pass validation, the system's back end generates a receipt, updates process progress, sends notifications, and logs activities. This framework identifies all output items across the full workflow, with a clear boundary separating actions taken by the user and actions taken by the system.



**Figure 6. Data Flow Diagram of CKCM Document Tracking System**

Figure 6 presents the data flow diagram of the CKCM Document Tracking System, which covers all interaction processes between the three core user groups (students, teachers, and administrators), all functional modules, and the system database. Starting from the user login stage, the login module supports dual authentication via both native login and Google OAuth, and identity authentication data is stored in the User DB. The system provides the functionality of integrated document tracking through five core features that are well defined in the diagram below: role-based access control, form management, submission tracking, document archiving and real-time notifications. Each of the six functional modules, such as Login /Google OAuth and Manage Role, is linked with a database that carries out sequential operations such as administrator permission control and student form submission.



**Figure 7. Entity Relationship Diagram (ERD) of CKCM Document Tracking System**

Figure 7 presents the Entity Relationship Diagram (ERD) of the CKCM document tracking system, which clearly illustrates the interaction logic of the system's core databases to underpin the management and tracking of the full document workflow. This system includes a total of 6 core databases: the User Database (User DB), which stores core user information, interfaces with the Role Database (Role DB) that manages role-based

permissions, to implement role-based access control; the Forms Database (Forms DB), which stores form details, configurations, and access settings, enabling authorized users to create and manage forms; the Submissions Database (Submissions DB), which records all form submission content and links to the complete set of approval information for documents submitted by users; the Archive Database (Archive DB), which securely stores finalized documents, supporting efficient retrieval and long-term retention; the Notification Database (Notification DB), which manages system alerts and pushes activity notifications for all workflow stages. This interconnected architecture maintains data integrity and provides comprehensive support for the operation of the full end-to-end business workflow.

**Implementation.** During the implementation phase of the Document Tracking System deployed by this institution, the core task is to transform the previously approved design specifications into a complete, stably operating system. Within this phase, seven development tasks including user interface development must be completed, three security control requirements such as data security must be fulfilled, three continuous improvement efforts including testing and debugging must be advanced, and an iterative mechanism for collecting user feedback and making corresponding adjustments must be established, to ultimately support this institution's goal of implementing full-process document management.

**Testing.** Following the completion of deployment of the Document Tracking System, multi-level full-link testing was officially launched, and four categories of verification work were implemented in sequence: unit testing validates the functions of individual components, integration testing ensures smooth linkage between modules, system testing verifies the effectiveness of the complete system, and acceptance testing confirms that the system meets user requirements. This set of testing centers on guaranteeing the system's accuracy, reliability, security, and usability as its core goal. Throughout the testing period, errors were identified and fixed, the data tracking and retrieval process was verified, performance was evaluated to avoid risks, and ultimately a high-quality, easy-to-use, qualified system that can efficiently manage document circulation was delivered.

**Deployment.** With the completion of all full-process testing, the Document Tracking System has stepped into the critical core deployment phase of its development cycle. This phase involves launching the system for official user access and ensuring the efficient operation of it. The deployment work is proceeding in three categories. At the technical layer, the teams perform installation, configuration and optimization to achieve optimal performance, including scalability, data migration, system integration and capacity planning. At the user layer, acceptance testing and training are performed to verify the system functions and help users get familiar with the system. The operation and maintenance layer provides constant monitoring support for system availability and prompt troubleshooting. Ultimately it helps users to handle and track documents in an effective seamless manner and assures the successful implementation of Document Tracking System.

**Maintenance.** The maintenance phase of the Document Tracking System is intended to provide continuous support of the system, to maintain its functionality and to ensure efficient operation. Major activities in this phase include bug fixing, system updates, upgrades to functions, and user feedback, all of which collectively protect the system's reliability, security, accuracy, and user satisfaction. Major implementation activities include monitoring of operations, troubleshooting problems, and implementing security measures. In the short term these activities minimize service interruptions and protect document integrity, while in the long term they allow for adaptation to demand and technology upgrades, ensuring the developed document tracking system remains effective and sustainable over long term use.

## RESULTS

### Assessment of the Developed System using ISO 9126-1 Software Quality Standard

The performance of the developed Christ the King College de Maranding, Inc. (CKCM) Document Tracking System was assessed using the ISO 9126-1 software quality framework. Results from the survey conducted among school faculty, IT professionals, security staff, students, and administrative users showed that the system performed excellently in all six quality indicators: reliability, efficiency, functionality, usability, maintainability, and portability.

