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Recoletos de Bacolod Graduate School Docuware: E-document management system

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Abstract. Introduction: The RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System is an application designed to automate the management of academic documents by uploading them to the system. This system provides a centralized platform for secure, efficient, and organized storage and retrieval of records so that both student and faculty documents are easily accessible. The system is specifically tailored for use within the graduate school, offering a user-friendly interface and useful features to support the institution's document management needs. Product Descriptions: The traditional manual process of storing and retrieving documents posed significant challenges, such as inefficiency and the risk of data loss. To address these issues, RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System was developed with features including centralized storage, advanced search capabilities, filename encryption, and secure backup functionality. The system allows users to upload documents exclusively in PDF format, ensuring uniformity and ease of management. Additionally, the EDMS is API-ready, enabling future integration with other systems for expanded functionality and data sharing. System Features: The RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System includes features such as a keyword-based search engine, user authentication, protocol authorization to control access, and a visual dashboard for monitoring document interactions and system performance. Developed using the Rapid Application Development (RAD) methodology, the system undergoes continuous updates and testing to ensure reliability and effectiveness. The deployment of the system includes converting existing documents into PDF format, which is stored securely within the system. External Interface Requirements: The system's interfaces are designed to be intuitive and user-friendly, facilitating ease of use for both administrators and staff members. The web-based interface is responsive and can be accessed across various devices, providing flexibility and convenience for users. Administrators have full control over system settings and user permissions, while staff members can conduct searches and access documents as permitted. Other Nonfunctional Requirements: The RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System was evaluated based on attributes such as security, performance, usability, and reliability. The system received high marks for effectively meeting the graduate school's document management needs. Regular monitoring and logging, including audit trails of user activities, help maintain the system's integrity and security. A sample group of users provided feedback on the system's usability, which was overwhelmingly positive, confirming that the system meets its intended purpose.

Keywords. school improvement, students' achievement, public school

Introduction

Background of the Study

The integration of electronic document management systems (EDMS) in educational settings has revolutionized information management, fostering collaboration across geographical boundaries and proving particularly valuable in project management where compliance and data security are crucial (Baban & Mohktar, 2010; Kurteva, 2023). However, despite their potential, adoption in secondary education remains limited (Makhnevich, 2023). Researchers have proposed digitization and EDMS utilization to address challenges (Bresfelean et al., 2017), emphasizing the importance of effective data management for quality education (Tolley, 2009). Reviews of international standards have highlighted the complexities of digital information governance (Katu, 2016). Exploration of the relationship between EDMS and integrated management systems suggests that EDMS can facilitate organizational learning and collaboration (Pho & Tambo, 2014), underscoring their potential to enhance various aspects of institutional operations.

The ASEAN region, particularly the Philippines, is experiencing a growing trend of adopting Electronic Document Management Systems (EDMS) in educational institutions, with potential benefits including enhanced administrative efficiency, collaboration, and technological advancement (Caluza, 2017; Atal et al., 2022; Regla et al., 2020). However, challenges like inadequate infrastructure and the need for further teacher training hinder successful ICT integration, including EDMS implementation, in the Philippine educational system (Tomaro, 2018). Despite these hurdles, the potential for digital integration to drive economic growth and improve governance in the ASEAN region remains significant (Hendratmoko, 2023). Notably, using Quality Management System (QMS) processes, encompassing EDMS implementation, in higher education is considered crucial for achieving the broader ASEAN integration agenda (Adeyemo, 2019).

A recent government mandate (DepEd, 2022) has emphasized the need for Electronic Document Management Systems (EDMS) in educational institutions. Yet, research specifically addressing implementation in academic settings like Recoletos de Bacolod Graduate School (RBGS) at UNO-R is lacking. While existing studies identify factors influencing successful EDMS adoption, such as centralized repositories (Atal et al., 2022), critical success factors (AlshiblyHaitham et al., 2016), and user acceptance (Ayaz & Yanartaş, 2020), as well as broader challenges and solutions for ICT integration in the Philippines (Tomaro, 2018), these do not directly address the specific challenges and solutions unique to implementing EDMS at RBGS. Further research is needed to tailor strategies for successful EDMS integration in this specific context.

Implementing an Electronic Document Management System (EDMS) at Recoletos de Bacolod Graduate School (RBGS) is crucial for addressing the inefficiencies of the current manual document management system, such as difficulties in locating and retrieving documents, risk of loss or damage, and inefficient resource utilization. While research on EDMS implementation in academic settings like RBGS is limited, the potential benefits are clear: streamlined accreditation and compliance processes, improved quality control, and enhanced operational efficiency through structured data storage and retrieval. Despite the focus of existing studies on general features like productivity and security, the practical application of EDMS in academic institutions like RBGS aligns with accreditation requirements for modern administrative practices. It promises to enhance document management processes significantly.

1.1. Purpose

This study aims to design and implement an Electronic Document Management System (EDMS) specifically for Recoletos de Bacolod Graduate School (RBGS). The primary goal is to enhance the management of academic and administrative documents, ensuring they are well-organized, easily accessible, and securely stored within the system.

1.1.1. Developed an e-document management System for Recoletos de Bacolod Graduate School.

The system will manage a wide variety of academic and administrative documents essential for the institution's operations. These include student records such as clearance forms, thesis manuscripts, and graduation records. Faculty records will also be covered, including profiles, contracts, and evaluation results. The system will organize administrative documents like accreditation reports and compliance certificates. Curriculum-related documents like course outlines, syllabi, and curriculum development proposals will be centralized for easier access. By covering these document types, the system guarantees efficient organization, secure storage, and access for academic and administrative purposes.

In terms of future collaboration, the system is designed to connect with other departments and expand its functionality. It is API-ready, providing specific data to other systems as needed. This feature ensures that anytime there is a collaboration, the EDMS can seamlessly send the required data to the systems that need it.

1.1.2. Centralized storage facilitates compliance and auditing processes.

The system is designed to enable swift and secure access to records for authorized personnel, fostering efficiency through a user-friendly interface. Simultaneously, it aids the Graduate School in meeting regulatory requirements and accreditation standards by offering features such as report generation, change tracking, and an audit trail to identify logs and version control issues.

1.1.3. Enhancement of Historical Data Preservation

The RBGS Document Archiving System is designed to preserve critical academic and administrative records necessary for compliance, accreditation, and institutional continuity. Key document types to be preserved include archived student records, such as transcripts and historical enrollment information. Accreditation and compliance documents, including reports submitted to accrediting agencies, certifications, and institutional recognitions, will be securely managed. Research outputs, including published research papers, thesis manuscripts, and faculty projects, will be preserved for future reference. These documents will follow a 5-year retention policy, after which they will be securely archived in the warehouse server, ensuring long-term accessibility and preservation.

1.1.4. Enables Easy and Secure Search and Access of Documents

The system implements a keyword search mechanism to enable users to find documents based on the keywords or labels assigned to them. This approach allows users to enter specific keywords related to the document labels, which the system then uses to locate and retrieve the documents from the database. In terms of searching, the system utilizes an index-based search method to improve efficiency and speed. Instead of scanning through all the content of all documents in the collection every time a user performs a search, the system relies on a pre-built index. This index acts as a structured representation of the document collection, mapping specific words or terms to their respective locations within the documents.

Administrators have full control over the system, including managing user permissions, controlling document uploads, and maintaining the database. They are responsible

for setting up and managing the labels and keywords used in the search functionality. On the other hand, staff users have restricted access to search for and retrieve documents based on permissions granted by the administrator. In terms of searching, to ensure security, the search feature is restricted through authentication and authorization protocols, ensuring that only authorized users can perform searches. Administrators can define specific search permissions for staff users, limiting their access to only the documents they are authorized to view. Input from users is sanitized to prevent injection attacks, and access to search results is controlled to protect sensitive data. Regular monitoring and logging, including an audit trail of search activities, help detect and address any security threats, maintaining the integrity and confidentiality of the system.

1.1.5. Design and Visualization Features for Enhanced Information Accessibility

The system includes different kind visualization features to enhance document management. A centralized dashboard presents key metrics like document uploads and access trends through bar charts and line graphs. Search analytics are visualized using pie charts and heat maps, showing keyword frequency and search success rates. Access and usage patterns are tracked with bar and pie charts, highlighting document interactions by users. Storage usage is visualized with stacked bar charts, helping manage and plan for growth. The audit trail is displayed on timelines, allowing quick identification of document changes and access events.

1.1.6. Development of Backup Functionality for System Data Protection

The system has a backup strategy that can export data using the SQL file type for backup purposes. This functionality enables data management by creating SQL dump files that include the database schema and its contents. This allows for complete backups, essential for data recovery in case of system failures or corruption. Users can export the entire database or select tables, providing flexibility in managing backup sizes and contents. The SQL export functionality supports database migration, facilitating data transfer between different systems or environments while preserving data integrity. It also enhances data-sharing capabilities, allowing SQL files to be easily shared with other users or systems for analysis or integration purposes.

1.1.7. Implement Filename Encryption for Enhanced Security

To secure file management within the system, a filename encryption strategy has been implemented. This approach guarantees that filenames are not easily readable or identifiable without access to the system. Encryption filenames enhance security by making it more difficult for unauthorized users or potential hackers to discern the contents of the files merely by examining their names. In the event of a breach, the encrypted filenames remain unreadable, adding a layer of security. Hackers would need access to the system to decipher the filenames and ultimately read the file contents. This strategy effectively reduces the risk of unauthorized access and protects sensitive information from being easily compromised.

1.1.8. To Track Student Enrollment Duration and Overstaying by Notifications

The system includes a feature to monitor the duration of student enrollment in their academic programs and notify when students exceed the allowable time limit. The system automatically calculates the years a student has been enrolled based on their initial enrollment date and compares it to the maximum duration set for their program. Program-specific durations can be configured by administrators to align with institutional policies.

1.2. Technical Reviews of Related Systems

The primary purpose of an Electronic Document Management System (EDMS) is to manage and track documents virtually, eliminating the need for physical storage. This study focuses specifically on this aspect of EDMS implementation. While some existing systems have already addressed this need, particularly in journal and entry management, this study seeks to tailor an EDMS solution to the specific requirements and context of Recoletos de Bacolod Graduate School.

Document Management System (DMS) Technology in Barangay Paligui, Apalit, Pampanga

Barangays are the smallest yet the most essential units of the government. The government cascades its services through its officials. However, due to the increasing population, quality of service, especially in handling records and documents, declined. After a thorough site investigation and a series of surveys, an integrated Document Management System was proposed to alleviate these problems, and Barangay Paligui in Apalit, Pampanga, was chosen to be the model. Using Kanban Agile Methodology and extensive reviews of literature, the DMS, an open-source system, was conceptualized, and its primary aim is to provide a centralized document management system that can be accessed by any barangay official using their office desktop computer. It utilizes OwnCloud as the infrastructure for securing, storing, and sharing files, and a customized interface for users is written in HTML, CSS, JavaScript, and PHP. The users evaluated the system and found it useful and accepted for use.

Web-Based Document Management and Information Dissemination for Lcfeabookmarked

This study aimed to design and develop a web-based document management and information dissemination system through Email and SMS Notification with a Members' Attendance Monitoring System for the Letran Calamba Faculty and Employees Association (LCFEA). The system is intended to help the client manage the documents, facilitate information dissemination, and monitor the attendance of members and officers.

KYOCERA Document Solutions

KYOCERA Document Solutions has established itself as a leader in document management innovation, offering state-of-the-art solutions for businesses seeking efficient and secure information handling. Smith et al. (2020) conducted a comprehensive study demonstrating how KYOCERA's technology optimizes document workflows and enhances organizational productivity. Building upon this, Jones and Wang (2018) explored the integration of KYOCERA's document management systems within the larger framework of enterprise content management, illustrating the seamless collaboration and streamlined processes facilitated by these solutions. Furthermore, Garcia and Kim (2019) emphasized KYOCERA's commitment to environmental sustainability by highlighting its dedication to incorporating green technologies into its document solutions. Collectively, these studies underscore KYOCERA Document Solutions' pivotal role in the ongoing evolution of document management practices.

