

Digital Archives: School and Academic records for Preservation and Accessibility

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ABSTRACT

At the core of every school or university is a key office that quietly keeps everything running smoothly, often working behind the scenes but essential to student success. The registrar's office is responsible for keeping academic records and managing credentials of all students, including the active and former students. They face a huge problem for a long time, as they manually do their task, which leads to delayed transactions, mismanagement of credentials, data loss or damage. This study aimed to improve the efficiency and accessibility of the Saint Columban College Registrar's Office by developing a system for archiving many academic records. This study proposed digitalization in converting physical credentials to maintain accuracy in verification on checking student credential submission whether its complete or incomplete, credential management, data security and data visualization. Additionally, data back was implemented through both local and cloud storage, user's details encryption, and inactive timeout to prevent unauthorized access in case the user leaves the computer unattended. The admin can monitor the user's activity and view the data visualization in the dashboard. This solution solved the time-consuming manual tasks and improved the services of the office as considered the busiest office in the institution. The study utilized the waterfall model due to its effectiveness in managing complex projects through linear and structured approach. For the Testing Phase, functional and non-functional test results were completed together with the Unit Testing. The Functional Test result examines the functions of the system, which has an average rate of 96.075% while the Non-Functional Test result examines the quality of the System, which has an average rate of 86.2%. The Unit Testing examines the functionality of each function and methods within the system using the NUnit Framework of Microsoft Visual studio 2022 software. Therefore, the results manifested that the system application is accepted and ready for utilization. This study can be improved through implementing system integration like Online Request system or system from other offices or departments.

Key words: Academic Records, Credential Management, Digital Archiving, Registrar Office

1. INTRODUCTION

In academic Institution, the Registrar Office plays a crucial role in managing credentials, providing academic documents and verifying student's requirements. However, most of their tasks are done manually, leading to mismanagement of credentials, delay of transactions, and data loss or damage. The office urgently needed not only a manpower, but also a digital system to enhance efficiency of the office transactions. The office faces a huge problem in terms of achieving the credentials of every student, from the very first student until now, for how many years the institution exists, preserves a thousand physical credentials. According to Mr. Edwind Nillama, the head of the Registrar's Office, handling these tasks manually is both time-consuming and risky, especially since it involves processing sensitive student information. Moreover, students and clients often complain about delays and missing documents, unaware of the complexities involved in record management [1]. The proposed system has been developed to address the challenges faced by the employees inside the registrar's office. This study aims to improve efficiency, reduce issues like data loss or misplace, and improve archiving management. By digitizing credentials submitted by the students, the system can automatically verify students' credentials, provide the requested academic document in less time compared to manual process. Additionally, the system will enhance data security by offering both local and cloud storage backups and incorporating features like encryption and inactivity timeouts to prevent unauthorized access. Through this approach, the office can reduce the time spent on manual tasks, ultimately improving service delivery in what is considered one of the busiest offices within the institution.

The proposed system aimed to streamline the process of academic document requests through a structured interaction between clients/students, staff/SG, and admins. In this system,

clients/students requests for academic documents, which were then verified by staff/SG. The staff/SG would check the completeness of the client/student's submission through a search function. If the submission was incomplete, the client/student would be unable to receive the requested document. Additionally, the staff/SG were responsible for scanning and converting the submitted physical documents into digital form. Admins had the capability to monitor user activity throughout the process and were able to view data visualizations, providing insights into system usage and document request trends. This comprehensive approach ensured efficient processing, tracking, and oversight of academic document requests, addressing the inefficiencies and challenges that the Registrar's Office previously faced in managing and safeguarding student records.

Most of the registrar offices, even in universities, are facing the same problem not just the manual process but also the institution itself has lack of support to provide the need of the office [2]. They just do not keep the academic record, but they also verify students' credentials, safeguarding students records and also planning and decision-making for the future of the office and institution [3]. Even though the registrar office is the one of the most important offices in a school or institution, they are also considered as one of the bare notice, it was underestimated [4]. Considering these challenges, it is crucial for the institution to recognize the need for modernization and support the Registrar's Office in its efforts to transition from a manual to a digital system. By implementing such a system, not only will the office's efficiency and accuracy be greatly improved, but the institution will benefit from enhanced service delivery, better resource management, and stronger data security. This study seeks to demonstrate that by addressing the current inefficiencies, the Registrar's Office can better serve both students and staff, ultimately contributing to the overall success and growth of the institution.

