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DEVELOPING A WEB-BASED INFORMATION SYSTEM FOR NEW GROUND GENERATION CHURCH, TAGUIG CITY

A Capstone Project Presented to the Faculty

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In Partial Fulfillment of the Requirements for the Degree of

Bachelor of Science in Information Technology

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DEDICATION

This capstone project is dedicated to all the people who gave unwavering support and encouragement to us as a student that have been our guide throughout this journey.

To our parents, who have always believed and supported us, their sacrifices have never been unnoticed. We are forever thankful for the love and encouragement and guiding us through the most challenging moments in our lives.

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ABSTRACT

Title	**: Developing a Web-Based Information System for New Ground Generation Church, Taguig City**
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The study focuses on developing a web-based information system for Taguig City's New Ground Generation Church to enhance operational efficiency and community engagement. The system addresses comprehensive administrative needs, including centralized member data management, event scheduling, ministry allocation, financial tracking, email announcement generator, and resource management. By centralizing records, the system ensures that member information is always up-to-date and accessible, aiding efficient church management. The event scheduling feature allows for effective

planning and coordination of church activities, ensuring all members are informed and engaged. Financial transparency is achieved through secure handling of donations and tithes, with clear transaction records promoting accountability and reports/analytics. Ministry allocation to members is efficiently distributed and managed by the church leaders and administrators. Email announcements enable administrators to post updates and announcements, fostering a connected and informed church community. Additionally, church resources management improved the file handling and distribution to members via the church website to improve the members spiritual growth and wellness. Overall, the system streamlines operations, enhances engagement, and supports the church's mission by providing reliable data management and facilitating effective communication.

The system's integration with the church’s public-facing website ensures that information such as events, ministries, and resources are consistently updated and accessible to both members and visitors. This integration enhances transparency and engagement by providing a single, reliable source of information. The role-based access control feature ensures that only authorized personnel can manage sensitive data, enhancing security and data integrity. By automating data synchronization and providing tools for effective communication, the system reduces administrative burden, allowing church leaders to focus on their core mission of serving the community.

This innovative approach ensures that the church can efficiently meet both immediate operational needs and long-term growth objectives, creating a more connected and engaged community.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

In the contemporary era, technology has evolved in all spheres of human life, changing the way people relate, work, and communicate. With the increasing connection in our world, many organizations, including religious ones, have seen the need to face its technological era in order to enhance their activities and remain relevant to their followers. This issue is also faced by the New Ground Generation Church located in Taguig City. Being a growing religious institution in the Philippines, the traditional approach to running its activities and managing its members needs to be updated due to the expanding size of the congregation. This explains why an alternative solution aimed at improving the running of the church's affairs must be sought that incorporates the use of internet information systems.

The New Ground Generation Church, like other religious establishments, plays an indispensable role in building community, providing guidance, and mobilizing resources for the religious activities of its members. However, as the congregation grows, so do the operational challenges. Important operations such as tracking active members, event planning, managing ministries, financial tracking, and communicating with attendees are all becoming more difficult and time-consuming to carry out using normal means (Joshua et al., 2023).

At present, the church only uses manual systems and some basic digital applications, which can be quite inefficient in passing out vital information, updates, and many other communications, which may also result in data losses. Ongoing reliance on these non-optimal methodologies strangles the internal management of the church and causes reduced communication efficacy to its members.

The proposed system aims at addressing the most vital administrative concerns in the church organization. Under these conditions, the church should have integrated and centralized data storage to facilitate the storage, management, and presentation of information (Wiratama & Desanti, 2022).

For one, it will act as a centralized database of all the congregation's records containing their biographical information, records of members, and involvement in different activities of the church like ministries and study groups. This will simplify the management and storage of files and enable convenience every time there is a need for the members' information. According to Purba et al. (2019), the design will feature a module that will help in planning and implementing various ministries, which in turn will improve the overall coordination of church events and activities as well as ministry programs.

The development of a Web-Based Information System for New Ground Generation Church, with which members and visitors are informed overall. An email communication module is also introduced in this web information system, intended for church leaders to announce activities, and reminders of special events. There will also be a financial management module to help keep track of donations, tithes, or contributions from church members, ensuring accurate monitoring of funds and promoting transparency.

In conclusion, this proposed system will answer the operating challenges of growing congregations and enhance internal processes while also improving member engagement. Overall, the church can increase management efficiency through user-friendly technology that will enhance church-to-member communication and promote community involvement among its members. The design and implementation of this proposed system form the basis of the ongoing reduction of the current issues, as well as the encouragement for future advancements in technology in the operation management of the church.

Project Background

New Ground Generation Church in Taguig City is a growing community church missioned to promote spiritual growth and meaningful connections among its members. As the church continues to expand its members and activities, managing its operations has become increasingly difficult. Currently, the church relies on traditional methods such as pen-and-paper records and multiple spreadsheet files to manage critical information such as member data, event schedules, ministry involvement, finance tracking, email announcement, and resource management. While these methods have served their purpose in the past, they have proven to be inefficient and prone to errors as the number of data increases.

The lack of a centralized system has led to several operational challenges. Record-keeping across multiple spreadsheets often results in data duplication, inconsistent updates, and a lack of security for administrators and church leaders. Managing learning materials, such as PDF files, is inconvenient without a unified storage and retrieval system. Pen-and-paper records are also vulnerable to physical damage and inefficiencies.

The absence of a public-facing website limits the church's ability to communicate with its members and the wider community effectively. Public visitors, who might seek information about the church's location, ministries, or

upcoming events, have no platform to access this information. Additionally, the lack of a centralized communication system has made it difficult to share announcements with members in an organized and consistent manner.

To address these challenges, this study proposes the development of a web-based information system tailored to the needs of New Ground Generation Church. The system will centralize member data, facilitate event scheduling, improve ministry involvement tracking, integrate financial tracking, send emails, and organize the management of learning materials. Furthermore, it will include a public website that allows members and visitors to access vital church information, events, and updates. To further improve internal communication, an email announcement feature will be integrated, ensuring that all members receive important updates in a unified and efficient manner.

By transitioning to a modern, web-based system, New Ground Generation Church can improve its operational efficiency, reduce manual administrative tasks, and provide a more engaging experience for its members and the community.

Objectives of the Study

The primary objective of this study is to design and develop a web-based information system that will address the operational needs of the New Ground Generation Church.

The study seeks to accomplish the following objectives:

To transition from traditional pen-and-paper methods and multiple spreadsheets to a secure and accessible digital platform for managing church operations such as member listings, event scheduling, financial tracking, ministry assignment, email announcement, and resource management.

To provide a public-facing church website that shares essential information about the church and its programs with members and public visitors, seamlessly integrating data from the information system to ensure accuracy, consistency, and real-time updates.