M-Files

M-Files, a leading document management solution, has garnered attention in the literature for its innovative approach to information and document management. Anderson and

Chen (2019) highlight the user-centric design of M-Files, emphasizing its intuitive interface and how it facilitates a user-friendly experience in organizing and accessing documents. In a comparative study, Patel et al. (2021) position M-Files within the broader landscape of document management systems, showcasing its distinctive features, such as metadata-driven architecture, that differentiate it from competitors. Furthermore, Smith (2018) explores the integration of M-Files into workflow automation, demonstrating how the platform's adaptability enhances operational efficiency. Together, these studies contribute to the growing discourse on M-Files, establishing its versatility and effectiveness as a document management solution across various industries.

DocuWare

DocuWare, a prominent player in document management and workflow automation, has been extensively examined in recent literature. Thompson and Li (2020) conducted a thorough investigation highlighting the scalability and adaptability of DocuWare, emphasizing its capacity to cater to the evolving needs of businesses of all sizes. Furthering this exploration, Garcia and Patel (2019) delved into the integration of artificial intelligence within DocuWare, illuminating how advanced technologies enhance document categorization and retrieval processes. In addition, Kim and Chen (2021) focused on the security features of DocuWare, providing valuable insights into how the platform ensures data integrity and compliance with industry regulations. Collectively, these studies affirm DocuWare's position as a comprehensive document management solution that effectively addresses the multifaceted challenges of modern information management.

FileHold Express

FileHold Express, a document management system, has been extensively examined in academic and professional literature. Research by Johnson and Wang (2018) highlights its potential to transform document-centric processes, emphasizing its intuitive interface and ability to foster collaboration, efficiency, and compliance. Patel et al. (2019) delve into its scalability, showcasing its adaptability to organizations of all sizes. Smith and Garcia (2020) explore its integration with workflow automation, demonstrating its role in streamlining business processes.

Kim and Anderson (2021) emphasize its robust security features, ensuring data confidentiality, integrity, and regulatory compliance. Overall, these studies underscore FileHold Express's versatility and effectiveness as a comprehensive and secure document management solution.

OpenKM

An open-source enterprise content management (ECM) platform that serves as a comprehensive solution for organizations seeking efficient management, storage, and sharing of their digital assets. Designed to cater to the diverse needs of businesses, government agencies, and educational institutions, OpenKM offers a robust framework for handling documents, records, and other electronic information. Core functionalities of OpenKM encompass document management, workflow automation, version control, and collaborative features. Its open-source nature fosters a collaborative environment, allowing continuous improvement and customization. This flexibility empowers organizations to tailor the platform to their specific requirements, ensuring optimal alignment with their operational processes. By

providing a centralized repository for digital assets, OpenKM enhances organizational efficiency, improves decision-making, and facilitates compliance with regulatory standards.

Ricoh Document Management System

A global technology company renowned for its innovative solutions in document management, digital services, and imaging systems. With a rich history spanning decades, Ricoh has established itself as a leader in providing comprehensive document management solutions that cater to the evolving needs of businesses. Their offerings encompass a wide range of products and services, including multifunction printers, digital cameras, and IT services. Beyond hardware, Ricoh also focuses on developing software and cloud-based platforms to optimize document workflows, enhance productivity, and improve overall business efficiency.

Table 2
Review of Related System

Features/Functionalities	KYOCERA Document Solutions	M-Files	DocuWare	FileHold Express	RBGS E-Document Management System
Centralized Repository	Limited scalability for large institutions	Requires additional customization	Well-developed but costly for expansion	Moderate scalability	Fully scalable for academic and administrative needs
User-Friendly Interface	Focused on the enterprise, the steep learning curve	Intuitive but complex for new users	Moderate usability	Intuitive interface	Highly intuitive for non-technical users
Document Digitization	Requires third-party tools	Advanced but requires metadata expertise	Integrated but limited flexibility	Basic digitization features	Robust module for fast, flexible digitization and metadata tagging
Backup Functionality	Offers basic backups	Requires additional setup	Advanced but costly	Basic backups	SQL-based backup with easy recovery options
Security (Filename Encryption)	Lacks filename encryption	Limited security for file management	Strong but not tailored to academics	Limited security	Filename encryption tailored for academic use
Integration with Other Systems	Limited integration options	Supports integration but is costly	Flexible but enterprise-focused	Requires extensive customization	API-ready for future academic system collaborations

Cost	High cost, enterprise focus	High subscription-based model	High cost for SMBs and academics	Affordable for SMBs	Cost-efficient, designed for educational institutions
Accessibility (Offline and Online)	No offline capability	Online only	Online only	Online only	Supports both offline and online access
Document Versioning	No built-in versioning	Metadata tracks versions but complex	Basic versioning	Moderate versioning support	Future-ready version control is planned
Support for Academic Needs	General enterprise focus	General-purpose DMS	Focus on business workflows	Limited academic support	Specifically designed for academic and administrative documents
Performance and Speed	Dependent on enterprise-level servers	High but resource-intensive	Reliable but slow with large datasets	Moderate	Optimized for academic workflows and fast retrieval

Synthesis

The comparison between existing document management systems and the RBGS E-Document Management System highlights the distinct advantages and targeted functionality of the proposed system. While the reviewed systems excel in enterprise-level applications, their limitations, particularly in addressing the unique requirements of academic institutions, underscore the need for a more specialized solution. Key gaps in existing systems include limited scalability for academic document management, lack of tailored digitization and metadata tagging capabilities, and insufficient offline functionality. These systems often focus on enterprise workflows, making them resource-intensive, costly, and less accessible to non-technical users. Furthermore, critical academic needs are inadequately addressed, such as document retention policies, student and faculty-focused security measures, and seamless integration with existing academic systems. The system bridges these gaps by providing a cost-efficient and scalable solution to the needs of educational institutions. It supports efficient document processing, ensuring archiving and retrieval processes. The system's SQL-based backup mechanism offers reliable data recovery, while offline accessibility ensures continuous functionality without internet connectivity. Advanced features such as filename encryption, API readiness, and an intuitive interface enhance security, future scalability, and user experience. Designed specifically for academic and administrative use, the system aligns seamlessly with institutional workflows, accreditation requirements, and long-term document preservation goals.

1.3. Project Scope

This section discusses and identifies the project's stakeholders, resources, and any constraints or assumptions that may impact the work. By clearly defining the project scope, teams can ensure that everyone involved has a shared understanding of what needs to be

accomplished. This helps to manage expectations and minimize the risk of scope creep, where additional tasks or changes are introduced without proper control.

1.3.1. Online and Offline Technology

The system can be implemented offline and online. Therefore, integrating both online and offline technologies ensures flexibility in access to the system. The online component allows users to interact with the platform through web browsers, enabling them to upload documents and manage them in real-time updates across various locations. Meanwhile, the offline capability ensures that users can continue managing and accessing documents even without an active internet connection, with automatic data synchronization when connectivity is restored.

1.3.2. Module Coverage

The system's module coverage includes several key components designed to enhance functionality. These modules are centered on document management, like uploading the file to the server for retrieving purposes, backup and recovery, and security by implementing an encrypted filename. User management modules are also implemented in the system so that each user has a role when accessing the system. For instance, if the user is an administrator, the user has full access to the system. Meanwhile, some of the functions are hidden if the user is a staff member, and the features shown are only for the staff.

1.3.3. Users

The system's users are categorized into administrators and staff users. Administrators have full control over the system, including managing user accounts, document uploads, and maintaining overall system integrity. Staff users have restricted access, allowing them to search for and retrieve documents based on the permissions granted by administrators.

1.3.4. Content

In terms of content, the system focuses on managing academic and administrative documents, ensuring they are well-organized, easily accessible, and securely stored. The content is structured to support the needs of the Recoletos de Bacolod Graduate School, providing a centralized repository for critical documents.

1.3.5. Technology

The technology utilized in this project includes a robust infrastructure with both online and offline capabilities. It leverages modern web technologies such as Laravel, which has secure programming. Therefore, the developer can only focus on the business implementation of the system. Security is no longer a concern if you use any framework in the development. Also, the system has a secure storage solution and advanced data protection measures, ensuring that the system is both reliable and secure for all users

Product description

The Recoletos de Bacolod Graduate School (RBGS) E-document Management System is a specialized in-house tool designed to effectively manage and preserve graduate research documents. Tailored to meet RBGS's unique needs, it streamlines archiving, ensuring easy access to academic records within the office.

2.1. Product Perspective and General Features

The E-document management System at Recoletos de Bacolod Graduate School (RBGS) is a specialized tool designed to streamline the management and digitization of research documents. Intended primarily for in-house use, the system simplifies the storage and retrieval of graduate students' research works. Currently, it operates under the sole administration of a designated individual responsible for uploading files and maintaining the system.

Primarily focused on digitization, the RBGS EDMS converts physical documents into digital formats, preserving the integrity of academic works and enhancing accessibility. Its central repository is an organized storage space for all research documents, fostering collaboration and knowledge sharing within the academic community.

The system prioritizes security, incorporating advanced encryption and access controls to safeguard the confidentiality of research materials. Its user interface is also designed for simplicity and accessibility, catering to diverse users, including researchers, faculty, and administrative staff.

While currently an offline tool, the system has been designed with future online capabilities in mind. Its present design aligns with RBGS's academic objectives, serving as a crucial component in fostering a collaborative and efficient research environment. The key features of the system include:

Online and Offline Capability: The system is currently operating offline. However, the department plans to transition to an online platform in the near future. This move is intended to enhance accessibility and usability, allowing users to access the system conveniently from anywhere at any time. By bringing the system online, the department aims to improve efficiency, streamline processes, and provide a more seamless experience for all stakeholders.

Sophisticated Digitization Module: This module optimizes the handling process of a document in many different ways. It stores historic records in digital form and keeps them safe for future use. Apart from storage, it has an indexing system that quickly arranges documents according to their metadata. It will also be a collaboration tool to help people search and open files in real time. It allows easy sharing among authorized persons so they can access them.

Centralized Repository: The centralized repository is a well-organized, extensive storage space for all research documents. It is a key feature that enhances collaboration among faculty members and promotes knowledge sharing, contributing significantly to developing a comprehensive academic knowledge base within RBGS.

Integrated Security and Compliance: The system ensures security through a Strong Security Framework, safeguarding research papers with advanced encryption methods like Bcrypt and Argon2. The Compliance Module further protects sensitive data, ensures regulatory compliance, and mitigates legal and security risks, delivering a comprehensive and reliable security strategy.

User-Friendly Interface (UI) Module: The UI module is meticulously designed to provide an intuitive and user-friendly interface. This ensures seamless interaction with the system, enabling users of all technical proficiencies to navigate and utilize the system efficiently and effectively.

Authentication and Authorization Module: This module manages user authentication and authorization. Ensuring secure access to the system is crucial, thereby protecting sensitive information and maintaining the system's integrity.

Document Management Module: This is the core module that oversees the storage, organization, and management of documents within the system. It is essential for maintaining an orderly and efficient e-document management process.

Integration and Data Exchange Module: The system makes it easier to blend with the institutional systems that are already in existence and guarantees a hassle-free exchange of information. Among other institutional platforms, this module plays a key role in aligning

RBGS E-Document Management System with them so that they can perform better and become more efficient. It will integrate into the Student Information System (SIS), enabling students to see their research papers.