Statement	Mean	Interpretation
1. The system ensures that all tracking data is consistently accurate and updated.	4.80	Very Reliable
2. The system records are securely stored and protected from unauthorized access.	4.65	Very Reliable
3. The system automatically syncs updates in real-time.	4.75	Very Reliable
4. The system notifications are sent promptly whenever	4.60	Very Reliable

records are changed.		
5. The system data remains consistent even during simultaneous user access.	4.70	Very Reliable
<b>Average</b>	<b>4.70</b>	<b>Very Reliable</b>
Note: 5-4.2 Very Reliable; 4.19-3.5 Reliable; 3.40-2.7 Fairly Reliable; 2.6-1.9 Minimally Reliable; 1.8-1.0 Not Reliable		

*Table 1. System Reliability Evaluation***Reliability: 4.70 (Very Reliable)**

Table 1 shows the evaluation of the reliability of the Document Tracking System. The Document Tracking System performed very well on all the reliability indicators, with all indicators having mean scores in the “Very Reliable” range. The Document Tracking System was excellent in making sure that the tracking data is always accurate and updated (mean: 4.80), which was the highest rating among all the indicators. The Document Tracking System also scored well with regards to its capacity to synchronize updates in real-time (mean: 4.75) as well as to maintain data consistency when multiple users are accessing the system at the same time (mean: 4.70). This means that the Document Tracking System is capable of doing multiple functions at the same time without sacrificing the integrity of the data. The respondents also rated the Document Tracking System high in terms of its capability of securely storing and protecting the records from unauthorized access (mean: 4.65) and its ability to send immediate alerts anytime there are changes made to the records (mean: 4.60). These results mean that the system is reliable, safe, and can provide accurate information that is up-to-date to its users. The system got an overall mean of 4.70 which is interpreted as “Very Reliable” which means that it can continuously perform its intended functionalities and can effectively support document tracking and management processes.

Statement	Mean	Interpretation
1. The system allows fast data recording and retrieval.	4.65	Very Efficient
2. The system provides real-time tracking and monitoring updates.	4.40	Very Efficient
3. The system automates notifications and reminders efficiently.	4.65	Very Efficient
4. The system handles multiple users and records simultaneously.	4.60	Very Efficient
5. The system displays accurate and updated data instantly.	4.55	Very Efficient
<b>Average</b>	<b>4.57</b>	<b>Very Efficient</b>
Note: 5-4.2 Very Reliable; 4.19-3.5 Reliable; 3.40-2.7 Fairly Reliable; 2.6-1.9 Minimally Reliable; 1.8-1.0 Not Reliable		

*Table 2. System Efficiency Evaluation***Efficiency: 4.57 (Very Efficient)**

Table 2 serves evaluate the Efficiency of the Document Tracking System. The system performed well in rapid data recording and retrieval (mean: 4.65), automated notifications and reminders (mean: 4.65) and handling numerous users and records at the same time (mean: 4.60). It was also able to offer correct and up-to-date data in real-time (mean: 4.55) and deliver real-time tracking and monitoring updates (mean: 4.40), offering users timely and reliable information. Such results show that the system can support document management operations, reduce delays and increase the productivity of the whole workflow. The high scores on all categories show that the system is efficient in supporting document tracking processes, in terms of speed, accuracy and responsiveness. In general, the system got an average mean rating of 4.57 in terms of efficiency which is translated as “Very Efficient” implying its efficacy in improving the management and monitoring of documents.

Statement	Mean	Interpretation
1. The system records and tracks all data automatically.	4.70	Very Functional
2. The system generates detailed tracking reports and summaries.	4.40	Very Functional
3. The system allows authorized users to edit or update records easily.	4.65	Very Functional
4. The system provides notifications for updates,	4.40	Very Functional

deadlines, or changes.		
5. The system integrates with other digital tools or platforms.	4.40	Very Functional
<b>Average</b>	<b>4.51</b>	<b>Very Functional</b>
Note: 5-4.2 Very Functional; 4.19-3.5 Functional; 3.40-2.7 Fairly Functional; 2.6-1.9 Minimally Functional; 1.8-1.0 Not Functional		

**Table 3. System Functionality Evaluation****Functionality: 4.51 (Very Functional)**

Table 3 presents the evaluation of Document Tracking System as to Functionality. The system performed well in automatically recording and tracking all data (mean: 4.70), allowing authorized users to easily edit or update records (mean: 4.65), and making detailed tracking reports and summaries (mean: 4.40). Besides, it was also efficient in giving notifications of updates, deadlines, or changes (mean: 4.40) and has been integrated with other digital tools or platforms (mean: 4.40). This indicates that the system has comprehensive features that help in efficient document management and monitoring. The results suggest that the system is able to execute its intended functions while meeting the operational needs of its users. The system obtained an overall mean rating of 4.51 as to functionality which may be interpreted as “Very Functional”.