To implement reporting and analytics capabilities that deliver comprehensive insights into financial performance of the church for better data-based decision-making by the church leaders.

Significance of the Study

The development of a web-based information management tool for the New Ground Generation Church will prove to be of help to the operations of the church as well as to the accomplishment of its mission objectives.

For Church Administration: In this case, the study provides the administrative team of the New Ground Generation Church with a central hub for carrying out routine tasks that include handling members and finance tracking, making event schedules and so on. As a result, all manual processes will be eliminated taking away a huge burden of record keeping and allowing church leaders to engage more on ministry activities.

For Church Members: The system is administered with access only to the admins and other super admins; however, its operation will result in advantages for the whole church membership. Increasing the organizational level of the church, New Ground Generation Church would be able to manage members and send emails to them in an organized way, which is vital for both the spiritual and communication aspects of the church. Better management of events and ministries and having reports/analytics of finance will enable the members of the church to remain active and informed, which will keep the church alive and engaged.

For the Church Leaders and Decision Makers: The system provides advanced information management tools, data security, and resource management tools for better decision-making and church management. Promoting transparency and accountability as the core component of the church will provide sustainable growth and operations of the church.

For Future Researchers and Developers: This work will be of great interest to those people and organizations who would be developing similar systems for churches and other non-profit groups. It records the challenges met and solutions gained through the development process of the system so that future developers may have guidance while constructing an efficient and customized system.

In summary, the aims of the study are also important to those who engage in research and development of similar systems for churches and other organizations in the future. This study outlines the experiences and problems encountered and aims to assist persons and organizations designing efficient and appropriate information systems for institutions similar to those presented in this study. Therefore, this study helps the organizational growth of the NGGC and aids the development of web-based systems for future developers and organizations.

Scopes and Limitations

Scope of the Study

The primary aim of this study is to develop an online information system that will cater to the operational needs and community activities of the New Ground Generation Church in Taguig City. Furthermore, this information system will provide an integrated approach to the church's operations through member management, event management, financial tracking, ministry assignment, email communication, and church resources ensuring effectiveness, integrity and orderliness to the operations of the church.

The scope of the study are:

1. **User Access and Authentication:** The system will have an account structure that will be meant for super admin and admin use only, with restrictions for security purposes. This means that only the designated church leaders and administrators will have access to the system to allow secure control of the information stored in the system.
2. **Member Information Management:** Establish means of record keeping of member-related information, including profiles, contact details, and activities.
3. **Event Scheduling and Notifications:** This function simplifies the management of events by involving church administrators in the preparatory work and creating a buzz about the event while ensuring that all the church members are updated in good time.

4. **Ministry Management Coordination:** The system will also manage and keep records of the members who are active in the many ministries of the church. This will help the church leaders plan and organize the usage of the people and other resources.
5. **Data Storage and Security:** Ensuring that data protection laws or regulations are complied with by implementing measures to protect sensitive information during or after its collection.
6. **Donation and Financial Tracking:** We will also incorporate a financial tracking module through which donations, tithes, and other financial resources from the members will be recorded and controlled in order to maintain them accountable.
7. **Reporting and Analytics:** Equipping the church administration with the necessary tools to generate reports and do analysis of finance performance of the church.

Overall, the project set out to develop an information system that will improve administrative task efficiency, enhance data protection, and build community, which are New Ground Generation Church's integral processes in spiritual enhancement and maintaining the organization.

LIMITATIONS OF THE STUDY

The limitations of the said project are:

1. **Budget and resource issues:** The development of the said system will solely be determined by the church financial resources allocated to the project. This in turn may affect the extent to which advanced technology may be incorporated.
2. **Reliance on the internet:** Given that the system is modeled on the web, it means that regular access to the internet will be a prerequisite, hence may limit its effectiveness to users residing in areas with consistent connectivity.
3. **Access to Super Admin and Admin Only:** The system has not been designed to allow member accounts; thus, only church administrators will be allowed to use it. This ensures tight security on the data present within the system. However, the system does not reach out to the members. They will not be able to directly log into the system in order to update personal details and access church materials by themselves.
4. **Customization:** The preliminary boundaries of the system are created to address the minimal running issues of the New Ground Generation Church. Customization features that are suited to the needs that other churches or institutions have will not be incorporated unless New Ground Generation Church management orders so.

5. **User adoption and training:** The introduction of the system may not be well received by some users because they would need additional assistance or training in order to operate the system, which may affect the rates of acceptance at first.
6. **Maintenance and support:** For ongoing system security and reliability, current forms of maintenance will be required, although they will be limited to the available skills and resources.
7. **Scalability:** The exponential increase in church members and manageable data will necessitate changes in the system, as the original outlook will not be able to accommodate significantly higher numbers of users.

Definition of Terms

Admin (Secondary Admin): A user with access to most administrative features but limited access to certain high-level security settings and other admin management. Admins handle tasks such as member management, event scheduling, financial tracking, ministry allocation, email announcement creation, and church resources management.

Centralized Data Management: A system where data is collected, stored, and managed in a single, unified platform. This is especially beneficial for churches to keep track of members, events, and financial tracking.

Church Administrator (Super Admin): The highest-level user with full access to all functionalities of the Church Executive Information System (EIS). Super Admins oversee and manage the entire system, including user management, data configuration, security settings, system updates, and comprehensive administrative tasks.

Church Resources: Various materials and documents that support the church's activities, including sermons, study materials, event templates, and other relevant resources. These resources are managed and made accessible through the information system.

Communication Management: A function that allows administrators to share announcements and updates, keeping the church community informed and connected.

Dashboard: An interactive interface that provides a high-level overview of key metrics, activities, and data within the Church Executive Information System. The dashboard includes visual elements such as charts, graphs, and summary reports.

Ethical Considerations: Guidelines that ensure responsible system design and usage, focusing on privacy, informed consent, accessibility, transparency, cultural awareness, and data security.

Event Management: The process of planning, organizing, and managing church events within the information system. This includes creating event schedules, managing RSVPs and providing event details.

Feedback Loop: An ongoing process for collecting user feedback to identify issues or improvements, ensuring continuous system enhancement.

Finance Report: The process of generating detailed financial reports and analytics based on recorded transactions. These reports include income statements, expense summaries, donation analyses, and overall financial health assessments.

Finance Tracking: The process of recording and managing all financial transactions within the church, including donations, tithes, and expenses. This ensures accurate financial records and accountability.

Member Management: The process of creating, updating, and maintaining detailed profiles of church members within the information system. This includes

tracking member participation, contact information, preferences, and membership status.

Ministries Assignment: The process of assigning church members to specific ministries based on their interests, skills, and availability. This also includes tentatively assigning ministry leaders responsible for coordinating ministry activities.

New Ground Generation Church (NGGC): A church based in Taguig City, which is the focus of this study to develop a web-based application aimed at enhancing internal operations and attracting members.

