**ALUMNI PROFILE WITH DOCUMENTS VERIFICATION USING BLOCKCHAIN TECHNOLOGY FOR CVSU – CARMONA**

Undergraduate Thesis

Submitted to the faculty of the

Cavite State University – Carmona Campus

Carmona, Cavite

In partial fulfillment

of the requirements for the degree of

Bachelor of Science in Computer Science

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**BIOGRAPHICAL DATA**

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**ACKNOWLEDGMENT**

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**THE PROPONENT**

**ABSTRACT**

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**ALUMNI PROFILE WITH DOCUMENTS VERIFCATION USING BLOCKCHAIN TECHNOLOGY FOR CVSU - CARMONA**

**Mark Roderick I. Salise**

|  |
| --- |
| An undergraduate thesis project proposal submitted to the faculty of the Department of Industrial and Information Technology, Cavite State University, Carmona Campus, Carmona, Cavite in partial fulfillment of the requirements for the degree Bachelor of Science in Computer Science. Prepared under the supervision of Mr. Alonel A. Hugo. |

**INTRODUCTION**

Cavite State University - Carmona has identified a problem that is commonly a nuisance for employers dealing with alumni profile. The need for accurate information increases over time which aligns with the growing population of students each year. Given this, it is critical to have an efficient and reliable source of information for this type of institution. With the gradual increase in the number of students, it is vital to enhance the efficiency of the system. This research aims to address the shortcomings of the current system used by the institution in the matter of managing the large number of alumni and aims to innovate and enhance data management and alumni connectivity.

This research will incorporate an alumni profile and document verification system when creating a system profile using blockchain technology to address each individual alumni record. Through using the SHA-2 algorithm, it navigates the information to compare it against existing records to validate its eligibility. If the information cannot be validated automatically, it will be manually checked by the assigned personnel. The SHA-2 algorithm also generates unique individual hashes while creating profiles. The document information will be stored on a blockchain platform, which can be distributed as a ledger. Each node in the ledger contains a collection of alumni information. The history of changes to the information will be meticulously recorded, listing every small change. This system will bring transparency and security to information storage, ensuring it is immutable and tamper-proof.

Blockchain technology secures academic records as decentralized; trusted personnel and administrators can access and handle records at once, offering immutability and transparency. If unauthorized access and tampering were to occur, the blockchain technology and SHA-2 algorithm will create new nodes showing the history of the previous record and the new record. These changes will notify the respective users and confirm the information, making it transparent. It also ensures that all certificates of completion for continuous recording are securely stored, thus making it tamper-proof. It also enables instant credential verification without intermediary cost, even global application. This technology can administer efficiently while not needing manpower (ZIRCONTECH, 2024).

**Objectives of the Study**

The general objective of the study is to create an Alumni Profile with Documents Verification using Blockchain technology following the requirement of the International Organization for Standardization 25010. This system aims to aid in managing large volumes of alumni profile to help organize efficiently.

Specifically it aims to:

1. Implement the following elements of blockchain technology:
   1. SHA-2 as Cryptographic Functionality
   2. Decentralized Ledger System as Distributed Ledger System
   3. Permissioned Blockchain
   4. Centralized Database with Cryptographic Hashing as Secured Database System
2. Develop a System that has the following module:
   1. Meeting Hub Module
   2. Department-Specific Module
   3. Application/Request Processing Module
   4. Admin Control Module
   5. Employer Interaction Module
   6. Job Placement Module
3. Develop the system using the following:
   1. Visual Studio Code for Integrated Development Environment (IDE),
   2. Python for programming language,
   3. MongoDB for database management,
   4. Hypertext Markup Language (HTML) and Cascading Style Sheet (CSS) for front-end design,
   5. FastAPI. For **Frameworks,**
   6. Uvicorn, Node.js and npm for database management,
   7. React for JavaScript Library
   8. SHA2 for algorithm for cryptographic hashing.
4. Employ the Modified Waterfall Model as the Software Development Life Cycle (SDLC) to ensure structured and iterative development processes.
5. Integrate real-time updates and intuitive interfaces to enhance user experience, providing transparency and instance notifications for:

* Job application status,
* Credentials verification progress.

1. Ensure data security and transparency through blockchain technology, enhancing:

* Accessibility to employers, alumni, and university administrators.
* Scalability to support the institution’s expanding needs.

1. Evaluate system performance using the ISO 25010 standards, focusing on:

* Product quality,
* Quality in use

1. Facilitate networking and employment opportunities to graduates by:

* Automating job placement processes.
* Providing detailed reports and dashboards to track job applications, placement, and system engagement.

**Significance of the Study**

This research aims to address the issues relating to the traditional record management of the institution. By using Blockchain Technology, the Cavite State University – Carmona Campus will be able to provide efficient, reliable, tamper-proof verification when administering alumni’s documents. It also aims to benefit the following stakeholders:

**For the University.** Given the importance of tracking information, it enhances and improves the institutionalized information needed to keep on track. By innovating with blockchain technology, operational efficiency and data security can be significantly improved.

**Alumni.** The research utilized real-time updates on job applications and credentials verification. As it reduces the administrative hassle, it enables an automated transition from education to employment.

**Researchers.** This will function as a tool to supply the future researchers with trustworthy and legitimate data required to address issues pertaining to this research.