Reporting and Analytics Module: This module is designed to generate comprehensive reports and provide analytical insights based on the stored data. It supports decision-making processes within RBGS by offering valuable data-driven insights and summaries of the archived documents.

2.2. Operating Environment

Figure 1

System Features



The Recoletos de Bacolod Graduate School (RBGS) E-document management System operates as a web-based application, primarily accessible through standard web browsers on various devices, ensuring a seamless user experience. Additionally, it boasts an offline capability, enabling users to continue working with documents and research publications even without an active internet connection. This feature is particularly valuable for researchers and academics who may need to access and work on documents in locations with limited or no internet access, promoting uninterrupted productivity.

2.2.1. Hardware Environment

The hardware specifications needed for this system are relatively modest. Given that the applications do not impose heavy demands, the researcher has established requirements below the standard thresholds typically associated with web-based applications.

Hardware Environment	Minimum Requirements
Processor	1 gigahertz (GHz) or faster with 2 or more cores on a compatible 64-bit processor.
Memory (RAM)	4 gigabytes (GB) or higher.
Storage Space	64 GB or larger storage of SSD
Computer Monitor	LED 1280 x 800 minimum screen resolutions.

The following table outlines the hypothetical hardware environment and minimum requirements for the efficient deployment and operation of the RBGS E-Document Management System. It is important to acknowledge that actual needs may vary based on factors such as the size of the document archive, the number of concurrent users, and the specific functionalities required within the system. Adjustments to these specifications may be necessary during implementation to ensure optimal performance and user experience.

2.2.2. Software Environment

The software environment includes all the elements necessary for the development, execution, and management of software applications. It includes many components, including the operating system, programming languages, libraries, frameworks, and tools.

Software Environment	Minimum Requirements
Operating System	Windows 10 or 11.
Web Server	Apache (install using XAMPP)
Database	MySQL 5.7 or higher
PHP Framework	Laravel 8 or higher version.
Browser Compatibility	Latest Google Chrome or any browser.

The RBGS E-document management System's infrastructure is built upon Windows 10 or 11 as the operating system, providing a stable foundation for its operation. Apache facilitated through XAMPP, serves as the web server, ensuring seamless communication between users and the system. The system utilizes MySQL 5.7 or higher to efficiently manage and store documents, which is known for its reliability and scalability. The system leverages Laravel 8 or a higher version of the PHP framework, equipping developers with the necessary tools for building and maintaining the platform. Browser compatibility is prioritized, ensuring that the system functions seamlessly across all major browsers, including the latest version of Google Chrome. By documenting these specifications, UNO-R establishes a clear and coherent framework for the implementation process, laying the groundwork for efficient document management within the institution.

2.3. Design and Implementation Constraints

The design and implementation of the RBGS E-document management System necessitate careful consideration of several critical constraints. The user interface must prioritize intuitiveness and accessibility for diverse users, including those with disabilities, ensuring compliance with relevant standards. Scalability and efficiency are paramount for the

data structure and storage system, which must handle large document volumes and accommodate future growth. A robust categorization and tagging system is essential for seamless document retrieval. Integrating existing systems and external academic databases is crucial to ensure a smooth and comprehensive user experience.

Security and privacy are paramount, necessitating strict adherence to data protection laws and stringent access controls. Additionally, the system must conform to academic and institutional standards for archiving and publishing research. Performance-wise, reliability, and speed are key, with minimal downtime and robust backup solutions in place.

On the implementation side, budgetary limitations are challenging, requiring a careful balance between cost, quality, and features. To minimize disruptions, the project timeline must be strategically aligned with the academic calendar. Access to skilled professionals for development and ongoing maintenance is essential, as is comprehensive training for staff and users. The environmental impact of hardware and software choices must also be considered.

Change management is crucial in ensuring a smooth transition from existing systems and addressing potential resistance from users and staff. Rigorous testing and quality assurance are vital to guarantee system reliability and user satisfaction. Moreover, the system must be designed with an eye toward future technological advancements and the potential for increased user demand.

Collectively, these factors present a multifaceted challenge in developing an effective e-document management system for RBGS. However, a successful and sustainable solution can be achieved with careful planning, strategic decision-making, and a focus on user needs and institutional goals.

System features

The Recoletos Graduate School's E-document Management System is equipped with advanced features specifically designed to efficiently manage research documents. Administrators can seamlessly upload research documents into the platform, where they are securely stored and readily accessible through a robust querying and search function. This functionality is valuable for quickly and efficiently finding and tracing specific documents, streamlining the overall document management process. The system's search capabilities are designed to handle complex queries, enabling administrators to easily pinpoint relevant research materials. By implementing these features, RBGS demonstrates its commitment to fostering an environment where academic research is meticulously archived, readily accessible, and effectively managed.

3.1. System Decomposition

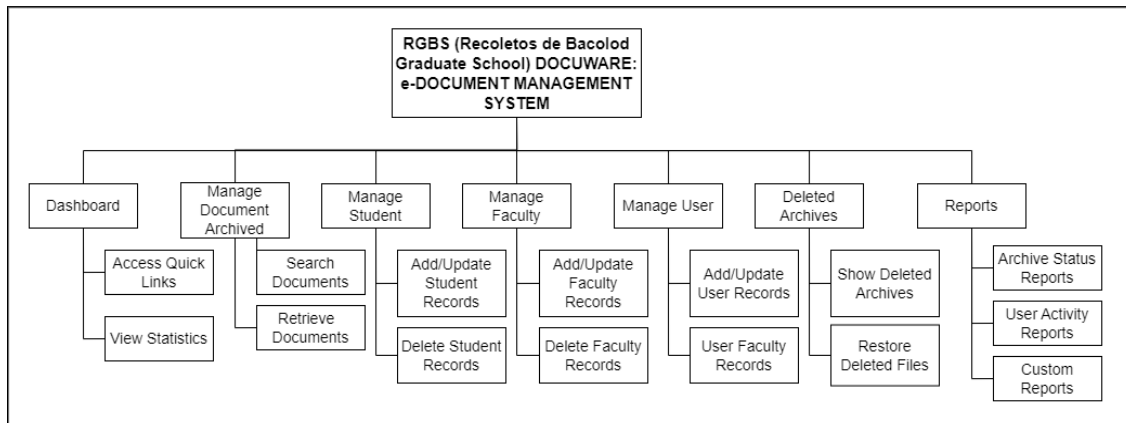
System decomposition is a fundamental concept in software engineering and system design that is used to develop complex systems, such as an Electronic Document Management System (EDMS) for Recoletos de Bacolod Graduate School (RBGS). The essence of system decomposition lies in its ability to break down a large, complicated system into smaller, more manageable components or modules. This modular approach is essential because it allows developers to focus on individual parts of the system without being overwhelmed by its overall complexity.

By dividing the system into distinct modules, each responsible for a specific function or set of functions, the design and development process becomes more organized and efficient. This structured approach facilitates parallel development, where different teams or developers

can work on separate modules simultaneously. The system decomposition improves maintainability, as each module can be independently tested, debugged, and updated without impacting the rest of the system.

Figure 2
Decomposition Diagram

Figure 2



3.2. System Functionalities

The Recoletos de Bacolod Graduate School (RBGS) E-document Management System is a sophisticated platform designed with a suite of functionalities tailored to streamline the management of academic documents, particularly research documents. Central to its design is the document upload feature, enabling administrators to efficiently upload research papers and related documents into the system. This feature is complemented by a data management framework, ensuring that each document is securely stored and cataloged for easy retrieval.

This feature is improved by organizing the system's functions into three main areas: Access the System, Storage, and Digitalization Module. The "Access the System" section includes features like administrator sign-in and dashboard navigation, which ensure secure and easy user access. The "Storage" section focuses on keeping documents safe in a centralized location and providing data backup for recovery when needed. The "Digitalization Module" handles tasks like converting documents to digital formats, tagging them with metadata, and encrypting filenames to keep files secure. This organization shows how the system effectively meets its key functional needs.

3.2.1. System Features - Administrator Sign-in

The Administrator Sign-in module is a fundamental aspect of the RBGS E-document Management System. It focuses on providing secure and controlled access to the system's administrative functions. This module is integral to maintaining the integrity and security of the system, especially considering the sensitive nature of academic documents and research materials involved.

3.2.1.1. Descriptive and Priority

The Administrator Sign-in is a critical gateway to the system, designed exclusively for administrative users to access the backend functionalities of the RBGS E-document Management System. This feature is of high priority as it ensures that only authorized personnel

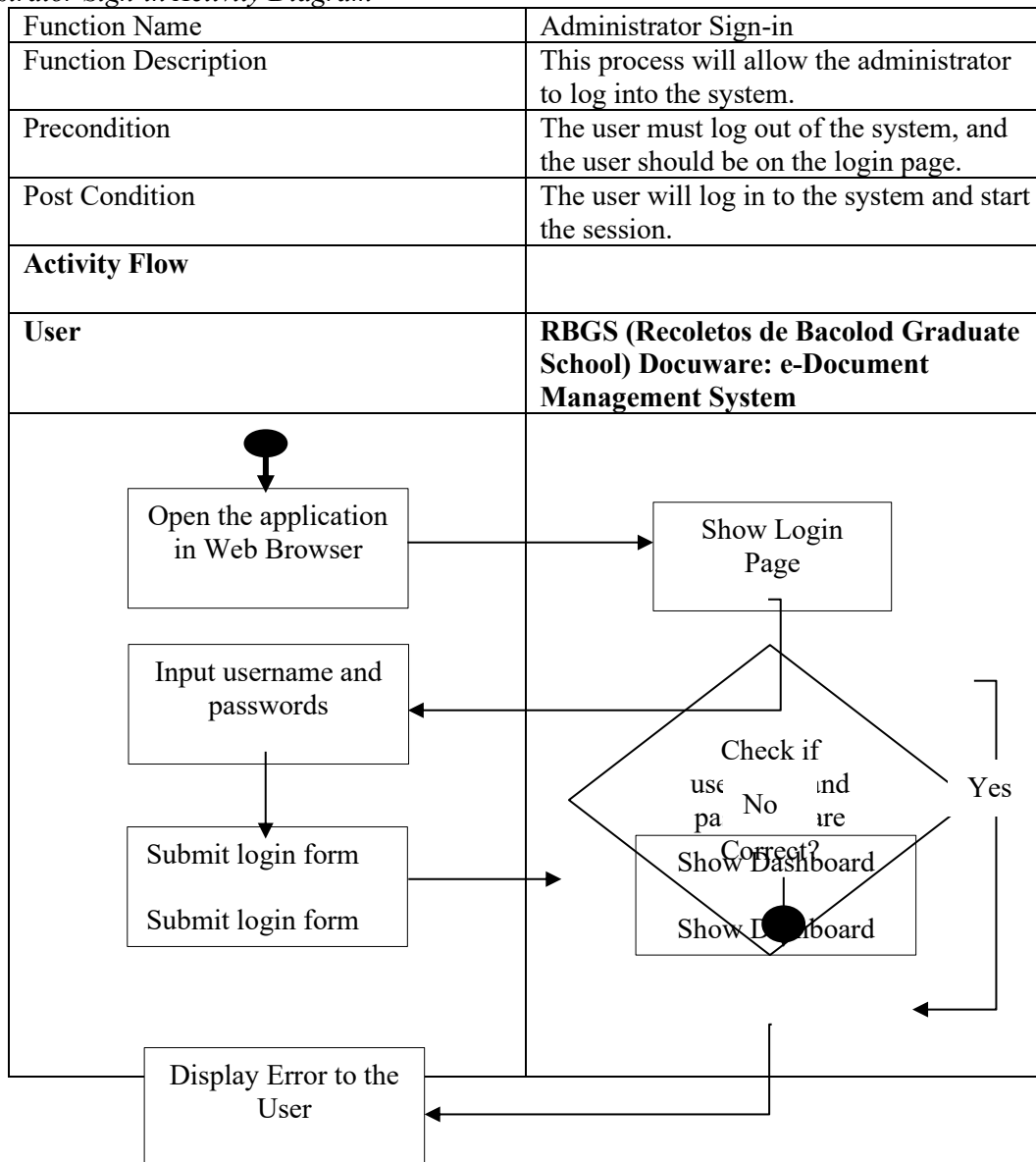
can upload, manage, and modify the contents of the archive. The integrity and security of the system largely depend on the robustness of this sign-in mechanism.