Statement	Mean	Interpretation
1. The system interface is clear and easy to navigate.	4.80	Very Usable
2. The system instructions and prompts are understandable and accessible.	4.75	Very Usable
3. The system can quickly search and view tracking information.	4.65	Very Usable
4. The system confirmation messages appear after actions or updates.	4.70	Very Usable
5. The system allows new users to learn and operate it with minimal training.	4.60	Very Usable
<b>Average</b>	<b>4.70</b>	<b>Very Usable</b>
Note: 5-4.2 Very Usable; 4.19-3.5 Usable; 3.40-2.7 Fairly Usable; 2.6-1.9 Minimally Usable; 1.8-1.0 Not Usable		

**Table 4. System Usability Evaluation****Usability: 4.70 (Very Usable)**

Table 4 shows the evaluation of Document Tracking System in terms of usability. The system showed great performance in the ability to provide a clear and easy to navigate interface (mean: 4.80) which is easy for users to access and accomplish tasks within the system. It also performed well in clear and straightforward instructions and prompts (mean: 4.75) and showing confirmation messages after actions or modifications (mean: 4.70) which helps users to interact with the system confidently and efficiently. Also, the system allows users to easily search and examine tracking information (mean: 4.65) and new users are able to understand and operate the system with minimal training (mean: 4.60). The results of this study suggest that the system is user-friendly, intuitive, and easy to learn, therefore minimizing the effort necessary to carry out document tracking duties. The system was rated with the average usability score of 4.70, which may be classified as “Very Usable”.

Statement	Mean	Interpretation
1. The system logs and reports help identify and resolve issues.	4.80	Very Maintainable
2. The system documentation supports easy troubleshooting and updates.	4.55	Very Maintainable
3. The system modules can be updated without affecting other components.	4.55	Very Maintainable
4. The system can adapt to new features or enhancements easily.	4.70	Very Maintainable
5. The system maintenance can be done efficiently by the technical team.	4.40	Very Maintainable
<b>Average</b>	<b>4.60</b>	<b>Very Maintainable</b>
Note: 5-4.2 Very Maintainable; 4.19-3.5 Maintainable; 3.40-2.7 Fairly Maintainable; 2.6-1.9 Minimally Maintainable; 1.8-1.0 Not Maintainable		

**Table 5. System Maintainability Evaluation**

**Maintainability: 4.60 (Very Maintainable)**

Table 5 presents the evaluation of the Document Tracking System in terms of maintainability. The system demonstrated high performance in providing logs and reports that help identify and resolve issues (mean: **4.80**), making it easier for administrators and technical personnel to monitor system performance and address problems efficiently. It also showed strong capability in adapting to new features or enhancements (mean: **4.70**), indicating its flexibility and potential for future improvements. Furthermore, the system received favorable ratings for providing documentation that supports easy troubleshooting and updates (mean: **4.55**) and allowing system modules to be updated without affecting other components (mean: **4.55**), which contribute to easier maintenance and system management. Additionally, respondents rated the efficiency of system maintenance by the technical team positively (mean: **4.40**). These findings suggest that the system is well-structured, adaptable, and capable of supporting long-term maintenance and development activities. The system achieved an overall mean rating of **4.60** in terms of maintainability, which is interpreted as "Very Maintainable."

Statement	Mean	Interpretation
1. The system works well on computers, tablets, and mobile devices.	4.80	Very Portable
2. The system compatible with various browsers and operating systems.	4.45	Very Portable
3. The system easily adaptable for future tracking purposes.	4.60	Very Portable
4. The system is readily accessible without needing complex installation or setup procedures.	4.70	Very Portable
5. The system built using standard frameworks for easy integration.	4.55	Very Portable
<b>Average</b>	<b>4.62</b>	<b>Very Portable</b>

Note: 5-4.2 Very Portable; 4.19-3.5 Portable; 3.40-2.7 Fairly Portable; 2.6-1.9 Minimally Portable; 1.8-1.0 Not Portable

**Table 6. System Portability Evaluation**

**Portability: 4.62 (Very Portable)**

The results of the Document Tracking System evaluation for the portability are presented in Table 6. The system worked very well in terms of operation on personal computers, tablets and mobile devices (mean: 4.80), which means an excellent adaptability to various device types, ensuring access for a large number of users. It also showed good compatibility with different browsers and operating systems (mean: 4.45), which means that users can access the system from the platform they prefer. In addition, the system was rated positively for its ease of adaptation to future tracking needs (mean: 4.60) and its flexibility for long-term use and system extension. Also, participants positively evaluated the system for its ease of access without complicated installation and setup procedures (mean: 4.70), which contributed to the convenience and ease of deployment. Lastly, the system was also evaluated as being built on standard frameworks for easy integration (mean: 4.55) suggesting its ability to seamlessly interact with other systems and technologies. These results indicate that the system is very accessible, flexible, and compatible with multiple surroundings, and hence adaptable to different user needs. The system was rated at a mean of 4.62 overall, interpreted as "Very Portable."