**Future Researchers.** This research will benefit the future researcher, particularly those whose focus of study is on records management and emerging authentication methods.

**Time and Place of the Study**

The Study is expected to start from January 2025 until May 2025. The data gathering will be conducted in Cavite State University – Carmona Campus.

**Scope and Limitation of the Study**

This research aims to focus on the development and implementation of alumni profile with documents verification using SHA-2 Blockchain Technology for Cavite State University – Carmona. The objective of the system aims to improve the efficiency, security, and transparency of alumni record management and credential verification processes for a job placement. The key areas covered include:

**Target Users.** The target users of this research include alumni and current students of Cavite State University – Carmona Campus who are seeking job placement assistance. Its application is specifically focused on addressing the needs of students from the current and preceding academic years. Additionally, employers who are interested in hiring CvSU-Carmona graduates will benefit from the system. University administrators who manage alumni records and employment data are also integral users, as the system aims to enhance data management and connectivity for these stakeholders.

**Key Features.** This research includes the **Credential Verification** whereas the use of SHA-2 algorithm secures the validation of alumni credentials to ensure immutability and authenticity; **Job Matching**, where it includes automating process of matching alumni skills profile with job posting for employees; **Real-Time Updates**, whereas the system will provide instant notifications to alumni and employers in job application and credential verification status; and **User Interface Modules**, whereas the system will develop intuitive dashboards for administrators, alumni, and employers to facilitate seamless interaction and data management.

**Technological Framework**. The system will be developed using modern technologies such as Python, React, FastAPI, and MongoDB, incorporating the Modified Waterfall Model as the SDLC. Additionally, the blockchain component will leverage SHA-2 algorithm for secure and immutable data storage.

**Performance Evaluation**. The system will be assessed against **ISO 25010 standards** to ensure product quality, reliability, and usability.

**Geographic Coverage.** The study is limited to Cavite State University–Carmona Campus and its associated alumni and employers, though the system’s scalability can support other campuses or institutions in the future. While the advent of the study aims to provide a comprehensive solution, certain limitations exist due to resource and scope constraint:

**Technological Challenges.** The system’s performance heavily depends on the quality of the internet connection and the technical proficiency of its users.

Blockchain technology, while secure, might pose challenges in scalability and integration with legacy systems.

**User adoption.** The success of the system requires active participation and adaptation by alumni, students, and employers. Resistance to adopting new technology may limit its effectiveness.

**Focus on Alumni and Employers.** The system is tailored for alumni and employers, with limited functionality for current students who may not yet require job placement assistance.

**Financial and Time Constraint.** Development and deployment are constrained by available resources, including funding, developer time, and hardware.

**Data Security Dependencies.** Although blockchain provides robust security, the system’s overall security also depends on proper implementation, user behavior, and administrative controls.

**Evaluation Standard.** The study’s evaluation of the system is confined to the ISO 25010 framework, potentially overlooking other criteria for software assessment.

**Definition of Terms**

The following terms are operationally defined in the study:

**Alumni profile** – A digital record containing personal, education, and professional information of graduates from Cavite State University – Carmona Campus. This profile will be used for job placement and credential verification.

**Blockchain Technology** – A decentralized and secure digital ledger system that records information in a way that makes it nearly impossible to alter or hack. In this study, blockchain ensures the immutability and security of alumni credentials and job placement.

**Credential Verification** – The process of authenticating and validating educational and employment records to ensure they are accurate and legitimate. blockchain technology enhances this by offering an immutable verification system.

**Distributed Ledger** – A database that is shared and synchronized across multiple sites. It enables secure and transparent record-keeping for alumni credentials and employment data.

**Job Placement System** – A platform or mechanism that connect graduates with potential employers based on their skills, qualification and job market needs.

**Permissioned Blockchain** - A blockchain network in this study that limits access to authorized users only, ensuring sensitive alumni and employer data are accessible to approved parties.

**Real-Time Notification** - A system feature that sends instant updates to stakeholders (alumni, employers, administrators) regarding job applications, credential verification, or other relevant activity.

**Conceptual Framework**

Figure 1 depicts the conceptual framework of the study.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **INPUT** |  | **PROCESS** |  | **OUTPUT** |
| Knowledge Requirements   1. Alumni and Student 2. Employer Requirements 3. Blockchain Technology 4. Database Management 5. SHA2 6. ISO25010   Software Requirements   1. Visual Studio Code 2. HTML, CSS, Python, React, FastAPI Framework 3. MongoDB for data storage   Hardware Requirements   1. Computer Set 2. Laptop   User Roles:  a. Alumni/Students  b. Employers  c. Administrators |  | Account Verification Module  Job Matching Algorithm  Blockchain Integration  Real-time notifications  Dashboard Functionality  a. Meeting Hub Module  b. Department-Specific Module.  c. Application/Request Processing Module  d. Admin Control Module  e. Job Placement Module |  | Alumni Profile with Documents Verification using Blockchain Technology for CvSU - Carmona |

*Figure 1. Conceptual Framework of the Alumni profile with documents verification using blockchain technology*

Figure 1 depicts the conceptual framework employed in this study. The input makes the raw data readable and the process specifies the need of a function. This will indicate that the output will deliver the desired outcome. This framework relies on the development and operation of the proposed blockchain-based system.