3.2.1.2. Stimulus / Response Sequences

The Administrator Sign-in process of the RBGS E-document management System follows a well-defined sequence of interactions. When administrators seek access to the system, they initiate the login process. In response, the system prompts the administrator to provide their authentication credentials, which typically include a username and password. Once the administrator submits these credentials, the system verifies them against a secure user database. The system grants access to the requested modules or functions if the credentials are correct. In the event of incorrect credentials, the system provides immediate feedback, such as an error message, without revealing specific details to maintain security.

Table 2

Administrator Sign-in Activity Diagram





The Administrator Sign-in feature entails essential functional requirements. It demands a secure authentication mechanism, possibly including multi-factor authentication, to authorize only legitimate administrators. Efficient credential validation is crucial, with safeguards against security threats like brute-force attacks. Effective session management, automatic logout for inactivity, and clear error messages for failed login attempts enhance security. An audit trail records all login attempts for security monitoring, while a user-friendly interface assists administrators, ensuring a secure and user-centric sign-in process.

3.2.2. View System Dashboard

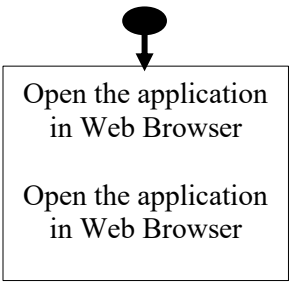
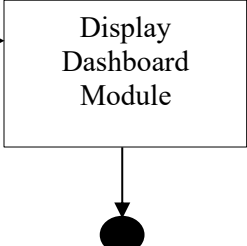
3.2.2.1 Descriptive and Priority

It serves as a central hub within the RBGS E-document Management System, offering administrators and authorized users a comprehensive overview of research documents and related data. This feature is a high priority as it directly impacts the system's usability and efficiency in document management. The dashboard is pivotal for quick access to documents, monitoring publication activity, and ensuring that academic research remains organized and accessible.

3.2.2.2. Stimulus / Response Sequences

The Research Publication Dashboard in the RBGS E-document Management System follows a well-defined sequence of interactions. When an authorized user accesses the dashboard, the system responds by presenting a summary view of available research documents, including metadata such as titles, authors, publication dates, and categories. Users can then initiate search or filter actions, prompting the dashboard to dynamically update and display search results or filtered content based on their criteria. Selecting a specific publication for more details leads to the system providing an in-depth view, including abstracts, full texts, and related documents. Finally, users can request actions like editing, archiving, or deleting a publication, to which the system responds by executing the requested action and updating the dashboard accordingly.

View System Dashboard Activity Diagram

Function Name	View System Dashboard
Function Description	This process will allow the user to view the overview information in the system.
Precondition	The user must log in to the system.
Post Condition	The user views the dashboard overview inside the system.
Activity Flow	
User	RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System
	

3.2.2.3. Functional Requirements

Several critical functional requirements underpin the Research Publication Dashboard. Firstly, the dashboard must succinctly present a summary of research documents, encompassing vital metadata. Users should be able to perform searches and apply filters to swiftly locate documents based on various criteria. Selecting a publication must provide users with comprehensive details, including abstracts, full texts, and related documents. Administrative actions such as editing, archiving, or deletion should be feasible directly from the dashboard. Role-based permissions should govern user accessibility, and the dashboard should be responsive across various devices. Performance optimization is imperative to handle large data volumes effectively, and security measures should be in place to safeguard sensitive research data and prevent unauthorized access. Collectively, these functional requirements ensure the Research Publication Dashboard's effectiveness and security in the RBGS E-document Management System.

3.2.3. Documents Archives Browsing

3.3.1.1 Descriptive and Priority

The "Show/View Document Archives" feature plays a pivotal role in the RBGS E-document management System by allowing users to access and view archived documents. This feature holds a high priority as it directly impacts user accessibility to research materials, making it essential for academic and administrative purposes.

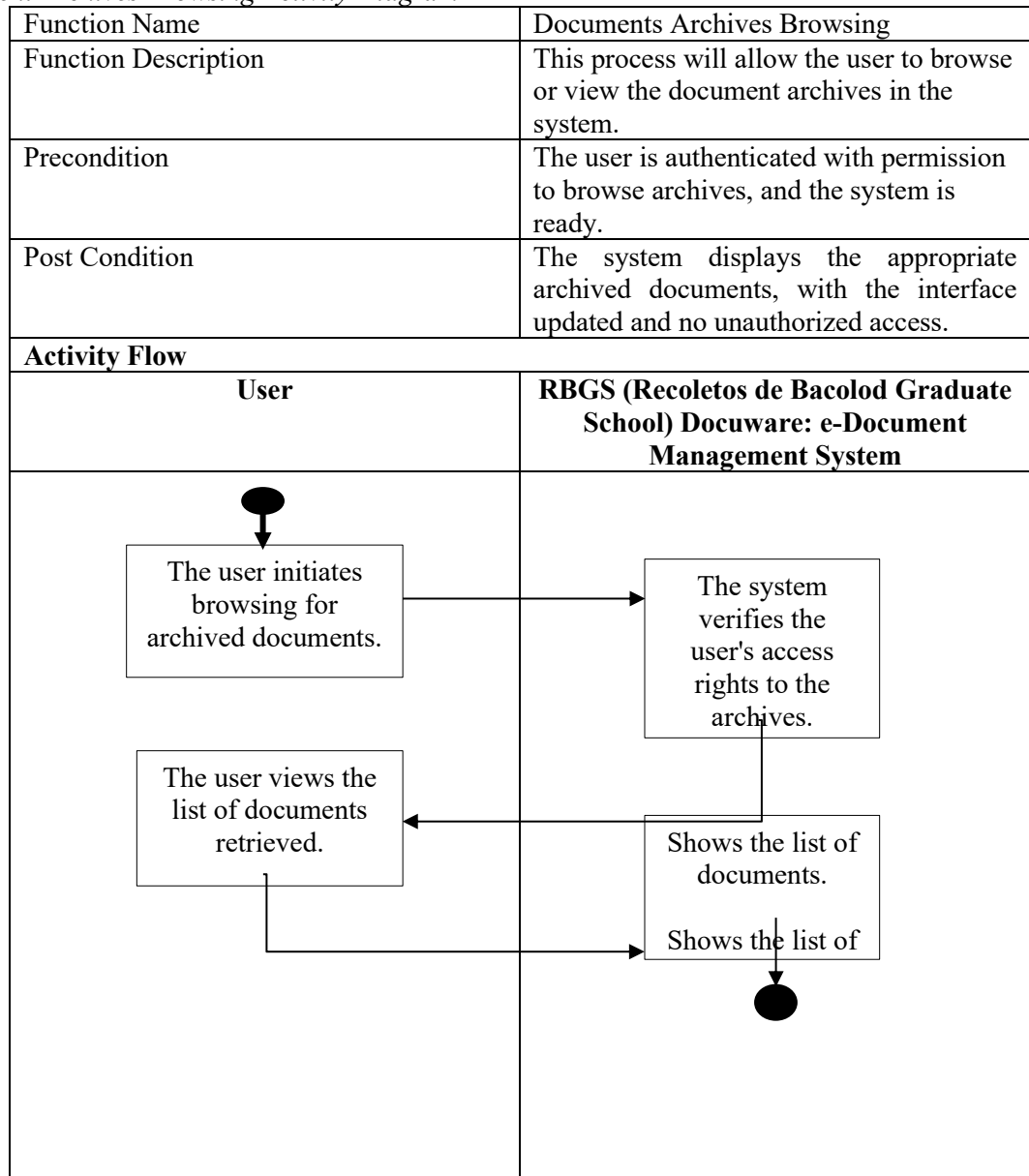
3.2.3.2. Stimulus / Response Sequences

The "Show/View Document Archives" feature in the RBGS E-document management System follows a structured sequence of interactions. When a user initiates a



The system responds by presenting a list of available document archives thoughtfully categorized and organized for easy navigation. Upon selection of a specific document archive, the system obliges by displaying its contents, including individual documents, abstracts, and full texts. Users can further engage with the system by performing actions such as searching, filtering, or sorting within the document archive, prompting dynamic updates to the display based on their actions.

Table 4
Document Archives Browsing Activity Diagram



3.2.3.3. Functional Requirements

The Recoletos Graduate School's E-document Management System (EDMS) is a specialized tool designed to streamline the management and digitization of research documents. It functions as an in-house platform for storing and retrieving graduate



managed by a designated administrator. The system's primary focus is digitization, converting physical documents into accessible digital formats. Its central repository fosters collaboration and knowledge sharing within the academic community, while robust security measures ensure the confidentiality of research materials. The user-friendly interface caters to diverse users, and although currently offline, future online capabilities are planned.

The EDMS operates primarily as a web-based application accessible through standard web browsers. Notably, it offers offline functionality, allowing uninterrupted access to documents and research publications even without an internet connection. This feature particularly benefits users in locations with limited connectivity, ensuring continuous productivity and research progress.

3.2.4. Manage Faculty

3.2.4.1. Descriptive and Priority

This module is a core component of the system, designed to streamline the administration and management of faculty-related records. This feature prioritizes operational efficiency by organizing and safeguarding faculty profiles, contracts, evaluation results, and related documents. It ensures secure and efficient access for authorized users, supporting administrative and academic needs.

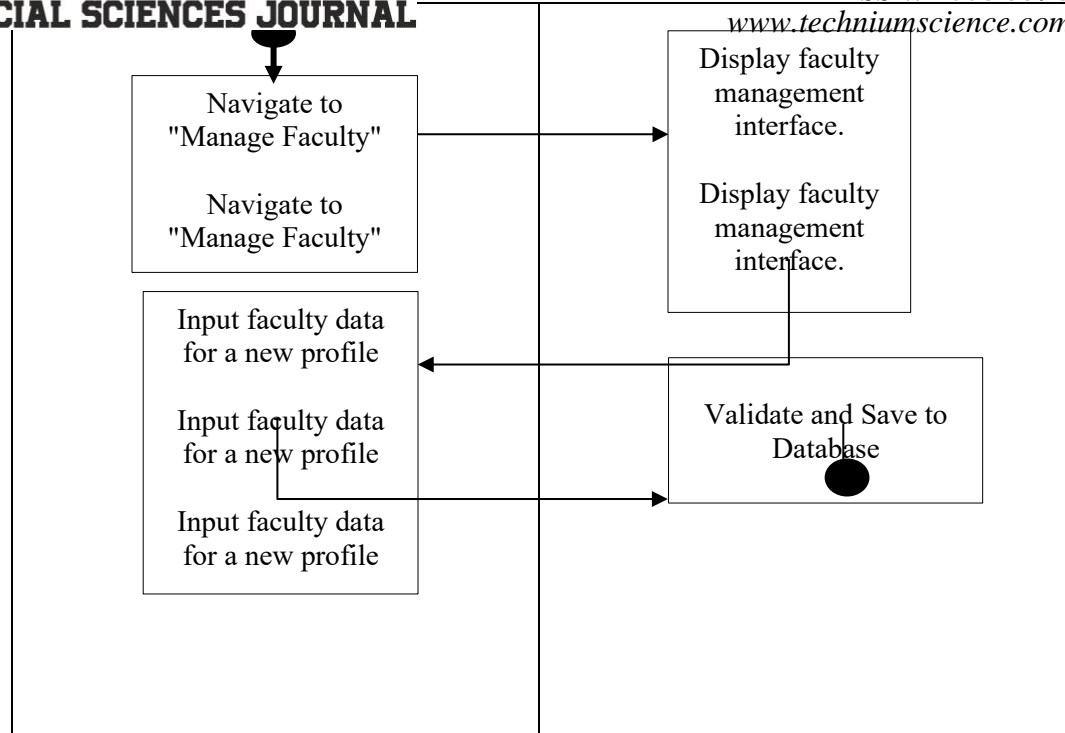
3.2.4.2. Stimulus / Response Sequences

The "Manage Faculty" module begins with the administrator navigating to the "Manage Faculty" section through the system's dashboard. Upon accessing the module, the system displays an interface with options to add, view, update, or delete faculty records. When the administrator selects adding a new faculty profile, the system prompts them to input the required details, such as the faculty member's name, department, contact information, and related documents. After the data is submitted, the system validates the inputs and securely saves the information to the database, generating a confirmation message upon successful completion.