2. RELATED LITERATURE

In recent years, educational institutions have recognized the growing need to modernize their administrative operations, particularly in managing academic records, as traditional manual processes often lead to inefficiencies, errors, and delays; this literature review explores how digitalization, credential management, data security, and system development methodologies can improve the efficiency and reliability of systems like the proposed digital archiving solution for Saint Columban College's Registrar's Office.

2.1 Digitalization in Educational Institutions

Digitalization in Academic records is now a significant trend in most of the educational institution. It enhances a lot of work, especially in the registrar office that manages academic records [5]. In the Registrar's Office, where managing large

volumes of student data is essential, digital systems allow for seamless retrieval, ensuring accuracy and reducing the potential for human error [6]. This shift towards digital systems is also a response to the growing need for scalability, as institutions handle increasing amounts of data due to higher enrollment numbers [7].

2.2 Data Security and Privacy

Data security and privacy have become major concerns for educational institutions as they increasingly rely on digital systems to manage sensitive student records [8]. To safeguard this data, institutions must use encryption, secure access controls, and multi-factor authentication to prevent unauthorized access [9]. Additionally, whether data is stored on local servers or in the cloud, institutions must ensure that it meets high security standards to protect it from loss or tampering [10]. As technology continues to evolve, it's essential for educational institutions to regularly review and update their security measures to stay ahead of potential threats and ensure the privacy of their students [11].

2.3 Cloud Storage and Backup Solutions

Cloud storage and backup solutions have become vital for schools and universities as they manage growing amounts of student data. By using cloud storage, institutions ensure that records are not only easy to access but also safe from physical damage or loss, which can happen with traditional storage methods [12]. Cloud solutions offer a secure, flexible way to handle academic records, providing features like automatic backups, data redundancy, and real-time syncing. This means that even if something goes wrong with the system, schools can still access their records without interruption [13]. As more educational institutions move toward digital systems, combining cloud storage with local systems creates a strong, reliable, and secure way to protect student data.

2.4 Credential Management Systems

Credential management systems have become essential for schools and universities, making it easier to handle and verify student records. These systems ensure that important documents like transcripts, diplomas, and certificates are accurately managed and can be quickly accessed when needed [14]. By moving to digital and automated systems, institutions can reduce errors, speed up processing times, and provide better service to students and alumni. They also improve security by making sure that only authorized personnel can access or change sensitive information [15]. With a good credential management system in place, schools can keep student records safe and maintain a smooth, efficient process for everyone involved.

3. PROPOSED METHOD

This study follows the Waterfall Model to develop a Digital Archiving System for the Saint Columban College Registrar's

Office, progressing through sequential phases. The first phase involves Requirements Gathering, where the needs and challenges of the registrar's office are identified. During this phase, the team will ensure adherence to ISO standards for system design and data security to ensure the best practices. The Software Requirements Specification (SRS) document will be created to define the functional and non-functional requirements of the system, focusing on digital document archiving, student credential verification, and integration with existing administrative tools. Figure 1 below shows the Waterfall Model.