For instance, input consists of alumni profiles, employer job requirements, and blockchain technology and the necessary technology requirements, such as HTML, Python, CSS, React, the FastAPI framework, and MongoDB. As these elements serve, these findings make the foundation and operating the system.

The process involves validating alumni credentials using SHA2 blockchain technology. The findings indicate that it verifies all the information by the alumni profile. Ensures all process data is accurate and validated by the system or manually by the administrator.

The study aims to produce a secure, efficient, and user-friendly blockchain-based system that verifies every step. It ensures that all data provides transparent reporting for alumni, employers, and administrators.

To account for all of this, it ensures that the transition from old habits of paperwork to employment is leveraged by leveraging blockchain technology. It manages to input all the data through a safe environment when dealing with such information as alumni profiles. The alumni profile is verified using SHA-2 blockchain technology for the Cavite State University–Carmona Campus system. It will take advantage of such a system, which will ensure transparency and credibility throughout the making.

**REVIEW OF RELATED LITERATURE**

The international literature and studies cited in this chapter tackle the different concept, understanding, and ideas, generalization or conclusions and different development related to study of the enrollment from the past up to the present and which serves as the researchers guide in developing the project. Those that were also included in this chapter helps in familiarizing information that are relevant and similar to the present study.

Nowadays, the storage of information has become widely digital. Given this, the management of large database records in various fields has been leveraged through digital means. However, security problems have arisen regarding the protection of data and the verification of information has become, if not accurate, unreliable. This has led to issues such as online scams, data tampering, and other security breaches. In response to these challenges, many technological innovations have been developed to combat such occurrences, including the creation of SHA2 Cryptographic Functionality (Secure Hash Algorithm 2), an algorithm that was designed by the National Security Agency (NSA) and published by the National Institute of Standards and Technology (NIST) in 2001. This algorithm ensures that data remains unaltered during digital storage or transmission. Any modification to the input data results in a completely different hash value, making tampering easy to detect.

According to Bensalah et al. (2024) the efficiency and relevance of SHA-2 lies on its computational capabilities, emphasizing its suitability for handling secure and large-scale data operations, as required in creating a system that involves record verification. This cryptographic algorithm is incorporated in the blockchain technology as it is suitable in creating a hashing method that uses a ﬁxed-size output or hash from incoming data of arbitrary size. This is used in blockchain technology to generate digital signatures that verify the correctness and validity of transactions, ensuring network security by preventing malicious players from tampering with the ledger.           
 This claim was also supported by Ardiansyah et al. (2024), who recorded in their research that the use of the SHA-256 hashing algorithm in blockchain technology plays a role in maintaining security by assigning a unique code to each piece of information. This code, proven to be highly secure through testing, ensures the effective functioning of the system and has the ability to track all individual actions by creating nodes of history with every minor change.

Additionally, Huang et al. (2024) research results recorded that the tamper-proof nature of blockchain allows the system to prevent users from falsifying the validation results of documents due to financial interests, which leads to a lack of fairness in validation. Therefore, the data integrity can be ensured based on verifiable algorithms such as implementing the SHA2 cryptographic algorithm in the system.

Comparative analysis, such as those conducted by Pun et al. (2024), highlights just how reliable SHA-256 is among cryptographic algorithms. Their findings validate the choice of SHA-256 for secure data management, noting that the higher the hash rate (determined by how many guesses can be made per second to solve complex mathematical problems), the better. This robustness is why it continues to be a preferred option in various security applications, including its use in the medical field.

Research conducted by Khallaf et al. (2024) demonstrates the effectiveness of SHA-256 in medical data security. Their proposal includes the evaluation of the cryptosystem’s strength against differential attacks using several comprehensive metrics. Simulation results and theoretical analysis confirm the cryptosystem’s effectiveness by showcasing its ability to provide high levels of security and immunity to data leakage.

Zhang and Xui (2019) defined blockchain technology as a secure ledger that organizes the growing list of transaction records into a hierarchically expanding chain of blocks. It serves as a secure, distributed ledger that archives all transactions in a persistent, verifiable manner. They explained that each block contains transaction records, its own hash value (a cryptographic identifier), and the hash value of the preceding block, forming a cryptographic chain. A decentralized consensus mechanism enforces rules for adding new blocks, verifying the blockchain, and ensuring data consistency across nodes. Once a block is added to the chain, its transaction records cannot be altered, guaranteeing data integrity and tamper-proofing. This system effectively secures and preserves all transaction data within an open, networked environment. However, they did not rule out the possibility of data tampering. They proposed two ways that the information may be tampered with:  (1) miners may attempt to tamper with the information of the received transaction; (2) an adversary may attempt to tamper with the information stored on the blockchain. They analyzed and explained further how these occurrences are prevented in blockchain technology as follows:

Blockchain technology, as used in Bitcoin, prevents tampering by combining cryptography and decentralized storage. Every transaction is protected with a unique hash and digitally signed using the sender’s private key, making it impossible to alter without detection, as any modification invalidates the signature. Blocks in the blockchain are linked using hash pointers, where each block references the hash of the previous one. Any attempt to tamper with a block disrupts this chain, creating a mismatch that the network can easily detect. Since the blockchain is distributed across all network nodes, altering all copies simultaneously is practically impossible.