Quality Attribute	Mean	Interpretation
Reliability	4.70	Very Reliable
Efficiency	4.57	Very Efficient
Functionality	4.51	Very Functional
Usability	4.70	Very Usable
Maintainability	4.60	Very Maintainable
Portability	4.62	Very Portable
<b>Overall Mean</b>	<b>4.62</b>	<b>Overall Performance</b>

Note: 5-4.2 Very Portable; 4.19-3.5 Portable; 3.40-2.7 Fairly Portable; 2.6-1.9 Minimally Portable; 1.8-1.0 Not Portable

**Table 6. Summary of Document Tracking System Evaluation**

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## DISCUSSION

The findings showed that the developed Document Tracking System had a very good performance in all the software quality attributes evaluated with an average of 4.62. This means that the system has well addressed the need for document tracking, management, and archiving in Christ the King College de Maranding, Inc. The reliability of the system obtained a mean rating of 4.70 interpreted as Very Reliable. The respondents agreed that the system always had an accurate tracking information, updates in real time, and secured records from unauthorized access. This indicates that the system can provide reliable services with data integrity and security. These findings support a study which emphasized that electronic document management systems improve information security, accountability, and record accessibility [11].

The system also gained an efficiency mean score of 4.57 which implies that the system is Very Efficient. The results revealed that the system enables fast data record and retrieval, gives real-time tracking updates, and automates notifications and reminders efficiently. These features make documents to be processed faster and minimize administrative delays. Similar results were also found that digital document systems greatly improve transaction processing and operational efficiency [2].

For the functionality, the system gained a mean score of 4.51 which is interpreted as Very Functional. Respondents recognized the system's capability to automatically record and track documents, generate reports, provide notifications, and support authorized record updates. The results show that the developed system performs its intended functions and the user requirements are successfully met. This is in line with a study that pointed out that electronic records management systems improve organizational performance through effective information management [4].

The usability evaluation obtained a mean score of 4.70 which is one of the highest quality attributes. The respondents thought that the system was easy to navigate, understand and operate with little training. The system had a clear interface and instructions that were easy to follow, which contributed to a positive user experience. As pointed out by a study, perceived ease of use is a major factor that influences user acceptance and continued use of information systems [6].

The system maintainability obtained a mean score of 4.60 which is interpreted as Very Maintainable. The respondents agreed that system logs, documentation, and modular architecture facilitate troubleshooting, updates, and future enhancements. Results indicate that the system can be maintained and adapted to changing institutional needs efficiently.

Finally, the system's portability obtained a score of 4.62, which is considered as Very Portable. The system was found to be compatible with various devices, browsers and operating systems, allowing access to various types of users. Its web-based architecture and use of standard development frameworks strengthen future integration and growth. This result supports the suggestion of a study that modern document management systems should offer flexibility and accessibility across multiple platforms [1].

Overall, the evaluation results demonstrate that the Document Tracking System met the study's objectives of enhancing document management, enhancing tracking accuracy, enhancing security and enhancing operational efficiency. The high scores obtained for all quality attributes indicate that the system is an effective and reliable solution for managing academic and administrative documents within the institution.

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## CONCLUSION

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The researchers were able to accomplish the primary goal of the study which was to create, deploy and assess a Document Tracking System for Christ the King College de Maranding, Inc. (CKCM). Findings of the research showed that the current manual document processing system was plagued with issues like delay in processing documents, difficulty in tracking records and poor retrieval of documents. These issues created the need for a digital solution to improve document processing and management.

The developed system provided a centralized storage, monitoring and control of academic and administrative papers through a role based platform. It has the ability to track documents in real time, enabling the users to quickly trace the status and location of documents, thus increasing transparency and accountability in the process of document processing. Furthermore, the use of secure authentication, role based access controls and data protection techniques ensured the confidentiality, integrity and security of institutional records.

The evaluation results proved that the system greatly improved the speed, accuracy, and accessibility of document retrieval and processing. Users may access information more quickly, receive timely notifications and track document transactions in real time. These skills dramatically decreased the restrictions of manually managing documents and improved overall workflow effectiveness.

The system was evaluated by the ISO 9126-1 Software Quality Standard evaluation and the reliability (4.70), efficiency (4.57), functionality (4.51), usability (4.70), maintainability (4.60) and portability (4.62) were rated highly and regarded as an exceptional level of performance. These results show that the system is reliable, efficient, user-friendly, adaptive and cross-platform and cross-environment compatible.

Thus, it can be concluded that the proposed Document Tracking System is an excellent solution in document management and tracking for academic institutions. The system has achieved all research objectives and has a great potential to improve operational efficiency, improve record management, and assist the digital transformation initiatives of Christ the King College de Maranding, Inc. and other similar educational institutions.

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