Table 6

Manage Faculty Activity Diagram

Function Name	Manage Faculty
Function Description	This module facilitates the management of faculty records, including adding, updating, and retrieving faculty information.
Precondition	The administrator must be logged in and have the appropriate access rights.
Post Condition	Faculty records are securely updated, retrieved, or archived, reflecting any changes made by the administrator.
Activity Flow	
User	RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System



3.2.4.3 Functional Requirements

The "Manage Faculty" feature provides comprehensive functionality to efficiently handle faculty-related records. It allows administrators to add new faculty profiles by entering essential details such as personal information, department assignments, and contact information and uploading relevant documents, including contracts or performance evaluations. The system also supports updating existing records, enabling administrators to modify faculty information as needed to ensure accuracy and completeness. Additionally, the module includes functionality for viewing detailed faculty profiles, which may contain archived documents, assigned courses, and evaluation histories.

3.2.5. Manage Archives

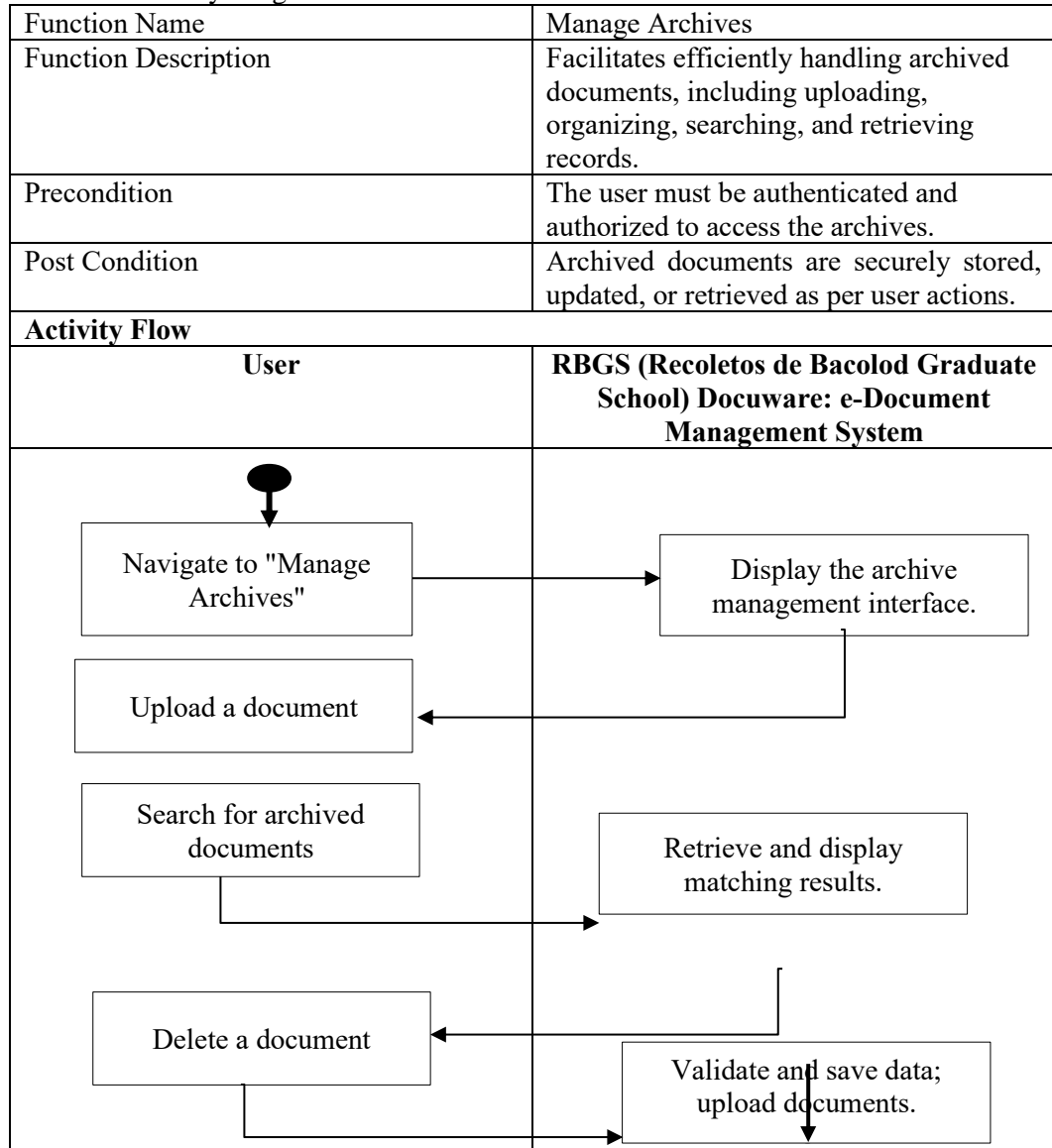
3.2.5.1. Descriptive and Priority

The "Manage Archives" module is an important system component, enabling the efficient organization, storage, and retrieval of archived academic and administrative documents. This feature is prioritized to preserve critical institutional records, compliance with retention policies, and secure accessibility for authorized personnel.

3.2.5.2. Stimulus / Response Sequences

When users access the "Manage Archives" module, they can upload, organize, search, and delete archived documents. After submission, the system validates the provided data, encrypts the filename for security purposes, and saves the document in the centralized repository. Users can search archived documents using keywords, date ranges, or specific categories, with the system retrieving and displaying the matching results alongside metadata and access logs. If the user initiates an update or deletion of a document, the system verifies their access rights, performs the requested action, and logs the activity for audit purposes.

Manage Archives Activity Diagram



3.2.5.3. Functional Requirements

The "Manage Faculty" feature provides comprehensive functionality to efficiently handle faculty-related records. It allows administrators to add new faculty profiles by entering essential details such as personal information, department assignments, and contact information and uploading relevant documents, including contracts or performance evaluations. The system also supports updating existing records, enabling administrators to modify faculty information as needed to ensure accuracy and completeness. Additionally, the module includes functionality for viewing detailed faculty profiles, which may contain archived documents, assigned courses, and evaluation histories.

3.2.6. Generate Reports

3.2.6.1. Descriptive and Priority

The "Generate Reports" module allows users to create comprehensive lists of all students and faculty stored within the system. When a user selects the "Print Reports" feature, the system prompts them to choose the type of report—students and faculty. The system retrieves the relevant records from the database and organizes them into a structured HTML format optimized for printing on either short or long bond paper. After rendering the report, the system provides a print preview to ensure the output aligns with the selected paper size and layout. Once the user confirms, the system sends the formatted report to the printer.

3.2.6.2. Stimulus / Response Sequences

The "Generate Reports" module begins when the user selects the option to generate a report from the system dashboard. The system responds by presenting an interface allowing the user to specify the type of report, such as student and faculty records. The users can configure filters, including department, year level, or role, and select the preferred paper size—either short or long bond paper. After configuring the report options, the user submits the request. The system retrieves the relevant records from the database, organizes them into a structured HTML format, and applies the specified filters and formatting for printing. A print preview is displayed to ensure the report layout aligns with the selected paper size and includes all necessary details. Upon confirmation by the user, the system sends the report to the printer, completing the process.



Print Reports Activity Diagram

Function Name	Print Reports
Function Description	his functionality allows users to generate and print reports containing a list of all students, faculty, or both. The reports are formatted in HTML and optimized for printing on short or long bond paper.
Precondition	The user must be logged into the system with proper authorization to access and generate reports.
Post Condition	The report is successfully printed in the selected paper size, with the specified filters applied.
Activity Flow	
User	RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System
<pre> graph TD Start(()) --> Step1[Navigate to the "Generate Reports" module.] Step1 --> Step2[Display the report generation interface.] Step2 --> Step3[Select the type of report (student or faculty).] Step3 --> Step4[Submit the request to generate the report.] Step4 --> Step5[Format the report in HTML and generate a print preview.] Step5 --> Step6[Send the formatted report to the printer to complete the process.] Step6 --> Step7[Review the print preview and confirm to print.] Step7 --> End(()) </pre>	

3.2.6.3. Functional Requirements

The "Generate Reports" module requires the ability to compile and present lists of students and faculty in a structured HTML format suitable for printing. The system must allow users to select the type of report, choose the paper size (short or long bond), and apply filters to refine the data. Reports should include key details such as names, IDs, departments, and roles, organized in a clear tabular format. The system must support pagination for large datasets to ensure readability and proper printing alignment. It should also provide a print preview, ensuring users can verify the report's layout before printing. Additionally, the module must adapt the HTML output to match the selected paper size, maintaining proper margins and spacing for professional presentation. Only authorized users should have access to this feature, with role-based permissions determining the scope of the report generation.

External interface requirements

4.1. User Interfaces

4.1.1. Login

Figure 3 shows that the login module is the gateway to the system, allowing authorized users to securely access the platform. It features a user-friendly interface for entering credentials and employs authentication mechanisms to verify user identities and access privileges. Integrated with RBGS's user management system, administrators can manage user accounts efficiently. It may include features such as password recovery and account locking for enhanced security and usability. Overall, the login module ensures secure and reliable access to the RBGS system while maintaining data integrity and confidentiality.

Figure 3

Login Module

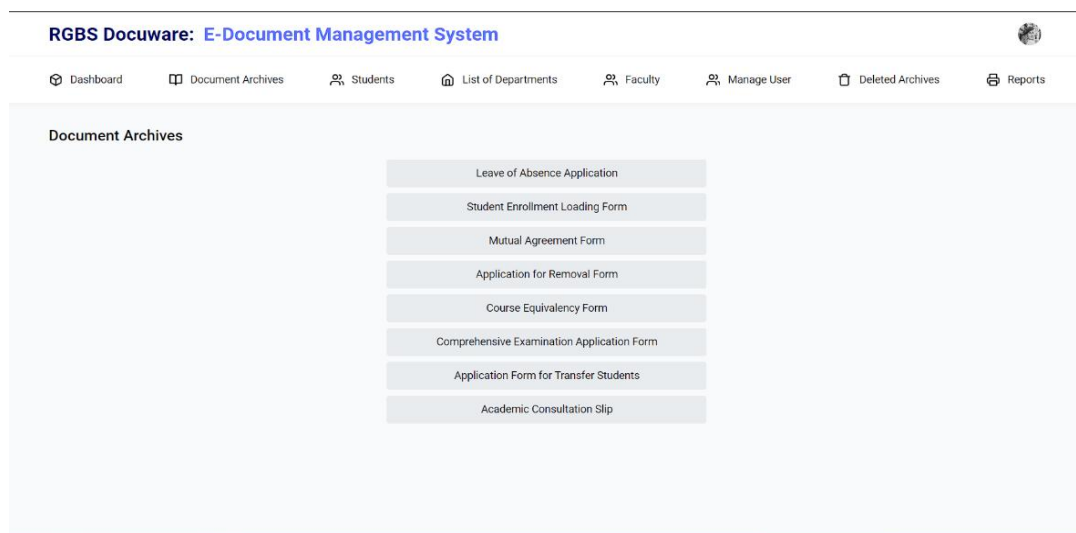


4.1.2 Document List Archives

Figure 4 shows that the Document List Archives module streamlines RBGS's document management by providing a centralized repository for academic materials. Users can easily navigate, search, and retrieve documents, aided by features like categorization, keyword search, and document preview. Version control ensures access to the latest information, while metadata enhances organization. Access control mechanisms maintain document security. Overall, this module improves efficiency and accessibility in handling RBGS's academic documents.