This robust security ensures the integrity of transaction data and makes blockchain suitable for applications like healthcare, where it can create immutable records and protect sensitive information which was also stated in the studies of Thakre et al. (2024) and Sattaiah & Chinnaiah (2024) that emphasizes that the role of implementing the SHA-256 in the system will further prevent data breaches.

In the study conducted by Ranjan et al. (2024), they concluded that by integrating IoT (Internet of Things) with blockchain using SHA-256, the scalability and versatility in managing sensitive data were significantly enhanced. This integration allowed for real-time updates and secure communication across devices, ensuring that data integrity was maintained while reducing the risk of unauthorized access. Their findings emphasized the potential for blockchain and IoT to work in tandem to create robust systems capable of handling sensitive information in dynamic environments.

Villanueva (2024) discussed further that with applications like academic and profile management and document verification systems, this approach could enable real-time credential updates and notifications while ensuring the security and immutability of the records. He categorized the use of blockchain into two types namely the Private Blockchain and Public Blockchain. In the Private Blockchain, the users are required to ask consent in order to join the network. However, in Public Blockchain, all transactions are fully transparent by allowing anyone to participate which is the focus of this thesis.

**REVIEW OF RELATED LITERATURE**

        The local literature and studies cited in this chapter tackle the different concept, understanding, and ideas, generalization or conclusions and different development related to study of the enrolment from the past up to the present and which serves as the researchers guide in developing the project. Those that were also included in this chapter helps in familiarizing information that are relevant and similar to the present study.

In exploring the potential of blockchain technology to revolutionize records management and other applications in the Philippines, various studies, reports, and initiatives highlighted its current uses and implications. As a result, blockchain, a decentralized and tamper-proof technology, is rapidly gaining traction in education and public administration due to its ability to ensure transparency, security, and efficiency.

The Philippine Science High School’s blockchain-based records management system, as reported by BitPinas (2024), serves as a pioneering project in integrating blockchain into academic institutions. By using blockchain for managing student records, the system ensures that credentials are immutable, easily verifiable, and secure from tampering. This initiative aligns with the national push for digital transformation and provides a strong case study for other educational institutions.

At the collegiate level, Mendoza (2024) discusses in the Junior Blockchain Education Consortium of the Philippines (2024) the blockchain training and development program hosted by the Technological Institute of the Philippines (TIP). The program emphasizes capacity building among students and educators, equipping them with the necessary skills to implement and maintain blockchain systems. This effort demonstrates the commitment to integrating blockchain technology into the academic curriculum and fostering a new generation of blockchain professionals.

Similarly, Ocampo (2024) explores the integration of blockchain into government transactions in the Philippines. This source highlights how blockchain is being employed to enhance transparency in public processes, such as tax collection and land registration, ensuring accountability and reducing instances of corruption. Such applications showcase the versatility of blockchain beyond academic settings and into public administration.

The Tonis (2024) report underscores the role of blockchain research in higher education. It reveals how universities across the Philippines are conducting blockchain studies to modernize systems, such as record management, and expand its use cases. This research not only advances technical knowledge but also bridges the gap between innovation and application in the country’s educational institutions.

In the Chainalysis Report (2023), they highlight the country’s emerging blockchain ecosystem, noting its potential to transform sectors like finance and education. It stresses the importance of fostering regulatory frameworks that can support widespread blockchain adoption while safeguarding public interest.

Academic perspectives, such as those presented by Villanueva (2024), delve into blockchain’s role in enhancing transparency in academic records. Villanueva’s research examines how blockchain can eliminate fraud in credentialing systems, ensuring that academic records are tamper-proof and verifiable, which is critical for maintaining institutional credibility and trust.

The Blockchain Philippines (2024) report expands on blockchain's use cases in education and public administration. It provides examples of projects where blockchain is employed for automating processes, reducing inefficiencies, and securing sensitive information. This resource serves as a valuable reference for understanding how blockchain can address long-standing challenges in these sectors.

The University of the Philippines ITDC (2024) outlines the blockchain innovation programs implemented across the university’s various departments. These programs include research collaborations and pilot projects that test blockchain’s potential in data security and inter-departmental communication. Such initiatives position UP as a leader in blockchain adoption in higher education.

Furthermore, Sy et al. (2024) discusses the creation of a permissioned blockchain network using Hyperledger Fabric, serving as the backend for an educational credential verification system to assist Higher Education Institutions (HEIs), third-party verifiers, and students/alumni in viewing educational credentials.

Moreover, Mendez and Bayyou (2024) provide an overview of the Philippine blockchain, focusing on its applications in education. They stated that the education  sector  also  needs  to  utilize  the  benefits  that  blockchain  technology  provides.  Educational institutions  especially tertiary  institutions  are  now eyeing  to employ  this  application  to  improve teaching  and  learning  activities and promote collaboration among the stakeholders such as students, teachers and parents. It will also be used in e- transcripts, digital degrees and certification, cloud storage, identity management.