Role-Based Access Control (RBAC): A method of regulating access within a system based on the user's role, ensuring that only authorized individuals can access certain functionalities.

Security Testing: Assessing the system's defenses against potential threats, including penetration testing and vulnerability assessments.

Super Admin: A user with access to all administrative and management features of the system. Super admins handle tasks such as admin management, member management, event scheduling, financial tracking, ministry allocation, email announcement creation, and church resources management.

Transparency and Accountability: The practice of maintaining clear and accessible records, particularly with regard to finances, to build trust and ensure responsible management of resources.

Web-Based Information System: A digital system accessible through a web browser that allows organizations to manage, store, and share information. In the church context, it facilitates member engagement, event scheduling, and administrative tasks.

CHAPTER II

REVIEW OF RELATED LITERATURE AND SYSTEMS

This chapter intends to present a complete review of the literature and system that is connected to the web-based Church Information System, which would be helpful in this proposal. When we consider a wide variety of studies and articles, we will examine literature relevant to coming up with a background on the present methods, systems, and best practices. The digression will allow us to carry out our project goal successfully.

Related Literature

Management Information Systems Education: A Systematic Review

Erod et al. (2022) conducted a systematic literature review in order to identify the critical trends in MIS education as it adjusts to equip students with industry-relevant skills. Five major themes that have been highlighted for future research are innovative pedagogical approaches, industry partnerships, specific subtopics within MIS education, new methods and metrics for assessing success, and cross-disciplinary opportunities in mathematics, traditional business disciplines, and the hard sciences.

One of the gaps the researchers found is in international perspectives. Most studies included in their review gathered information solely from the United States. In addition, although their findings present shifting trends for MIS education, the paper does not address how specific sectors like nonprofit

organizations or religious institutions use MIS principles. Therefore, it would be possible to look at how MIS frameworks are used in settings other than the general business.

The proposed system for church administration aligns with the principles outlined by them by addressing the intersection of organizational management and technology through the lens of a nonprofit religious organization. Their educational orientation the proposed system uses MIS principles to establish a centralized, web-based platform for the simplification of church record management and enhanced coordination of ministries and events.

Advantages of Management Information System Development

According to Alawamleh et al., (2021), MIS is very essential for Contemporary Organizations, the research emphasizes that organizations are progressively considering MIS as a comprehensive instrument that tackles issues across the organization rather than merely concentrating on the technical components of the MIS division. This change highlights the significance of synchronizing MIS strategies with overarching organizational objectives to enhance their effectiveness.

The study by Alawamleh et al. (2021) thoroughly details the essential elements of MIS, covering its definition, mission, role, purpose, and philosophy. It additionally offers a comprehensive classification of MIS, illuminating its numerous aspects and the different advantages it can deliver to businesses.

Despite these benefits, the research highlights various challenges and barriers that impede the efficient adoption and use of MIS. These consist of technological constraints, poor integration, insufficient training, and organizational resistance to change, all of which hinder companies from completely utilizing the strategic advantages of MIS.

By discussing the problems MIS faces, one can stress teamwork between different departments, continuous education, and coordination among the organizational goals. In short, these strategies are applied not only to help organizations overcome available obstacles but also to fully exploit the advantages that MIS offers in such a manner that would positively impact their competitiveness and efficiency compared to an increasingly IT-oriented global level. Findings from the study will prove essential for companies seeking improvement in their MIS skills to effectively and dynamically adjust to the demands of modern business environments.

Data Management and System Design in Churches

HKBP Kebon Jeruk Church manages a whole lot of data, starting from the church records and pastor as well as server information up to family and marital details, baptismal records, and church agendas of activity schedules and service timings. However, there are inefficiencies, and it is even difficult to acquire necessary information due to such manual management. To address these challenges, Purba et al. (2019) came up with the development of a web-based

church information system oriented toward the needs of HKBP Kebon Jeruk. The system, which was developed using Extreme Programming methodology, was subjected to analysis using the PIECES framework to enhance data management and streamline church operations.

Church Communication Through Website of Bishops

Izrael and Polievková (2024) deal with the functions of bishops' conference websites in fostering internal communication in the Catholic Church in selected countries. The work assesses whether these websites meet the goals of the church and include different publics in this digital environment. Analyzing websites in Slovakia, Poland, and the Czech Republic reveals variations in content emphases, accessibility in more than one language, use of multimedia, and the inclusion of social media. These variations reflect cultural and ecclesiastical contexts, demonstrating how these websites serve as digital gateways to the Catholic Church and public-facing portals for their respective conferences. Using the Website Communication Model (WCM), their study assesses the content, multilingual features, multimedia incorporation, and social media presence of these sites.

Raising Digital For a Digital World

Adedokun (2024) notes that churches must adjust to the digital world but maintain a theological foundation anchored in the scriptures and led by the Holy

Spirit. However, many churches are challenged to keep up with the ever-changing technologies and trends. In order to stay relevant and responsive to their members, churches need to periodically review and adjust their approach. The problem, however, is in the balancing act of adopting new technologies and not losing sight of the message of the gospel. As much as it may facilitate outreach and communication, technological advancements should always be subordinate to the church's message and not alter it.

Development Method in Designing Church Service Information System

According to Sondang (2024), a system must be designed with regard to user needs; in this respect, the system must be fast, easy to use, and capable of handling all types of data and information. This paper will explain how Object-Oriented Technology, using the Rapid Application Development (RAD) method, offers a strong and efficient approach to designing information systems. It describes how the phases of RAD in the planning, design, development, and implementation phases of an information system of HKBP Perumnas Simalingkar Church Service. Further, the article mentions the use of Codeigniter 4, which makes use of Object-Oriented Technology in developing complex systems, while Unified Modeling Language is one of the tools in the designing process of the system. This combination of methods and technologies accelerates the development of powerful information systems.

While the system improves certain aspects of church services, it lacks a comprehensive approach to church-wide management. The approach developed will close this gap because the general administrative needs of the church will be met. It aims to develop an integrated web-based system that will enhance administrative efficiency, communicate effectively, and coordinate operations in a wide range of church activities by using similar approaches such as object-oriented technology and RAD.

Emerging Technologies and Innovative Research

Kalaivanan (2019), discussed the development of an online church administration system in Thanjavur's Assembly of God Church, especially emphasizing automating access and record-keeping of the church service. It gives remote management and information access without necessarily using paper-based processes while improving data management in the church administration system. This way of achieving efficiency is by centralization of records and easy retrieval of information.

However, the study primarily focuses on the automation of church records and does not touch upon other very critical administrative functions such as event management, ministry coordination, or communication between the leaders of the church and the members. In this regard, the system improves some aspects of church operations but does not present a complete solution to all the administrative needs of the church.