Figure 4

Document List Archives Module

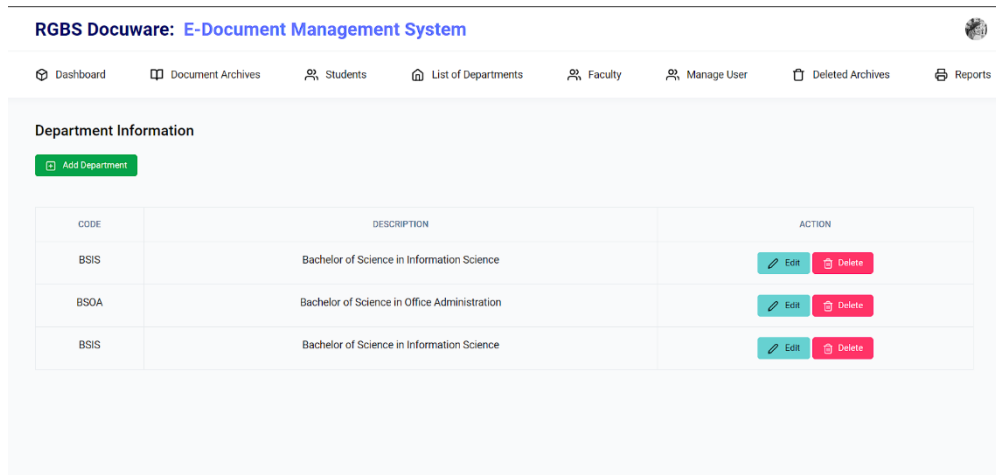


4.1.3 Department Information Module

Figure 5 shows that the Department Information Module acts as a centralized database for all RBGS department-related data, providing users easy access to essential information. It offers detailed department profiles, including department heads, contact details, and objectives, along with course offerings, faculty directories, and event calendars. Users can also share resources and collaborate within the module, enhancing communication and transparency. Administrators have access to tools for managing departmental data efficiently. Overall, this module streamlines administrative processes, improves information sharing, and fosters collaboration within RBGS departments.

Figure 5

Department Information Module

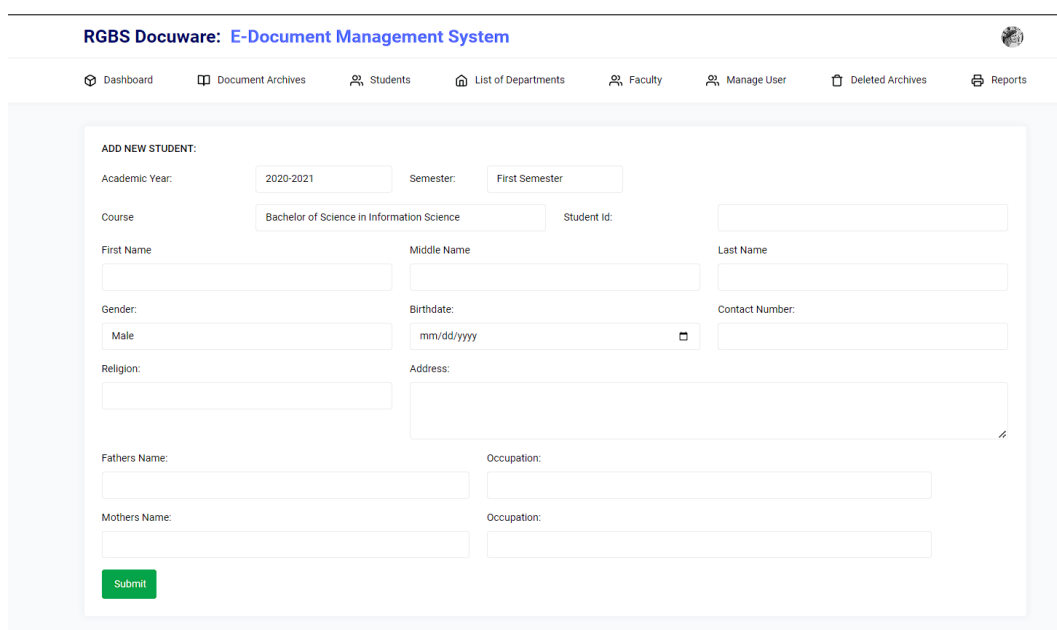


4.1.4 Add New Student

Figure 6 shows that the Add New Student Module streamlines the process of adding new students to the RBGS system. It can easily input essential student details, such as personal information, using intuitive data entry forms. The module includes validation checks to ensure data accuracy and may allow for document uploads. Notification alerts keep users informed of successful additions or any encountered errors. This module enhances administrative efficiency and supports RBGS's commitment to maintaining accurate student records.

Figure 6

Add New Student Module



4.2 Hardware Interface

The best performance and reliability of the RBGS Docuware e-Document Management System depend on its hardware requirements. Processing power, memory units, and storage devices are essential to process documents faster and keep the system live. Also, it is visually attractive and used for document management. It should be displayed on high-resolution monitors. Such prerequisites are important because they help deliver uninterrupted service through document management systems.

4.2.1 Server Computer

The hardware requirements of the server computer are important for ensuring optimal performance and reliability of the system. It should be equipped with a processor that meets the demand for processing power, ideally a 1 gigahertz (GHz) or faster CPU with 2 or more cores, and it should be compatible with 64-bit architecture. This ensures efficient handling of multiple tasks and concurrent user requests. A minimum of 4 gigabytes (GB) of RAM is essential to support the system's memory requirements, allowing for smooth operation even during peak usage periods.

In terms of storage, the server should have at least 64 GB of storage space, preferably in the form of Solid-State Drive (SSD) technology. SSDs offer faster data access and better reliability than traditional Hard Disk Drives (HDDs), which are essential for handling the large volumes of documents and data managed by the e-Document Management System. The monitor has LED technology, ensuring a minimum screen resolution of 1280 x 800. While the server typically operates without direct user interaction, the monitor may be necessary for initial setup, maintenance tasks, or troubleshooting purposes. Implementing these hardware requirements ensures that the server computer can effectively support the RBGS Docuware e-Document Management System, providing the necessary performance, storage capacity, and display capabilities to meet the demands of document management and ensure seamless operation within the academic institution.

Figure 7

Hardware Interfaces



4.3 Software Interfaces

The software interface of the Docuware e-Document Management System is important within Recoletos De Bacolod Graduate School (RBGS) as it serves as the primary platform for efficient document management. The system provides a digital record of documents ranging from student records to research archives and administrative paperwork. A user-friendly interface is important to ensure continuous interaction and navigation through these digital

assets. It minimizes the learning curve for faculty, administrative staff, and students, thereby enhancing productivity and ensuring widespread adoption of the system. Moreover, the interface search and categorization functionalities streamline document retrieval, ensuring that required documents are readily accessible when needed, thus facilitating smoother operations across the institution. The software aligns with RBGS's commitment to modernizing administrative processes. By providing a centralized platform for document management, it promotes standardization, consistency, and transparency in document handling. This not only brings up collaboration and communication within RBGS but also reinforces the institution's reputation for embracing technology-driven solutions to meet the evolving needs of its academic community.

Table 9
Minimum System Requirements

Specifications	Laptop or Desktop
Processor	1 gigahertz (GHz) or faster with 2 or more cores on a compatible 64-bit processor
Operating System	Windows 10 or Higher.
Browser	Compatible web browser (e.g., Google Chrome, Mozilla Firefox, Microsoft Edge)
RAM	4 gigabytes (GB) or higher
Storage	64 gigabytes (GB) or larger SSD
Connectivity	Ethernet or Wireless Connection

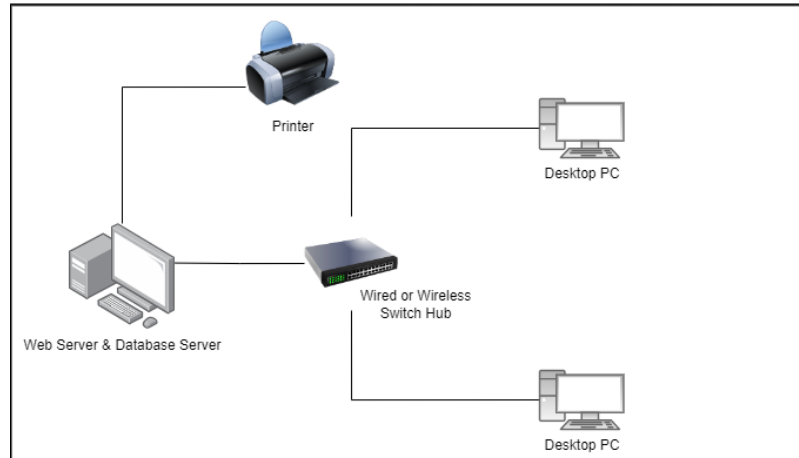
4.4 Communication Interfaces

Communication interfaces are important bridges enabling the exchange of information between systems, devices, or users. They encompass physical connectors like USB and Ethernet ports and wireless connections like Wi-Fi and Bluetooth. They also include software protocols and APIs facilitating data exchange over networks, like HTTP for web communication or TCP/IP for internet-based connectivity.

The communication interface of the system involves a straightforward setup, with a central server located within the school premises and clients connected to the database. The system is installed on a single PC designated as the server, which serves as the central hub for data storage and management. This server PC is connected to a switch, facilitating connectivity with client computers within the network.

Figure 8

Communication Interface



5. Other nonfunctional requirements

This chapter addresses additional considerations beyond the functional requirements of the RBGS Docuware: e-Document Management System. These nonfunctional requirements encompass aspects such as performance, reliability, usability, and security, all crucial for ensuring the system's effectiveness and user satisfaction. By specifying and analyzing these requirements, we aim to create functions that enhance operational efficiency and deliver a seamless user experience.

5.1 Performance Requirements

In this section, we evaluate the performance of RBGS Docuware: e-Document Management System accessibility through clients' web browsers. The evaluation involves 22 measures, with a specific focus on ten measures directly correlated with product features. Thirty respondents, including ten professionals and 20 students, were carefully selected to participate in the assessment of the system's functionality. Utilizing a five-point rating scale known as the Pomel Scale, ranging from 5, denoting Excellent, to 1, indicating Very Low, respondents provided valuable insights into the system's effectiveness and usability. Detailed findings and ratings are presented in Table 5 for reference.