Finally, Alammary et al. (2019) highlighted that blockchain technology represents an innovative advancement in the field of education. Through comprehensive research analyses and a review of various scientific studies, they proposed a framework centered on three key themes: applications, benefits, and challenges of this technology. Their findings revealed that blockchain is predominantly utilized for issuing and verifying academic credentials, sharing students’ skills and learning achievements, and assessing their professional capabilities. Furthermore, the study emphasized the significant advantages of blockchain in education, such as providing a secure platform for managing student data, reducing costs, and promoting trust and transparency.

**METHODOLOGY**

This chapter presents the research method. It focuses on the method used in conducting this research which covers research design, population and sample techniques, research locale, research instruments and techniques, data gathering procedure, and data analysis and procedure.

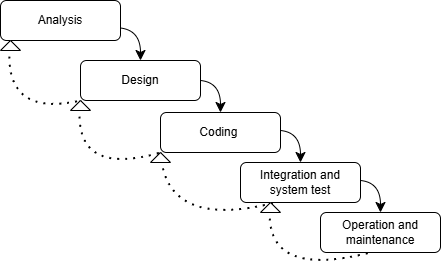
**Materials**

The analysis was conducted using several software and hardware were used for developing the Alumni Profile with Documents Verification using SHA2 Blockchain Technology for Cavite State University (CVSU) – Carmona. The study employs applications software used for the development of the following: Visual Studio 2022 for Integrated Development Environment (IDE); FastAPI for web framwork; Hypertext Markup Language(HTML), Cascading Style Sheet(CSS) for front-design and React for front-end library; Python for backend programming; MongoDB for database management; SHA2 for Cryptographic Hash Algorithm.

The research use devices for the development such as a desktop with a Ryzen 3 1500x with an Rx 580, 2048, 8gb VRAM, 16 Gigabytes (GB) of Random Access Memory (RAM), A 512 Gigabyte (GB) Nonvolatile memory express (NVMe), 1 Terabyte (TB) Hard Disk Drive (HDD), 512 Gigabyte (GB) Hard Disk Drive (HDD) and a Windows 10 Operating System (OS). For the internet connection, a Philippine Long Distance Telephone Company (PLDT) Fiber was utilized.

**Method**

The research uses system development life cycle (SDLC) used by the researcher was the Waterfall Model as shown in Figure 1. This method consist of five phases; Analysis, Design, Coding, Integration and System test, and Maintenance

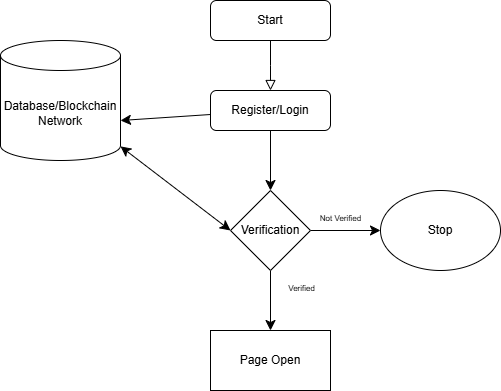


*Figure 1. Modified Waterfall model (Kossiakoff et al., 2020)*

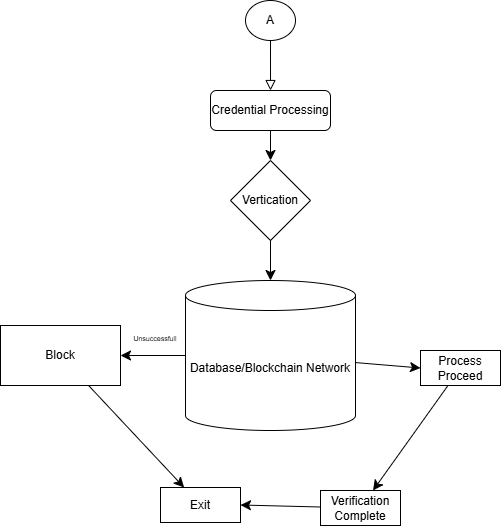
The Alumni Profile with Document Verification System is a robust and scalable solution designed to securely manage alumni credentials, facilitate job placement, and provide transparency through blockchain integration. The user flow begins with alumni uploading their credentials, which are processed through a hashing mechanism using the SHA-2 cryptographic algorithm. These hashes are stored in the Credential Table alongside metadata, such as upload timestamps and verification statuses. Employers interact with the system to post job opportunities and verify alumni credentials via the Employer Table and Job Postings Table, where job-specific data such as titles, descriptions, and required skills are stored. Administrators oversee the system, manually verifying credentials when necessary and resolving disputes, with all actions logged in the Verification Logs Table for accountability.

The system flow incorporates a Validating Network, consisting of components like the Validator Client, Beacon Client, and Execution Client, to process and validate transactions securely. Once credentials are verified, the result is stored in the blockchain and reflected in the system’s Notification Module, providing real-time updates to all stakeholders. The integration of a centralized database for fast data access, coupled with blockchain for immutability, strikes a balance between scalability and security. The system supports seamless interactions between alumni, employers, and administrators, ensuring efficient processes for credential validation and job placement. This end-to-end solution not only automates the verification process but also enhances user experience and trust by providing transparency, accountability, and scalability.