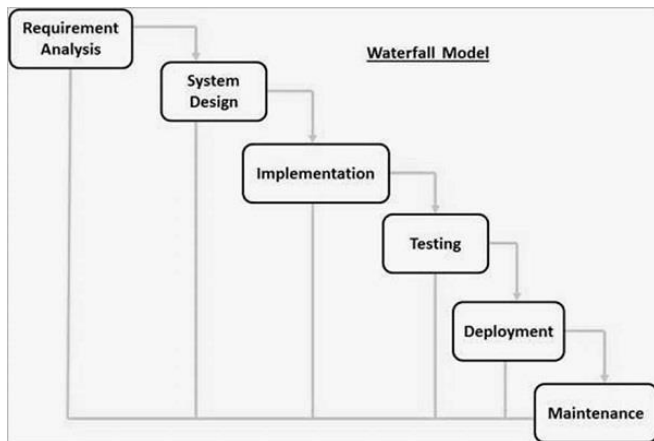


Figure 1: Waterfall Model

In the Design phase, the system will be outlined in detail with the help of the System Design Document (SDD), specifying architecture, user interfaces, and security measures like data encryption and inactivity timeouts. The Software Project Management Plan (SPMP) will guide the project by setting timelines, resource allocation, and risk management strategies. The Implementation phase will involve the actual development of the system, while the Testing phase will ensure it meets the defined requirements and passes rigorous tests for accuracy and security. Finally, the project will conclude with Deployment, and the team will prepare the Software Test Description (STD) document to verify the successful completion of the system before it is fully adopted by the registrar's office.

In the Testing phase, the team utilized the NUnit Framework, a widely used unit testing library, within Microsoft Visual Studio 2022 to validate the methods and functions of the system. A total of 29 test cases were executed, all of which passed successfully, ensuring that the system's components functioned as expected. The tests were performed efficiently, with a total duration of 7.9 seconds, and an average response time of 272 milliseconds per test. This rigorous testing process helped verify the accuracy, security, and performance of the system, providing confidence that it met the defined requirements and was ready for deployment.

4. RESULTS AND DISCUSSION

The results of the testing demonstrate that the Digital Archiving System for the Saint Columban College Registrar's Office is largely successful in meeting its objectives. Functional tests showed that most key features, such as account creation, document scanning, and student verification, performed flawlessly, with scores of 100% in several areas. However, areas like login, print, and settings functionalities received slightly lower scores, indicating room for improvement. In terms of non-functional testing, the system scored well in security (91%), efficiency (87.17%), and compatibility (86.69%), although usability (83.43%) and scalability (81.88%) could be enhanced for smoother user experience and better performance under larger workloads. The unit testing results also confirmed that the system's components, such as encryption, data handling, and password strength functions, were efficient, with an average test duration of 272 milliseconds, suggesting that the system operates quickly and reliably. Overall, while the system is highly functional and secure, further improvements in performance and user experience would enhance its effectiveness and scalability.

5. CONCLUSION AND RECOMMENDATIONS

Based on the test results, the group concluded that the implementation of the Digital Archiving System for the Saint Columban College Registrar's Office was highly successful, achieving the desired outcomes in terms of efficiency and security. The system effectively digitized and archived academic documents, improved credential verification, and reduced delays in transactions. The integration of backup systems, encryption, and inactivity timeouts aligned with ISO 25010 standards for security, ensuring that data was safeguarded against unauthorized access. Overall, the system fulfilled the requirements outlined in the Software Requirements Specification (SRS), demonstrating a significant improvement over the manual process.

The following are the recommendations:

- Explore PDF Libraries: Investigate additional PDF libraries in C# that do not include watermarks and can handle document generation and viewing without performance issues, ensuring high-quality output for printable records.
- System Integration: Integrate a system from other offices or the same office but different systems like Online Request.
- OCR: Implement Character Recognition to verify credentials accurately through matching the names to the credential details.