Table 1

Pomel Scale for Evaluation

Description	Range	Interpretation
The performance and quality of the product based on the measure has reached an excellent level	4.50-5.00	Excellent

The performance and quality of the product based on the measure have reached a satisfactory level.	3.50-4.49	Good
The performance and quality of the product based on the measure have reached an acceptable level	2.50-3.49	Average
The performance and quality of the product are below the acceptable level but remain workable. Improvement is highly recommended.	1.50-2.49	Low
The performance and quality of the product are not acceptable. There is a need to re-analyze and re-design the entire application.	1.00-1.49	Very Low

Table 2

Summary Features and Attributes of RBGS Docuware e-Document Management System

Product Features	Software Quality Attributes
User-Friendliness (Usability)	Operability, Training, and Communicativeness
Compatibility (Adaptable)	Operability and Consistency
Reliability (Reliability)	Accuracy, Consistency, and Simplicity
Interactivity (Human Engineering)	Simplicity and Communicativeness
Learning Reinforcement (Understandability)	Consistency, Conciseness, and Modularity
Dynamic Environment (Flexibility)	Operability, Expandability, and Modularity

Table 5 discusses the different features of the application using RBGS E-Document Management System with corresponding quality attributes of the application, mean, and interpretation, which are the results based on the formulas presented. The table below shows how to evaluate the application based on the given attributes and make it suitable for the users.

Table 3
Mapping of Features and Relevant Measures

Product Features	Software Quality Attributes	Mean	Interpretation
User-Friendliness (Usability)	Operability	4.87	Excellent
	Training	4.93	Excellent
	Communicativeness	4.90	Excellent
Compatibility (Adaptable)	Operability	4.87	Excellent
	Consistency	4.89	Excellent
Reliability (Reliability)	Accuracy	4.93	Excellent
	Consistency	4.89	Excellent
	Simplicity	4.91	Excellent
Interactivity (Human Engineering)	Simplicity	4.91	Excellent
	Communicativeness	4.90	Excellent
Learning Reinforcement (Understandability)	Consistency	4.89	Excellent
	Conciseness	4.87	Excellent
	Modularity	4.87	Excellent
Dynamic Environment (Flexibility)	Operability	4.87	Excellent
	Expandability	4.90	Excellent
	Modularity	4.87	Excellent

The proponent used a five-point Pomel scale to rate and measure the application. Google Forms was used as survey administration software to distribute to each respondent. After answering the survey, the proponent got the results instantly from the 30 respondents and tabulated the data in each feature.

5.1.1. User-Friendliness

The RBGS E-Document Management System is user-friendly, so users can easily operate the web application and use all the features. For this attribute, the results of its survey are as follows: operability ($m = 4.87$), training ($m = 4.93$), and communicativeness ($m = 4.90$). This results in a mean score of 4.90, which is "excellent".

5. I .2. Compatibility

It is a feature of RBGS E-Document Management System that software can run not just on one platform or model but on other operating systems or hardware. For this feature,

these are the quality attributes, and its scores are the following: Operability (M= 4.87) and Consistency (M = 4.72), in which the two have a mean value of 4.79 and are rated as "excellent".

5.1.3. Reliability

It is a feature of RBGS E-Document Management System that refers to the capability of the web application to maintain its level of performance under stated conditions for a stated period. For this feature, these are the quality attributes, and its scores are the following: Accuracy (M=4.93), Consistency (M=4.89), and Simplicity (M=4.91). This results in a mean score of 4.91, which is "excellent".

5.1.4. Interactivity

It is a feature of the system that allows interaction between users. These are the quality attributes for this feature, and its scores are Simplicity (M=4.91) and Communicativeness (M=4.90). This results in a mean score of 4.90, which is "excellent".

5.1.5. Dynamic Environment

This feature of the system changes the page or interface on the web application every time there is progress or another level. For this feature, these are the quality attributes, and its scores are the following: Operability (m= 4.87), Expandability (M=4.90), and Modularity (M= 4.87). This results in a mean score of 4.88, which is "excellent".

The nonfunctional requirements of the system were evaluated through a structured survey conducted with 30 respondents using a five-point Likert scale. The survey results were collected using Google Forms, allowing for efficient data gathering and instant tabulation of responses. Respondents observed that the system excelled in key areas such as usability, reliability, compatibility, interactivity, and flexibility, reflected in the high mean scores for corresponding attributes like operability, communicativeness, accuracy, and modularity. Observations also emphasized that the system's dynamic environment enhanced user experience by adapting seamlessly to changes and progress, with attributes like expandability and modularity receiving excellent ratings.

5.2. Safety and Security Requirements

The section on Safety and Security Requirements is crucial within any software development project, particularly in environments like Recoletos De Bacolod Graduate School (RBGS), where data integrity and user privacy are paramount. This section outlines measures and protocols aimed at safeguarding sensitive information, preventing unauthorized access, and ensuring the overall safety of the system and its users. The safety requirements may include measures to prevent data loss or corruption, such as regular backups and disaster recovery plans. The safety protocols may address potential hazards associated with system usage, such as ensuring that user interfaces are intuitive to prevent user errors that could lead to unintended consequences. It also serves as a comprehensive guide for ensuring the confidentiality, integrity, and availability of RBGS's e-Document Management System. By addressing potential safety hazards and implementing stringent security measures, RBGS can mitigate risks and build trust among its users, ultimately fostering a safe and secure digital environment for academic operations. The system does not include revision or versioning capabilities. Once a file is finalized, users must export it as a PDF and then upload the updated document to the system. This process guarantees that only the most recent, finalized version of the document is stored, maintaining clarity and consistency in the document repository.

5.2.2 Data Backup

The Data Backup system, integrated into the settings module, provides a convenient solution for Recoletos De Bacolod Graduate School (RBGS) users. By simply clicking the

backup button, users can generate a downloadable SQL code. This SQL code serves as a comprehensive backup of critical data, ensuring that in the event of system issues or data loss, users can effortlessly import the backup to restore functionality and retrieve essential information.

5.3 Installation Directory

In the installation process, the administrator is required to set up several essential components to ensure the smooth operation of the system. Firstly, the installation involves the deployment of XAMPP, a web server solution that integrates Apache, MySQL, and PHP, providing an environment for hosting web applications. The installation includes Composer, a dependency manager for PHP, which facilitates the installation and management of third-party libraries and packages essential for the system's functionality. The installation version should be PHP version 8.2, ensuring compatibility with the latest features and security enhancements. Administrators are tasked with installing Git, a version control system, enabling efficient collaboration and tracking changes to the system's codebase. This empowers administrators to easily manage system updates and modifications, facilitating agility and flexibility in adapting to evolving requirements. The installation directory is within the XAMPP folder in the htdocs directory, providing a centralized location for hosting the system's files and directories. This ensures easy access and management of the system's components, allowing administrators to easily configure, customize, and maintain the system. The installation process is meticulously designed to equip administrators with the necessary tools and resources to deploy and manage the system effectively within the RBGS environment.

6. Summary and recommendation

This chapter summarizes the development of the RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System, including its key findings and outcomes. It also provides recommendations to guide future improvements and address any recognized gaps.

6.1 Summary

This study focuses on designing and implementing the RBGS (Recoletos de Bacolod Graduate School) Docuware: an e-Document Management System. The system enhances the efficiency and productivity of document management at RBGS by providing a well-organized, easily accessible, and securely stored repository for academic and administrative records. Key contributions of the system include the digitization of hard copies, centralized document management, and support for future collaboration through API-ready infrastructure. These features include the ability to upload only PDF files, centralized storage, and advanced security through filename encryption, ensuring the confidentiality and integrity of documents. The system's robust search functionality and user-friendly visualization tools streamline document retrieval, while the comprehensive backup strategy using SQL file types ensures data safety and recovery. By replacing manual processes with a digitized and centralized system, RBGS benefits from improved workflow efficiency, reduced administrative workload, and enhanced document accessibility. However, the system does not support file versioning, requiring users to export finalized documents in PDF format and re-upload them to maintain consistency and accuracy.

This innovative solution significantly contributes to RBGS by addressing current challenges in document management and paving the way for a more efficient and secure digital future.

6.2 Recommendations

To further enhance the RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System, it is recommended to explore the integration of version control to manage document revisions more effectively. While the current system ensures document consistency through finalization and re-uploading, incorporating versioning would facilitate better tracking of document changes and revisions. Regular system updates and user training are also advisable to ensure continued effectiveness and user satisfaction. The system should support online access and operations to improve flexibility and accessibility, enabling users to manage documents and perform necessary tasks from any location.

Considering future scalability and integration with other institutional systems will support the ongoing growth and adaptability of the RBGS (Recoletos de Bacolod Graduate School) Docuware: e-Document Management System.

7. Project management

A. Hardware Recommendations

The hardware needed for the system development of the Docuware: e-Document Management System for Recoletos De Bacolod Graduate School is shown in the table below:

Server Specs	Network Peripherals
Windows 10 OS (64BIT)	1 Modem
Intel i5 Processor 10th Generation	1 Router
1 TB Hard drive	1 Switch Hub
8GB RAM	2 Network Printers
2GB VGA	

The server specifications and network peripherals are designed to support the efficient operation of the RBGS Docuware: e-Document Management System. The server is equipped with a 64-bit Windows 10 operating system, powered by a 10th generation Intel i5 processor, which offers high performance for handling multiple tasks and faster processing of data. The system includes a 1 TB hard drive, a storage capacity for managing large volumes of documents, and 8 GB of RAM to facilitate quick data access and multitasking. A 2GB VGA card is included to ensure that the server can handle graphics-intensive tasks, such as the visualization features integrated into the system.

The network peripherals use the server's capabilities to guarantee reliable and efficient connectivity across the system. A modem provides internet access, while a router manages the distribution of this connection to various devices within the network. A switch hub enhances the network by enabling multiple devices to communicate seamlessly, thus optimizing data flow between the server, workstations, and network printers. Including two network printers ensures that documents can be printed directly from the system, streamlining administrative processes and improving overall productivity. Together, these components create a well-rounded and efficient network infrastructure supporting system requirements.

B. Software Recommendations

These are the software needed for the development of the system shown in the table below:

Table 4

Software Recommendations

Development Tools	The Use
Application and Software <ul style="list-style-type: none"> • XAMPP 2.5 • NotePad++ • Adobe Photoshop CS5 • Adobe Dreamweaver CS5 • PostgreSQL 	These are the software requirements that must have been used by the developer to develop the system. These will be the software tools to develop a good product or output.
Operating System Platform <ul style="list-style-type: none"> • Windows 10 Ultimate • Windows 10 Professional 	The Operating system needed will fit our system.
Tools for Documentation <ul style="list-style-type: none"> • Microsoft Office 	Tools must be used for documentation and report purposes. Also used for the configuration of some pictures and editing.

On the server side, the Xampp application will interpret the scripts written using the programming language used in the RBGS Docuware: e-Document Management System. Xampp is a free application that can be downloaded. It is also an open-source, cross-platform web server application. The system can be tested offline via Xampp if installed on the server. Other editors are required to enhance images, modify codes, or debug. Operating systems should be installed first so that third-party applications can be installed. For printing reports, Microsoft Office programs are needed.

C. User Classes and Characteristics

The people ware requirement is the involvement of the users of the system who can use it

Table 5

People Requirements

Developer	Job and Involvements
Project manager	They are responsible for modifying and leading the project to success. The one who will shape the project to fit the needs of the required project.
Systems Analyst Programmer Researcher System Designer	The one who will analyze the problem and suggest a solution. Responsible for the development of the project based on the needs of the system requirements. The one responsible for the fact-finding and assisting the group in finding the research and fact-finding technique.

	Responsible for the design according to what the beneficiary wants must understand the user interface.
Back-end Users: Administrator Front-end User:	Responsible for running, manipulating, storing, retrieving, updating, adding, deleting, and viewing data.