User Flow



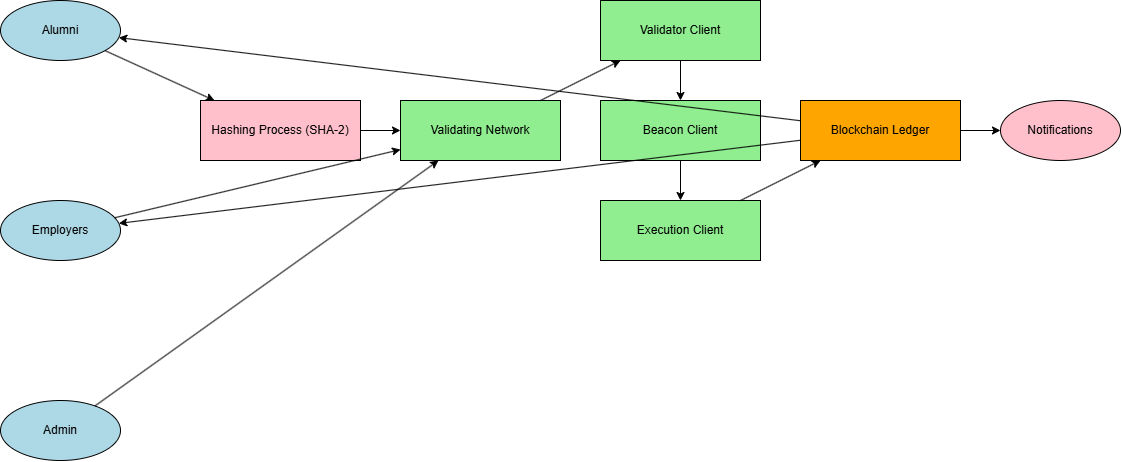
*Figure 2. User Flow Diagram*



*Figure 2. Continued…*

Blockchain Data Flow

Blockchain technology is utilized to ensure secure and tamper-proof credential verification. When alumni submit credentials, the system hashes the data using SHA2 and stores the hash in a blockchain ledger. This process guarantees that credentials remain immutable and verifiable. Employers or administrators requesting verification retrieve the hash from the blockchain and compare it to the provided credentials. If the hashes match, the credentials are deemed authentic.

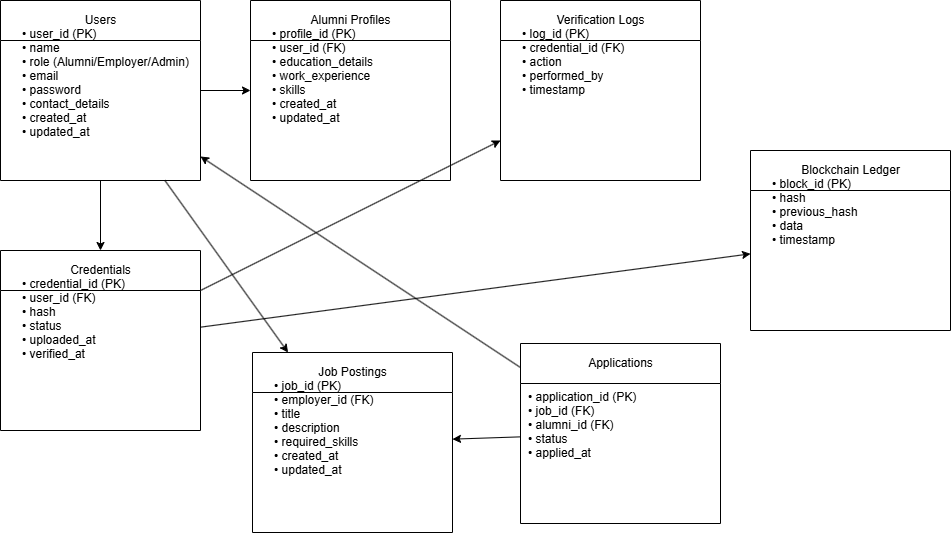


*Figure 3. Blockchain Data Flow Diagram*

Database Schema

The database, implemented using MongoDB, organizes data into multiple entities, including Users, Credentials, Jobs, and Applications. The **Users** collection stores information such as user ID, name, role, and contact details. The **Credentials** collection contains hashed alumni records, verification statuses, and timestamps. The **Jobs** collection manages job postings and their associated employer data, while the **Applications** collection tracks alumni applications, including submission dates and status updates.

At the core of the system, the database schema ensures efficient management of all data interactions. The Alumni Table links alumni profiles to their credentials and applications, forming the backbone of the system. Credential verification leverages SHA-2 hashing and blockchain integration to ensure tamper-proof storage and retrieval. The blockchain ledger serves as an immutable record for credential hashes, ensuring that even if the database is compromised, the integrity of alumni credentials remains intact. Verification requests compare the hash of the uploaded document against the blockchain record, guaranteeing authenticity. Employers query the system for credential verification and receive real-time notifications about job applications and verification statuses.