The proposed system in our study is aimed at filling these gaps by offering a broader range of administrative features. It will automate record-keeping but focus more on other key administrative tasks such as event planning, coordination of ministry, and communication within the church organization. Our system would thus improve the overall efficiency of the operations of the organization by addressing these important concerns on the administrative front of the church organization by bringing all the functions under one central platform.

Decolonizing Recordkeeping

McKemmish (2019), discussed the child system recordkeeping as well as the principles and the values in recordkeeping and emphasized that recordkeeping must be recognized by the children as individuals. By making the record a foundation for the analysis that can be used for examining the history of colonial ideologies. However, the gap that exists in the study is by advocating the transform recordkeeping that takes on the decolonized values. It emphasizes the importance of the system to acknowledge the children as an active member of their community. The proposed system in our study aimed to create a centralized system for recordkeeping and ensure that records will reflect all the members of the church, also the purpose of recordkeeping is for transparency and accountability to ensure that recordkeeping becomes ethical and responsive to all the members.

Church Records and Information Management System

Olipas et al., 2021, discussed that The church is one of society's sectors that handle different kinds of data and produces various information based on their records. Like business organizations, parish churches need to effectively and efficiently handle their files and records to provide reliable results to their parishioners. Efficiency, accuracy, security, and increased productivity are the benefits of having an IT solution in an organization. Today, more and more organizations and institutions deploy IT solutions to reap the benefits and positive effects of technology. The aim of the study was the design to continue improving the Church Records and Information Management System and other system features to increase its effectiveness and efficiency.

Related System

Congregation Management Information System Design

According to Tanusaputra et al. (2024), the growth of the digital age and the problems brought about by the pandemic increased the demand for web-based systems that support remote operations. The demand motivated researchers to conduct a study at the Bethany Tower of Christ Church to evaluate the existing church management system. The current system through observations and interviews with pastors and deacons showed great limitations. Some features could not meet certain requests, such as forms or inquiries to the church. In addition, updates had to be done to make devotionals, news, and

posts more practical and efficient. Tanusaputra et al. (2024) used the Waterfall development method to address the aforementioned issues.

This approach started with direct observation and analysis of the needs of the church, and then a congregation management system was designed and implemented. After its implementation, testing and maintenance were done, which brought out areas that needed improvement such as fixing bugs and adding essential functionalities. However, the system showed high feasibility, with an average user satisfaction rate of 87.3%. The importance of iterative development in building a robust and user-friendly web-based system that supports administrative efficiency and congregational engagement is highlighted by the study. Although Tanusaputra et al. (2024) developed a system, which is adapted to Bethany Tower of Christ Church; however, gaps exist, and the suggested study fills them. Gaps that exist in missing functionality and maintenance challenges highlight the need for a system that will address the wide range of critical administrative demands across churches.

Unlike the study of Tanusaputra et al., the proposed system introduces a central database that integrates all church records, such as member information and involvement in various activities into one unified interface. In addition, it has a module that focuses on planning and implementing ministries. It helps in arranging the activity of the church as well as programs for the development of learning and overall managing process. Focusing on these essential areas, the proposed system draws inspiration from Tanusaputra et al. (2024) while

addressing weaknesses produced by fragmented features, besides maintenance challenges. Its practicality and use also cover the larger administrative burdens facing church organizations, delivering scalable, web-based service directly connected with their spiritual aspirations.

Web-Based Congregation Data Management Information System

The SCC/GKS Kanjonga Bakul Congregation presently uses traditional methods in handling data, such as collecting photocopies of family cards and visiting congregational homes to obtain information. This traditional method, however, is inefficient, makes data consolidation difficult, and increases the risk of errors and inaccuracies. Ina et al. (2024) solved this problem by suggesting the design of a web-based congregation data management system.

These parish organizations cater to a different range of transactions and activities to serve the ecclesiastical and financial needs of the congregation. Therefore, proper planning and systemic strategies ensure that services can be rendered accurately and with efficiency by parishes when they desire to serve the community in an effective way (Marlis et al., 2020). This calls for the implementation of information management systems that would cater to the specific needs of parish operations (Development of Centralized Parish Record and Information Management System (PRIMS) to Support the Strategic Information System Plan (SISP) of the Diocese of Cubao).

Church Records and Information Management System

The integration of information technology has greatly enhanced efficiency in many sectors, including church operations. Parishes play an essential role in society, providing spiritual growth and community involvement. Beyond their spiritual purposes, parishes manage critical records and documents that require accurate and efficient management. To solve the challenges associated with traditional written data administration, this research proposes the design and implementation of a web-based Church Records and Information Administration System (CRIMS). Olipas et al. (2021) underline the need for effective record-keeping in churches, demonstrating how information technology-based solutions may revolutionize data management procedures and improve parish administration.

Arthur & Rensleigh (2015) explored the particular difficulties small churches face in implementing web technologies because of financial and technical constraints. While larger churches have successfully integrated digital solutions, smaller churches face challenges that prevent them from using web-based tools. However, they pointed out that small churches would significantly benefit from embracing web technologies, enhancing communication, data management, and outreach programs. This approach points to the need for solutions that are accessible and scalable, thereby catering to the needs of smaller congregations.

On the other hand, Olipas et al. (2021) focused on the larger scale of communication and pointed out the importance of sophisticated digital systems in supporting the vast ecclesiastical outreach. Their findings show the broad range of technology for bigger organizations while emphasizing the importance of personalized solutions to address the particular operational demands of smaller parishes.

These observations form the basis for web-based information system development, whose aim would be to develop the operational effectiveness of SCC/GKS Kanjonga Bakul Congregation. Thus, a system with prospective solutions to most traditional problems in data management as illustrated will facilitate successful administration in a parish and quality services.

Church Management System

According to Sherpa (2022), a well-designed database system captures information on details of the problem and transaction records about every request more than monitoring the availability status. It also retains personal information for users, enabling managers to authenticate the user and their requests. However, the problem in the system identified was that it lacked a systematic structure; therefore, managing requests and announcements was disorganized. There was no well-structured framework of an organized database, hence affecting the efficiency and effectiveness in handling and

tracking transactions. This made the verification of users and requests more complicated.

Web-Based Financial Information System

Being a community-based organization, the church performs various activities and transactions to serve its members. Joshua et al. (2023) studied the design, analysis, and development of a web-based financial information system for the Christian Evangelical Church in Minahasa (GMIM). Such complexity in its operations calls for centralized and integrated data management, including storage and presentation.

Management Information System in Web-Base Church

Wijaya et al. (2023) established a management information system for the Oikumene Prabumulih Protestant Church to enhance data processing and communication with its congregation. Their study utilized a descriptive methodology and incorporated both primary and secondary data sources, a waterfall system development model, and UML design tools for the system's creation. Using PHP and MySQL, their system wants to replace the church's manual data collection practices, enhance data management, minimize paper usage, and facilitate more functional communication. The primary issue addressed in their study was the inefficiency of the manual data system, which

posed challenges in timely information management and dissemination to the congregation.