D. Product Feasibility Assessments

Product Feasibility Assessments are comprehensive evaluations conducted to determine the viability of a proposed product or system before its development and implementation. These assessments help identify potential challenges, risks, and opportunities, guaranteeing that the product is both practical and profitable. The evaluation typically covers several key areas:

a. Marketing

The RBGS Docuware e-Document Management System presents a promising opportunity in the market, particularly within academic institutions like Recoletos de Bacolod Graduate School. Efficient, secure, and user-friendly document management systems are increasingly important as schools move towards digital transformation. The system's ability to centralize and automate document storage and retrieval. Marketing efforts could focus on the system's unique features, such as its user-friendly interface, positioning it as an essential tool for educational and student needs.

b. Management/Personnel

From a management and personnel perspective, the RBGS Docuware e-Document Management System is highly feasible. The system's development and implementation are managed by an in-house team, including the researcher, who is already employed at the graduate school and serves as the system administrator. This internal management ensures the project is closely aligned with the institution's needs and objectives. However, the successful deployment of the system will require dedicated training sessions for staff to familiarize them with the new processes and features. This training is essential to ensure smooth adoption and to maximize the system's effectiveness in daily operations.

c. Economic/Financial

Economically, the project is highly viable. Since the development and deployment are managed internally, no significant additional costs are involved other than those related to training and potential minor upgrades in hardware or software. The absence of external development costs significantly reduces the financial burden on the institution. Also, in the long-term benefits of the system, such as improved efficiency, reduced document loss, and enhanced compliance with accreditation standards, are likely to result in cost savings and a positive return on investment over time.

d. Production

The production of the RBGS Docuware e-Document Management System is practical and achievable within the current institutional infrastructure. The system is designed to be implemented within the existing IT framework of the graduate school, utilizing standard hardware and software already in place. The development process involves leveraging familiar technologies, reducing the learning curve for both developers and end-users. The primary focus during production will be the system's security and scalability to handle the institution's growing needs. Given the straightforward nature of the production process, the system can be

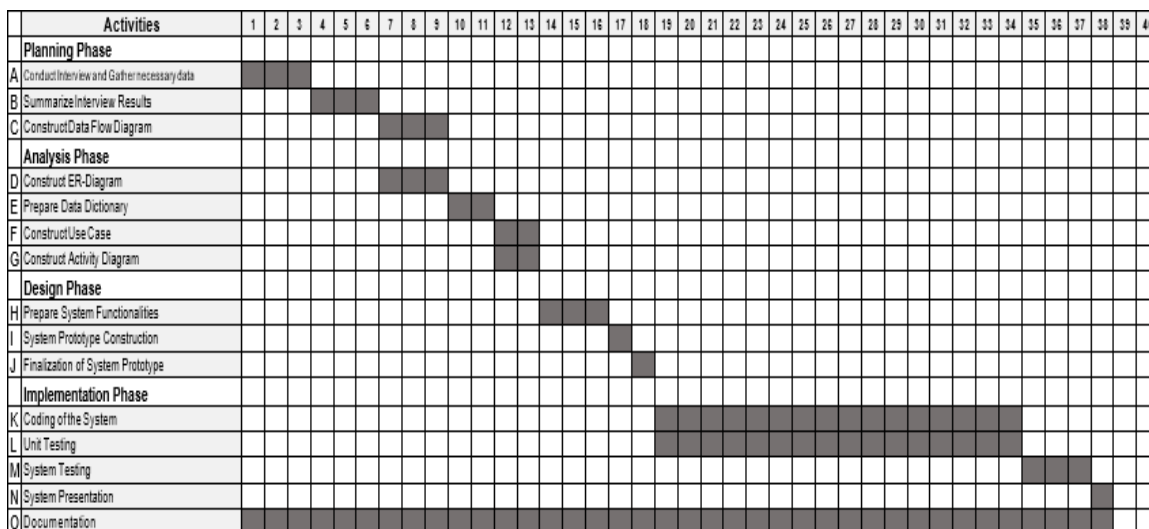
rolled out in a phased manner, minimizing disruption to ongoing operations and allowing for iterative improvements based on user feedback.

E. Time Management

The development of the system is expected to take approximately five months, with ongoing updates to the documentation throughout the process. The researcher employs the Rapid Application Development (RAD) methodology, which allows for iterative development. This means that as each component of the system is completed, it is immediately deployed to the server for testing purposes.

Figure 9

Ghantt Chart



This approach facilitates continuous feedback and refinement, ensuring that the system is progressively improved during development. The deployment phase and the process of uploading documents are time-consuming, as each document needs to be converted into PDF format before being added to the system. While this conversion process is necessary to ensure uniformity and compatibility within the system, it adds to the overall timeline and requires careful attention to detail to maintain document integrity during the transition.

F. Communication, Coordination, and Team Composition

The team utilizes Trello for Kanban-based project management, which is also related to RAD and proves effective in tracking bug fixes and logging future features required for the system. Trello's visual interface aids in organizing tasks and ensuring that all development milestones are met. The team primarily relies on Messenger for quick chats and discussions for day-to-day communication, facilitating prompt responses and collaboration. While the development of the RBGS Docuware e-Document Management System is driven by an informal plan, the primary objective remains clear: to successfully implement the system for RBGS. Despite lacking a formalized development strategy, the team focuses on delivering a functional and efficient product that meets the client's needs.

References

- [1] A study of standard model for electronic document archiving. (2005). *Journal of the Korean Society for Information Management*, 22(2), 147–164. <https://doi.org/10.3743/kosim.2005.22.2.147>
- [2] Adeyemo, K. S. (2019). Predictors of the use of quality management system (Qms) processes for the Asean agenda. In *Higher Education Policy in the Philippines and ASEAN Integration* (pp. 60-75). Brill. DOI: 10.1163/9789004411326_004
- [3] An Open-Source Archiving System. (2011, June 1). IEEE Journals & Magazine | IEEE Xplore. <https://ieeexplore.ieee.org/abstract/document/5770985>
- [4] AlshiblyHaitham, ChiongRaymond, & BaoYukun (2016). Investigating the critical success factors for implementing electronic document management systems in governments. *Information Systems Management*.
- [5] Atal, C., Angala, M., Fernandez, F. R., & Lacsina, C. K. (2022). Electronic document flow monitoring and control system using document structure analysis. *ECS Transactions*, 107(1), 20169. DOI: 10.1149/10701.20169ecst
- [6] Ayaz, A., & Yanartaş, M. (2020). An analysis on the unified theory of acceptance and use of technology theory (UTAUT): Acceptance of electronic document management system (EDMS). *Computers in Human Behavior Reports*, 2, 100032. DOI: 10.1016/j.chbr.2020.100032
- [7] Baek, J., & Sugimoto, S. (2010). Feature analysis of metadata schemas for records management and archives from the viewpoint of records lifecycle. *Journal of Korean Society of Archives and Records Management*, 10(2), 75–99. <https://doi.org/10.14404/jksarm.2010.10.2.075>
- [8] Balogun, N. A., Raheem, L., Abdulrahaman, M. D., & Balogun, U. (2019). Adoptability of electronic document management system in Ilorin businesses. *Nigerian Journal of Technology*, 38(3), 707. <https://doi.org/10.4314/njt.v38i3.24>
- [9] Baban, H., & Mokhtar, S. (2010, November). Online document management system for academic institutes. In *2010 3rd International Conference on Information Management, Innovation Management and Industrial Engineering* (Vol. 4, pp. 315-319). IEEE. DOI: 10.1109/ICIII.2010.555
- [10] Berchtold, S., Biliris, A., & Panagos, E. (1999). SaveMe. *ACM Sigsoft Software Engineering Notes*, 24(2), 167–176. <https://doi.org/10.1145/295666.295684>
- [11] Bresfelean, V.P., Mocean, L., & Urean, C.A. (2017). DMS implications for universities. *Bioinformatics*.
- [12] Caluza, L.J. (2017). Development of electronic document archive management system (EDAMS): A case study of a University Registrar in the Philippines. *International Journal of Digital Information and Wireless Communications*, 7, 106-117.
- [13] Chan, L., Kirsop, B., & Subbiah, A. (2006). Open access archiving: The fast track to building research capacity in developing countries. *ResearchGate*. https://www.researchgate.net/publication/23778268_Open_Access_Archiving_The_Fast_Track_to_Building_Research_Capacity_in_Developing_Countries
- [14] Christodoulakis, S., Θεοδωρίδου, M., Ho, F., Papa, M., & Pathria, A. (1986). Multimedia document presentation, information extraction, and document formation in MINOS: A model and a system. *ACM Transactions on Information Systems*, 4(4), 345–383. <https://doi.org/10.1145/9760.9764>
- [15] Electronic Document Management: Challenges and Opportunities for Information Systems Managers on JSTOR. (n.d.). <https://www.jstor.org/stable/249710>

- [16] Hendratmoko, S. (2023). ASEAN's digital integration: Strategic management, challenges, opportunities, and the role of new technologies. *Jurnal Ekonomi dan Bisnis Digital*, 2(4), 1271-1286. DOI: 10.55927/ministal.v2i4.6734
- [17] Hunaifi, N., Hikmah, A. B., & Ary, M. (2020). Online information system for archiving documents and letters requests at the sub-district level. *Proceedings of the Proceedings of the 7th Mathematics, Science, and Computer Science Education International Seminar, MSCEIS 2019, 12 October 2019, Bandung, West Java, Indonesia*. <https://doi.org/10.4108/eai.12-10-2019.2296543>
- [18] Katuu, S. (2016). Managing digital records in a global environment: A review of the landscape of international standards and good practice guidelines. *The Electronic Library*, 34(5), 869-894. DOI: 10.1108/EL-04-2015-0064
- [19] Kurteva, K. (2023, September). Compliance and data security in document management systems. In *2023 XXXII International Scientific Conference Electronics (ET)* (pp. 1-5). IEEE. DOI: 10.1109/ET59121.2023.10279523
- [20] Makhnevich, D. (2023). Theoretical overview of the implementation of electronic document management in institutions of general secondary education. *Zhytomyr Ivan Franko State University Journal. Pedagogical Sciences*, (1 (112)), 177-189. DOI: 10.35433/pedagogy.1(112).2023.177-189
- [21] Mukred, M., Yusof, Z. M., Al-Moallemi, W. A., Mokhtar, U. A., & Hawash, B. (2021). Electronic records management systems and the competency of educational institutions: Evidence from Yemen. *Information Development*, 38(1), 125-148. <https://doi.org/10.1177/0266666920980829>
- [22] Pho, H. T., & Tambo, T. (2014). Integrated management systems and workflow-based electronic document management: An empirical study. *Journal of Industrial Engineering and Management (JIEM)*, 7(1), 194-217. DOI: 10.3926/JIEM.846
- [23] Regla, A. I., & Marquez, P. S. (2020). Workplace document management system employing cloud computing and social technology. In *Computational Science and Technology: 6th ICCST 2019, Kota Kinabalu, Malaysia, 29-30 August 2019* (pp. 415-424). Springer Singapore. DOI: 10.1007/978-981-15-0058-9_40
- [24] Tolley, H., & Shulruf, B. (2009). From data to knowledge: The interaction between data management systems in educational institutions and the delivery of quality education. *Computers & Education*, 53(4), 1199-1206. DOI: 10.1016/j.compedu.2009.06.003
- [25] Tomaro, Q. P. V. (2018). ICT integration in the educational system of Philippines. *Journal of Governance and Public Policy*, 5(3), 259-282. DOI: 10.18196/JGPP.5399
- [26] Zabukovšek, S. S., Jordan, S., & Bobek, S. (2023). Managing document management systems' life cycle in relation to an organization's maturity for digital transformation. *Sustainability*, 15(21), 15212. <https://doi.org/10.3390/su152115212>
- [27] Requito, A. R., Macapagal, R. C., Pineda, A. A., Cortez, C. A., Canlas, F. Q. & Natividad, R. L. (2019). Implementing document management system (dms) technology in Barangay Paligui, Apalit, Pampanga. *Innovatus*, 2(1)
- [28] Gonzales, J. V., Llanderal, J. G., Perez, J. T. & Marquez, R. E. (2016). Web-based document management and information dissemination through email and sms notification with members attendance monitoring system for LCFEA. *Ani: Letran Calamba Research Report*, 3(1).