*Figure 4.* *ERD Database Flowchart*

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### APPENDICES

**Appendix 1**

Evaluation for Unit Testing



Republic of the Philippines

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### ALUMNI PROFILE WITH DOCUMENTS VERIFICATION USING BLOCKCHAIN TECHNOLOGY FOR CVSU – CARMONA

|  |  |  |  |
| --- | --- | --- | --- |
| **CRITERION** | **DESCRIPTION** | **TESTING** | **REMARK** |
| **Modules** | **Meeting Hub**  Facilitates interaction among alumni, employers, and administrators. Provides navigation tools and a dashboard for collaboration, discussion, and event planning. | **First Test**  Focus on how accurately and efficiently data is presented, particularly graphs and visuals. Assess the correctness of navigation and display accuracy. |  |
| **Department-Specific Module**  Displays department-specific data, such as a list of borrowers, items, and archived transactions. Includes functions for sorting and receipt generation. | **First Test**  Verify the loading accuracy of data tables, the sorting functionality, and the correct formatting and printing of receipts.. |  |
| **Application/Request Processing Module**  Handles transaction details using user inputs such as text fields, dropdown menus, and date pickers for smooth data processing. | **First Test**  Perform trial runs for new transactions, ensuring the accurate capture and handling of input data. |  |
| **Admin Control Module**  Manages administrative tasks, including the deletion of processed transactions and oversight of system functions. | **First Test**  Validate the deletion functionality, ensuring records are correctly removed without affecting the database's integrity. |  |
| **Employer Interaction Module**  Enables employers to interact with the system, access archived transactions, and verify alumni credentials. | **First Test**  Evaluate the responsiveness and accuracy of data table loading and sorting. Ensure the archival process meets specifications. |  |
|  | **Job Placement Module**  Automates the job-matching process between alumni profiles and employer job postings, offering real-time updates and analytics. | **First Test**  Conduct performance assessments to verify the correct pairing of alumni with suitable jobs and monitor notification efficiency. |  |
| **Security** | **Database**  MongoDB Server express will be employed. | **First Test**  Conduct data integrity tests by manually inputting data to confirm that information is accurately stored and retrieved. Execute performance tests to evaluate the database's responsiveness and scalability under varying workloads. Perform security audits to identify and address potential vulnerabilities in the database system. |  |
| **Platform** | **Google Chrome** | **First Test**  The user will test each functionality of the system thoroughly, paying attention to compatibility and performance of the system on the said browser. |  |
| **Microsoft Edge** | **First Test**  The user will test each functionality of the system thoroughly, paying attention to compatibility and performance of the system on the said browser. |  |
| **Mozilla Firefox** | **First Test**  The user will test each functionality of the system thoroughly, paying attention to compatibility and performance of the system on the said browser. |  |

Prepared by:

**MARK RODERICK I. SALISE**

#### Appendix 2

Evaluation for System Testing

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### ALUMNI PROFILE WITH DOCUMENTS VERIFICATION USING BLOCKCHAIN TECHNOLOGY FOR CVSU – CARMONA

|  |
| --- |
| Dear Participant,  Good day! We are currently conducting project research entitled “**SUPPLY MONITORING SYSTEM FOR LOCAL GOVERNMENT UNIT OF GENERAL MARIANO ALVAREZ, CAVITE**”. In line with this, I respectfully request your assistance in filling out this evaluation form. It will not be a problem if you wish not to participate, but your responses will be highly valued. The evaluation form can be completed anonymously. Responses from completed questionnaires will be collated for analysis; once complete, the original questionnaires will be kept electronically. Rest assured that all information indicated therein will be treated with utmost confidentiality under the Data Privacy Law of 2012 and strictly used only for the above purpose. All the gathered information/data will also be retained in the system and used as a part of the historical data for further analysis. If you wish to learn more about the results of the research, please send an email to **cc.kelvinclark.memije@cvsu.edu.ph**.    We are hoping for your kind consideration and support. Thank you very much. |

Name (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_

Address (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Profession: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Specialization: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Instructions:** Please evaluate using the given scale and placing a checkmark (✓) on the appropriate column corresponding to your response.

**Numerical Rating:**

5 – Excellent 4 – Very Good 3 – Good 2 – Fair 1 – Poor

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **INDICATOR** | **5** | **4** | **3** | **2** | **1** |
| **Functional Suitability** |  |  |  |  |  |
| 1. **Functional completeness** - Degree to which the set of functions covers all the specified tasks and user objectives. |  |  |  |  |  |
| 2. **Functional correctness** - Degree to which a product or system provides the correct results with the needed degree of precision. |  |  |  |  |  |
| 3. **Functional appropriateness** - Degree to which the functions facilitate the accomplishment of specified tasks and objectives. |  |  |  |  |  |
| **Performance Efficiency** |  |  |  |  |  |
| 4. **Time behavior** - Degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements. |  |  |  |  |  |
| 5. **Resource utilization** - Degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements. |  |  |  |  |  |
| 6. **Capacity** - Degree to which the maximum limits of a product or system parameter meet requirements. |  |  |  |  |  |
| **Compatibility** |  |  |  |  |  |
| 7. **Co-existence** - Degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product. |  |  |  |  |  |
| 8. **Interoperability** - Degree to which two or more systems, products or components can exchange information and use the information that has been exchanged. |  |  |  |  |  |