Website-Based Public Service Information System

Sofyansyah and Anom (2023), discussed how the information system of public services at www.istiqlal.or.id increased visits to the Istiqlal Mosque among service users and administration. This study focused on how the administration of the mosque exploited information technology to improve public services, especially for home and foreign visitors, and how the mosque was positioned as a pioneer in the management of modern places of worship. They stated that to maximize its benefits, the system must be improved continuously and publicized more effectively.

Though this study focuses on web-based systems that manage visitation in a mosque, it addresses just one form of public service and does not cover all the religious organizational administrative issues. For example, record management, event planning, or even members' mobilization, and so forth. This church administration system fills in that gap, using web-based technology for the administration of critical problems inside the religious organization. More specifically, it is intended to standardize church record keeping, ministry coordination, as well as communication for improving the overall administrative efficiency that is needed in the religious setting.

Web-based Application Design for St. Peter's Catholic Church

Yuek V.R Lumintang et al. (2021), discussed that catholicism faces challenges using the traditional manual method of data management caused by the large number of data involvement. To address this problem, a web-based application was developed for St. Peter Warembungan Church. The proposed system in our study is also built-in PHP, and JavaScript and also supported by MySQL enabling the user admin to delete, add, edit, and store the data successfully. The system was also user-friendly, worked function smoothly, and eased data management by improving access to information about Chuch administrator and members

Analysis and Design of Web-Based Information System for Church Congregations

(Wiratama & Desanti, 2022) designed a web-based information system for the BNKP Pewarta Church to resolve various problems during the COVID-19 outbreak. This system was concerned mostly with health data collection from all attending church members to reduce further multiplication of the virus and enhance interaction for future church events. Originally, before the system design and development, health details would be recorded manually on attendance sheets, which was considered as tedious and prone to errors. The web-based system permitted more efficient data gathering and real-time updates besides maintaining health information in a single database.

However, their research has a critical limitation as the scope of the system is very narrow; it focuses only on health tracking and communication about the pandemic. This does not address the other major church operations like managing membership records, event scheduling, financial data, and other ecclesiastical functions, etc. Hence, there is a need for an efficient web-based information system to bridge the gaps.

The present study aims to bridge the gap by developing a web-based system that would integrate all aspects of church operations into one system and improve access, accuracy, and efficiency. This system will help meet some of the basic operational needs of the church about its communications, scheduling events, keeping financial records, and maintaining data on members.

Development of A Dynamic Web-Based Information System

For the Christian and Missionary Alliance Churches of the Philippines, Inc., also known as CAMACOP, Ventura (2022) designed an online information system. This was to help facilitate the search for information about churches, workers, and missionaries through the CAMACOP Locator; the tracking of numerical status of churches and missionaries through the CAMACOP Statistics; allow churches and districts to view their contributions through MyGivings Online; and to preserve and retrieve missionary activities and prayer requests through the CAMACOP Archive. These were constructed with PHP and MySQL,

eliminating duplication of information and making the information much more accessible and efficient for the entire denomination.

However, in terms of scope, the system introduced by Ventura (2022) is not all-encompassing. Though it considers essential functions like tracking finance and missionary activities, the system does not consider the other essential administrative concerns of local church operations, internal communication, event planning, and member engagement. Moreover, the system does not provide solutions for localized church management tasks such as ministry coordination or record management, which are critical for the day-to-day running of a church.

Our system for study presents this extension by filling up on the gaps of Ventura and focusing on the more relevant local level administrative concerns. By making web-based resources for the coordination of ministry, planning events, record-keeping, and internal communication, the system will enhance the operations of local churches to provide better collaboration between members of the church and its leadership. This strategy will ensure the needs of local churches and denominations are met as the system can be calibrated to a wider variety of church settings.

In conclusion, MIS is proven to have brought high improvements in the operation performance, decision-making capability, and data management of numerous different sectors, such as churches, and agricultural systems, among

many others. All of this, therefore, leads to decreasing errors and inefficiencies caused due to traditional methods, increases accuracy, and provides customer satisfaction. However, successful digital transformation requires alignment with organizational objectives, especially in sensitive places like religious institutions, where the essence of the message must be retained. Although progress has been witnessed, there are still a few gaps in areas of system integration and specific functional operations, which provide prospects for further research and development. As MIS continues to evolve, it will have the potential to develop improvements and meet the changing needs of different industries while making sure that systems are adaptable and responsive to users.

Synthesis

By offering web-based resources to facilitate the coordination of the ministry, planning of events, keeping records, and intra-communication, the system will help improve the efficiency in the running of local churches and ensure increased cooperation from the members to the church leadership. Such a plan will ensure the needs of local churches and denominations are met. The system can be tuned to fit in with a variety of local church settings.

The reviewed studies have shown that the web-based information system has been increasingly contributing to the betterment of church administration. However, there are still gaps in the comprehensive response to the diverse and intricate demands of church administrations. Tanusaputra et al. (2024)

developed a church administration system for Bethany Tower of Christ Church that prioritized user satisfaction and iterative development. This system has a high user satisfaction result but has some missing features and maintenance problems. The present study integrates a central database to compile church records in this system, including membership information, activity participation, and coordination of ministries. The above integration addresses fragmentation in the system proposed by Tanusaputra et al., providing a holistic solution to church administration, thus lowering maintenance costs and improving the overall effectiveness of the operational system.

However, there are still gaps in the comprehensive response to the diverse and intricate demands of church administrations. Tanusaputra et al. (2024) developed a church administration system for Bethany Tower of Christ Church that prioritized user satisfaction and iterative development. This current study expands on the discussion by providing a central framework that manages both ecclesiastical and administrative duties. The proposed system covers areas such as ministry coordination, event management, and member communication among others, making it the most holistic approach in Church operations compared to the fact that Sofyansyah and Anom focus entirely on one aspect of religious organizational management.

However, gaps exist to completely address the varied and intricate needs of church administrations. Tanusaputra et al. (2024) came up with a church management system for Bethany Tower of Christ Church, considering iterative

development very important and also the user satisfaction. This synthesis highlights how the proposed web-based system extends and improves the existing research by offering a more comprehensive solution to the challenges of church administration. It integrates various church functions into one system, hence filling the gaps left behind by previous studies, such that the administrative and spiritual needs of the church are effectively met.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter aims to provide an overview of the project's in-depth technical background for the system's development and deployment. It covers the tools, technologies, and methodologies utilized in the project intended to create a reliable, scalable, and user-friendly system by utilizing a variety of modern resources and technology. By assessing the functional and non-functional requirements of the system, this chapter provides a solid foundation for design principles and development procedures basis for understanding how the system fits into the whole technological environment.