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REFERENCES

- [1] **Totten, T. (2020, January 13).** *Course Key*. Retrieved from Challenges Registrars Face — And How To Solve Them: <https://coursekey.com/blog/challenges-registrars-face/>
- [2] **Yusof, Z. M. (2008, October).** *Research Gate*. Retrieved from Issues and Challenges in Records Management: https://www.researchgate.net/publication/303971735_Issues_and_Challenges_in_Records_Management
- [3] **Soliven, P. S. (2017, August 16).** *PhilStar Global*. Retrieved from The school registrar's attempt to provide quality service: <https://www.philstar.com/other-sections/education-and-home/2017/08/16/1729813/school-registrars-attempt-provide-quality-service>
- [4] **Zabala, A. (2011, September 15).** *PhilStar Global*. Retrieved from What every school registrar must know: <https://www.philstar.com/other-sections/education-and-home/2011/09/15/726973/what-every-school-registrar-must-know>
- [5] **Shrivastava, C., & Shrivastava, S. K. (2022, January).** *Research Gate*. Retrieved from The Impact of Digitalization in Higher Educational Institutions: https://www.researchgate.net/publication/357683597_The_Impact_of_Digitalization_in_Higher_Educational_Institutions?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [6] **Ansari, M. F., Dash, B., & Sharma, P. (2023, April).** *Research Gate*. Retrieved from Excessive Digitalization in Higher Educational Institutions and its Impact on Students' Psychology -A Survey: https://www.researchgate.net/publication/370470945_Excessive_Digitalization_in_Higher_Educational_Institutions_and_its_Impact_on_Students%27_Psychology_-A_Survey?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [7] **Bitchikashvili, T., Petriashvili, L., & Jang, L. K. (2023, September).** *Research Gate*. Retrieved from DIGITALIZATION OF MANAGEMENT OF A HIGHER EDUCATIONAL INSTITUTION, NATIONAL AND INTERNATIONAL CHALLENGES AND WAYS OF SOLUTION: https://www.researchgate.net/publication/373844266_DIGITALIZATION_OF_MANAGEMENT_OF_A_HIGHER_EDUCATIONAL_INSTITUTION_NATIONAL_AND_INTERNATIONAL_CHALLENGES_AND_WAYS_OF_SOLUTION?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [8] **Sanni, B. (2024, October).** *Research Gate*. Retrieved from Data Privacy and Security: Strengthening data privacy and security measures to protect sensitive employee information: https://www.researchgate.net/publication/384627963_Data_Privacy_and_Security_Strengthening_data_privacy_and_security_measures_to_protect_sensitive_employee_information?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [9] **Goyal, M. K. (2024, December).** *Research Gate*. Retrieved from Data Security and Privacy Enhancement: Leveraging Generative AI for Secure and Private Data Management AI-Generated Synthetic Data: A Game Changer for Data Security and Privacy: https://www.researchgate.net/publication/387062443_Data_Security_and_Privacy_Enhancement_Leveraging_Generative_AI_for_Secure_and_Private_Data_Management_AI-Generated_Synthetic_Data_A_Game_Changer_for_Data_Security_and_Privacy?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [10] **Paul, J. (2024, November).** *Research Gate*. Retrieved from Privacy and data security concerns in AI: https://www.researchgate.net/publication/385781993_Privacy_and_data_security_concerns_in_AI?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [11] **Sharma, S. (2024, November).** *Research Gate*. Retrieved from Impact of Data Security and Privacy in Cloud Computing: https://www.researchgate.net/publication/385587618_Impact_of_Data_Security_and_Privacy_in_Cloud_Computing?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [12] **Goswami, P., Faujdar, N., Debnath, S., & Singh, G. (2024, February).** *Research Gate*. Retrieved from Investigation on storage level data integrity

strategies in cloud computing: classification, security obstructions, challenges and vulnerability:
https://www.researchgate.net/publication/378239130_Investigation_on_storage_level_data_integrity_strategies_in_cloud_computing_classification_security_obstructions_challenges_and_vulnerability?_sg=PXLTJSggh-8evy8Lk_DMqRR7DcgJrQBxpvLOfyGubOKSRIgpAqLNAomErV

- [13] **Stephen, M. (2023, October).** *Research Gate*. Retrieved from Data Backup Strategies in Disaster Recovery: Ensuring Minimal Downtime: https://www.researchgate.net/publication/383276577_Data_Backup_Strategies_in_Disaster_Recovery_Ensuring_Minimal_Downtime?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [14] **Habib, M. A., Rahman, M. M., & Neom, N. H. (2024, June).** *Research Gate*. Retrieved from CredSec: A Blockchain-based Secure Credential Management System for University Adoption: https://www.researchgate.net/publication/381308038_CredSec_A_Blockchain-based_Secure_Credential_Management_System_for_University_Adoption?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19
- [15] **Surono, S. (2024, November).** *Research Gate*. Retrieved from Standard of Micro-Credential Quality Management System To Enhance Employability and Competitiveness of Graduates: https://www.researchgate.net/publication/385866651_Standard_of_Micro-Credential_Quality_Management_System_To_Enhance_Employability_and_Competitiveness_of_Graduates?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InNpZ251cCI6InBhZ2UiOiJfZGlyZWV0In19