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| **INDICATOR** | **5** | **4** | **3** | **2** | **1** |
| **Usability** |  |  |  |  |  |
| 9. **Appropriateness recognizability** - Degree to which users can recognize whether a product or system is appropriate for their needs. |  |  |  |  |  |
| 10. **Learnability** - Degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use. |  |  |  |  |  |
| 11. **Operability** - Degree to which a product or system has attributes that make it easy to operate and control. |  |  |  |  |  |
| 12. **User error protection** - Degree to which a system protects users against making errors. |  |  |  |  |  |
| 13. **User interface aesthetics** - Degree to which a user interface enables pleasing and satisfying interaction for the user. |  |  |  |  |  |
| 14. **Accessibility** - Degree to which a product or system can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use. |  |  |  |  |  |
| **Reliability** |  |  |  |  |  |
| 15. **Maturity** - Degree to which a system, product or component meets needs for reliability under normal operation. |  |  |  |  |  |
| 16. **Availability** - Degree to which a system, product or component is operational and accessible when required for use. |  |  |  |  |  |
| 17. **Fault tolerance** - Degree to which a system, product or component operates as intended despite the presence of hardware or software faults. |  |  |  |  |  |
| 18. **Recoverability** - Degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system. |  |  |  |  |  |
| **Security** |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **INDICATOR** | **5** | **4** | **3** | **2** | **1** |
| 19. **Confidentiality** - Degree to which a product or system ensures that data are accessible only to those authorized to have access. |  |  |  |  |  |
| 20. **Integrity** - Degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data. |  |  |  |  |  |
| 21. **Non-repudiation** - Degree to which actions or events can be proven to have taken place so that the events or actions cannot be repudiated later. |  |  |  |  |  |
| 22. **Accountability** - Degree to which the actions of an entity can be traced uniquely to the entity. |  |  |  |  |  |
| 23. **Authenticity** - Degree to which the identity of a subject or resource can be proved to be the one claimed. |  |  |  |  |  |
| **Maintainability** |  |  |  |  |  |
| 24. **Modularity** - Degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components. |  |  |  |  |  |
| 25. **Reusability** - Degree to which an asset can be used in more than one system, or in building other assets. |  |  |  |  |  |
| 26. **Analyzability** - Degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified. |  |  |  |  |  |
| 27. **Modifiability** - Degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality. |  |  |  |  |  |
| 28.**Testability** - Degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met. |  |  |  |  |  |
| **Portability** |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **INDICATOR** | **5** | **4** | **3** | **2** | **1** |
| 29. **Adaptability** - Degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments. |  |  |  |  |  |
| 30. **Replaceability** - Degree to which a product can replace another specified software product for the same purpose in the same environment. |  |  |  |  |  |

*Adopted from the International Organization for Standardization (ISO) 25010 for product quality*

**Remarks/Comments/Suggestions:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Signature of Respondent

**Appendix 3**

Evaluation for Acceptance Testing

Republic of the Philippines

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### ALUMNI PROFILE WITH DOCUMENTS VERIFICATION USING BLOCKCHAIN TECHNOLOGY FOR CVSU – CARMONA

|  |
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Name (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_

Address (Optional): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Profession: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Specialization: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Instructions:** Please evaluate using the given scale and placing a checkmark (✓) on the appropriate column corresponding to your response.

**Numerical Rating:**

5 – Excellent 4 – Very Good 3 – Good 2 – Fair 1 – Poor

| **INDICATOR** | **5** | **4** | **3** | **2** | **1** |
| --- | --- | --- | --- | --- | --- |
| **Effectiveness** |  |  |  |  |  |
| 1. The Supply Monitoring System enables users to achieve their intended goals, such as inputting transactions, deleting transaction, monitoring supplies, and printing of needed forms and receipts for every transaction. |  |  |  |  |  |
| 1. The Supply Monitoring System supports users in accomplishing tasks without errors, contributing to a high success rate in recruitment processes. |  |  |  |  |  |
| **Performance Efficiency** |  |  |  |  |  |
| 1. The Supply Monitoring System minimizes the time and effort required to complete recruitment-related tasks, such as resume extraction and application tracking. |  |  |  |  |  |
| 1. The system performs operations promptly without compromising reliability or accuracy. |  |  |  |  |  |
| 1. The system has an acceptable level of performance when being accessed by a large number of users. |  |  |  |  |  |
| 1. The system can handle a large amount of information. |  |  |  |  |  |
| **Satisfaction** |  |  |  |  |  |
| 1. The system achieved its realistic goals, including the result of use and the consequence of use. |  |  |  |  |  |
| 1. The system works well based on its functions. |  |  |  |  |  |
| 1. The user feels satisfied when he/she finished his/her task through the use of the developed system. |  |  |  |  |  |
| 1. The user feels satisfied with the totality of the developed system. |  |  |  |  |  |
| **Freedom from Risk** |  |  |  |  |  |
| 1. The system promotes and builds a good reputation for the client by providing accurate information. |  |  |  |  |  |
| 1. The system promotes data privacy by allowing the users to only access the functions and files applicable to their level of accessibility |  |  |  |  |  |
| 1. It is ensured that the processes involved in the system are based on the client’s transactions. |  |  |  |  |  |
| **Context Coverage** |  |  |  |  |  |
| 14. The system can be used with effectiveness, efficiency, freedom from risk, and satisfaction in all the specified contexts of use. |  |  |  |  |  |
| 15. The system can be used with effectiveness, efficiency, freedom from risk, and satisfaction in contexts beyond those initially specified in the requirements. |  |  |  |  |  |

*Adopted from the International Organization for Standardization (ISO) 25010 for quality in use*

**Remarks/Comments/Suggestions:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Signature of Respondent