Technical Background

The development of the Information System for New Ground Generation Church is a challenging project aimed at optimizing church operations and enhancing administrative efficiency. The system's primary goal is to create a reliable platform that effectively manages member data, ministry assignments, manage events, finance tracking, and more. To achieve this, an integrated approach involving both front-end and back-end technologies is crucial to deliver an exceptional user experience for administrators.

The system for New Ground Generation Church is designed to include a dedicated website for church members and visitors, alongside the Information System which is accessible only by church administrators. This dual-platform

approach ensures comprehensive management of church operations while providing a user-friendly experience for the congregation.

Front-End Development

The front end of the information system, where administrators interact with the system, uses foundational languages such as HTML5, CSS3, and Blade. Front-end libraries and frameworks like Bootstrap enhance platform interactivity and ensure a responsive user experience across desktop devices. These technologies enable rapid updates and user-friendly interfaces.

Back-End Development

On the server side, the system requires technologies capable of handling user authentication, data storage, and request processing. The Laravel framework is utilized for its robust frameworks that support secure and structured back-end functionality.

Database Management

The system uses a relational database, specifically MySQL, to store and manage structured data related to church operations. This includes data on church members, events, finance tracking, and announcements. Utilizing MySQL provides several key benefits that enhance the system's efficiency and reliability, ensuring that data information is organized and easily accessible.

Security and Authentication

To protect user data and ensure secure transactions, the system employs SSL/TLS encryption for secure HTTP connections ensuring all data transmitted between the server and administrators is encrypted. For user authentication, the system utilizes JWT (JSON Web Token), providing a robust mechanism for verifying user identities and maintaining secure sessions. Additionally, role-based access controls (RBAC) are implemented to enhance data security further, allowing administrators to define and manage access permissions based on user roles. This ensures that sensitive information is only accessible to authorized personnel, thereby safeguarding the integrity and confidentiality of the data.

Technologies Used

All the technologies required for developing the web-based information system have been gathered by the proponents. Following are all the details of the technology used:

Category	Description
Programming Language: PHP	PHP was selected as the primary programming language for its server site widely used open-source scripting language suitable for web development. It is written in HTML and to make web pages interactive with the database. We choose PHP since Laravel is composed in it and it controls server-side scripting wonderfully.
Web Framework: Laravel	Laravel, is a free and open-source PHP-based web framework, will be used for its comprehensive ecosystem and strong community support, which accelerates development and has features that are more automated and highly scalable and excels in error management and it provides a robust set of tools and an elegant syntax that simplifies common tasks such as routing, authentication, and caching. Laravel's MVC (Model-View-Controller) architecture ensures a clean separation of concerns, enhancing maintainability and scalability.
Database Management	MySQL is the relational database management system (RDBMS), which will be utilized as our main database

System: MySQL	due to its durability and wide array of architecture compatibility used to store and operate on all of this data makes it suitable for handling large volumes of church-related data securely.
Database Management Tool: PHPMyAdmin	For carrying out database tasks including creating tables, executing queries, and controlling user permissions, it gives an easy-to-use interface and was selected since it simplifies database administration tasks, making it accessible for its ease of use and powerful features that streamline database management.
Frontend Framework: Bootstrap	Bootstrap's grid system and pre-designed components accelerate the development process and will be used for designing responsive web interfaces. It includes a collection of CSS and JavaScript components that facilitate the creation of modern, mobile-first web pages ensuring a consistent and responsive design across different devices, improving the user experience and it is also compatible with Laravel.
Data Encryption: AES (Advanced Encryption Standard)	AES (Advanced Encryption Standard) is a highly secure encryption standard widely used in cryptographic applications. Laravel's encryption services will be implemented to ensure that sensitive data is protected by encrypting it with a secure key and signing it with a Message Authentication Code (MAC) to verify its integrity and Laravel has built-in encryption features to ensure the security and confidentiality of sensitive

	information within the system.
Web Server Stack: XAMPP Version 8.2.12	Provides a complete development environment for building and testing web applications locally for its ease of installation and configuration, which simplifies the setup of a local development environment and accelerates the development process.
IDE: Visual Studio Code	Visual Studio is being selected as an IDE for its powerful features and support multiple programming languages and lots of extensions which facilitates efficient development and debugging.
Dependency Management Tool for PHP: Composer	Enables the installation and management of project-related libraries and packages. In order to facilitate the installation and maintenance of PHP dependencies and guarantee a seamless development process, Composer makes sure that all dependencies are compatible and up to date. It also makes managing external libraries easier.
Version Control and Collaboration Platform: Git & GitHub	GitHub is a version control and collaborative tool that allows us to share, manage multiple versions of codebases and track changes. It also makes code review and issue tracking more easily.

Table 1. Software Requirements

Functional and Non-Functional Requirements

Functional Requirements

These specifications outline the precise functions and features that the web-based information system must have to satisfy the needs of the church to provide a comprehensive and user-friendly solution for managing and accessing the information system. Defining these features will help to guarantee that the system runs well and offers administrators, members, and visitors insightful information. To guarantee that the Information System accomplishes its primary goals, the following functional criteria must be fulfilled:

User Authentication & Access Control

- Implement secure login functionality for Super Admin and Admin users.
- Control access levels to ensure that each user has appropriate permissions based on their role (Super Admin with full access, Admin with limited access).

Church Administrator Access (Super Admin):

- Full access to all system functionalities, including user management, data configuration, security settings, system updates, and all administrative tasks.

Secondary Admin (Admin):

- Access to most administrative features such as member management, event scheduling, financial tracking, ministry allocation, email

announcement generation and resources management. Limited access to certain high-level security settings and user management.

Member Profile Creation and Management

- Administrators can create new member profiles by entering essential details such as name, email, contact information, address, date of birth, ministry assignment, and membership status and update existing member profiles to ensure that all information is current and accurate. Additionally, administrators can delete member profiles that are no longer active or relevant.

Dashboard Functionalities

- To provide quick access to important information, actions and view graphs for related data of the system such as reports and analytics.

Event Management and Scheduling

- Administrators can create new events by entering essential details such as event name, date, time, location, description, and an image.

Manage Finances, Reports and Analytics

- Administrators can create new financial records for various transactions, including donations, tithes, and expenses. This involves entering essential details such as the date, amount, source, purpose, and any associated notes.

- The system also generates reports to track total donations, tithes, expenses over specific periods, ensuring transparency and efficient financial management for decision making.
- The system provides data visualization tools such as charts and graphs to present financial data in an easily digestible format, helping administrators and church leaders identify gaps and patterns.

Ministry Assignments

- Administrators can create new ministries by entering essential details such as ministry name, description, objectives and can edit existing ministries to update details or make changes as necessary and delete ministries that are no longer active or relevant.
- Administrators can assign members to specific ministries based on their interests, skills, and availability.

Communications and Announcements

- Administrator can publish updates or email announcements. Members can access these announcements through their personal emails. The system allows creating and formatting announcements.

Church Resources Files

- Administrators can upload and manage documents (PDFs, Docx, etc.) in the system and can update existing resources to ensure they remain current and relevant. Additionally, the church members can view and download the documents via the church website.

Non-Functional Requirements

The non-functional requirements for the Information System are essential to ensuring that the system not only meets its functional goals but also performs efficiently, reliably, and securely. These requirements define the system's attributes and constraints, which are critical for delivering a high-quality user experience and maintaining system integrity.

Usability

- Design an intuitive and user-friendly interface that is easy to navigate, with clear labels and instructions. Ensure that users with varying levels of technical proficiency can effectively use the system.
- Provide comprehensive training materials, user manuals, and support resources to help users understand and effectively use the system.

Performance

- The system should have fast response times, with page loads and data retrievals occurring within 2-3 seconds under normal load conditions.
- The system should be designed to scale easily, accommodating an increasing number of users, data entries, and transactions as the church grows. This includes both vertical scaling (enhancing the capabilities of the existing infrastructure) and horizontal scaling (adding more servers).

Security

- Implement robust encryption (e.g., AES) for data storage and transmission to protect sensitive information from unauthorized access and breaches.
- Enforce strict access control measures, ensuring that only authorized users can access and modify data based on their roles and permissions.
- Use multi-factor authentication (MFA) to enhance security for user logins, reducing the risk of unauthorized access.

Scalability

- Design the system to be adaptable and scalable to future technological advancements and evolving church needs. This includes supporting new features, expanding user capacity, and accommodating additional data loads.

Maintainability

- Employ a modular design approach to facilitate easy maintenance, updates, and enhancements. This includes using well-documented code and clear separation of concerns.
- Maintain detailed and up-to-date documentation for system architecture, components, and processes. This includes developer documentation for technical maintenance and user documentation for administrators.

Data Integrity

- Using error-handling and validation tests, the system should guarantee that the data entered is correct and consistent, particularly for user profiles, event information, and donation tracking.

Compatibility

- To increase user accessibility, the system should work with smartphones and popular web browsers like Chrome, Firefox, Safari, and Edge

Compliance

- Adhere to financial regulations and best practices for handling donations, tithes, and expenses, ensuring transparency and accountability.

Reliability

- Ensure high system availability with minimal downtime, targeting an uptime of 99.9% or higher. Implement failover mechanisms and redundancy to maintain service continuity.
- Implement robust error handling mechanisms to gracefully manage system errors and exceptions, providing clear error messages and recovery options for users.

The members of the church will be viewing the information through a separate website, which displays the data managed by the system.

Design of Software, System, and Processes

The development of a web-based information system for New Ground Generation Church involves careful consideration of critical software, system architecture, and process designs to guarantee usability, functionality, and maintainability. A synopsis of the key design elements pertinent to this project is provided below.

Software Design

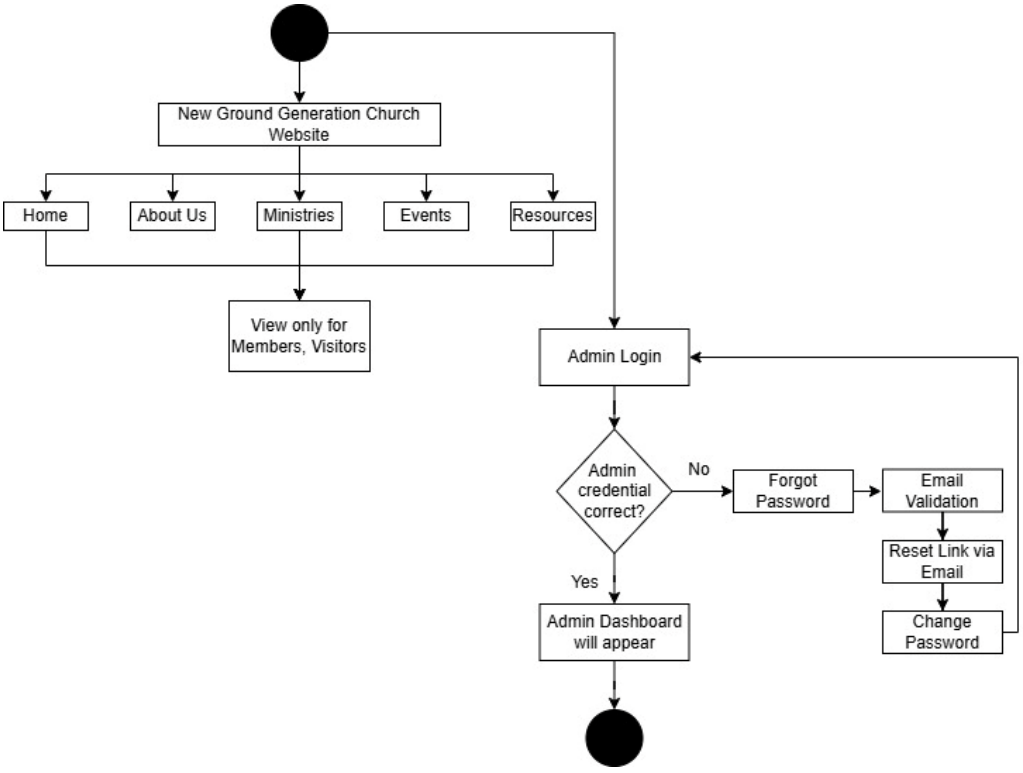

Figure 1: Activity Diagram of Landing Page to Information System

Figure 1 illustrates the process of administrators follow to access the Information System via the website. Upon initially accessing the website, administrators are directed to the landing page, which provides an overview of the website's

purpose and key features. From this landing page, administrators, church members, and visitors can navigate to various sections such as Home, About Us, Ministries, Events, and Resources.

The system itself is hidden and accessible only through a separate domain, restricted solely to authorized administrators. To utilize the system functionalities, administrators must log in using their credentials. Once logged in, administrators have the option to reset their passwords if necessary. Church members and visitors can access the public sections of the website, while administrators have access to restricted areas requiring authentication, ensuring secure and controlled access to sensitive administrative functions.

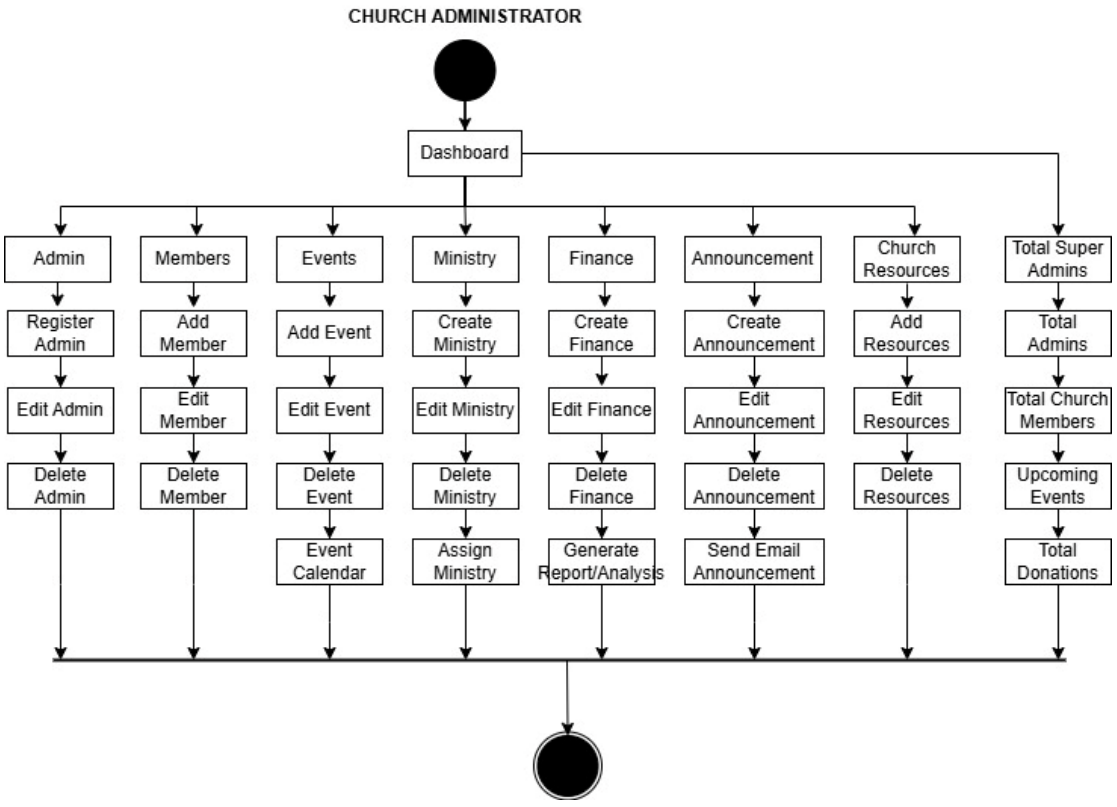

Figure 1.2: Activity Diagram Admin Workflow

Figure 1.2 provides a comprehensive visual representation of the information system administrator's workflow. This illustration shows all of the tasks and decisions that are made in daily church operations. Among the tasks that administrators can carry out are managing members, events, ministries, finances, announcements, and church resources.

Moreover, administrators have the ability to create reports. This diagram shows how these workflows are dynamic and how various jobs can be completed. Because of this flexibility, administrators may effectively manage their workload and prioritize tasks according to their importance and urgency.

Having a thorough understanding of this detailed workflow helps administrators to simplify procedures, enhance productivity, and guarantee the information system runs smoothly. This graphic representation is a useful tool for educating new administrators of the organization, identifying any bottlenecks, and setting strategies in place to improve system performance as an entire system.

System Architecture Design

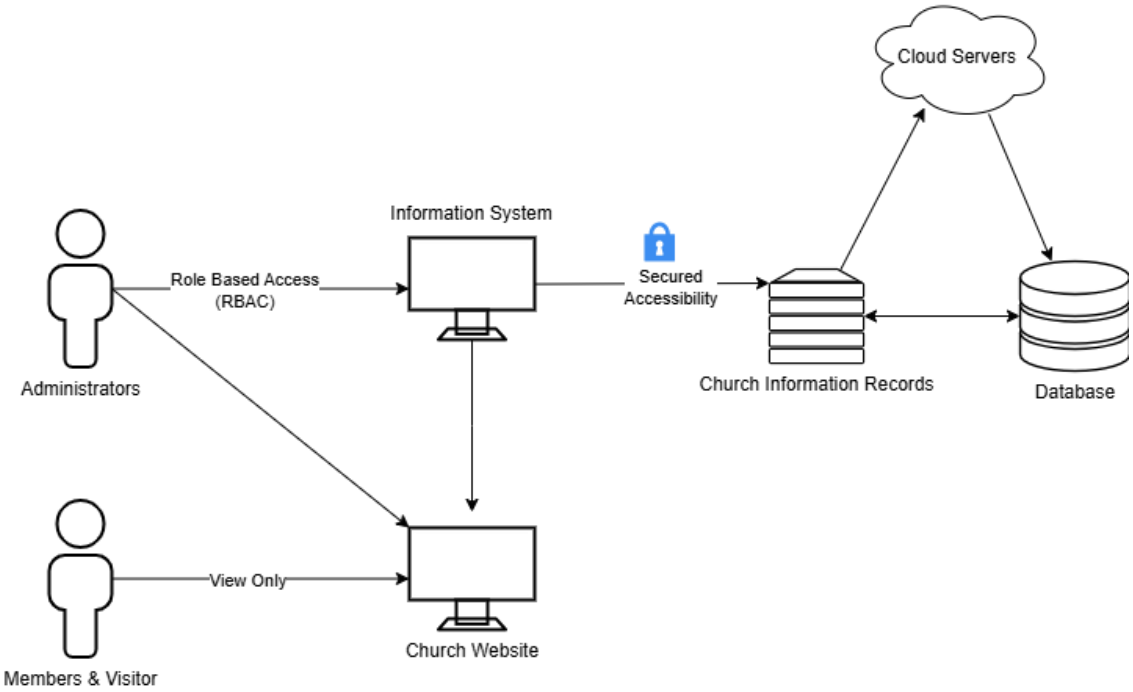

Figure 2. System Architectural Framework

Figure 2 illustrates the system architecture of the New Ground Generation Church Information System, designed to efficiently manage and integrate various church operations. Administrators, including super admins with full access and admins with limited high-level access, handle core inputs such as member data, ministry data, financial tracking, event details, resource files, and announcements. This data is securely stored in a central system database, ensuring protection and easy retrieval. The web server, powered by Apache within the XAMPP environment, handles data processes like saving, retrieving, and manipulating data, ensuring fast response times and reliable performance. The information system and the church website are integrated, with the system

automatically synchronizing data to maintain up-to-date and accurate information on the website. This integration allows visitors and members to access important church information and communicate with administrators through the website's email service. This architectural framework ensures efficient, secure, and well-coordinated church operations, supporting the church's mission through reliable data management and enhanced communication.

The system follows a three-tier architecture that includes the presentation layer, application layer, and data layer enhancing modularity, scalability, and maintainability.

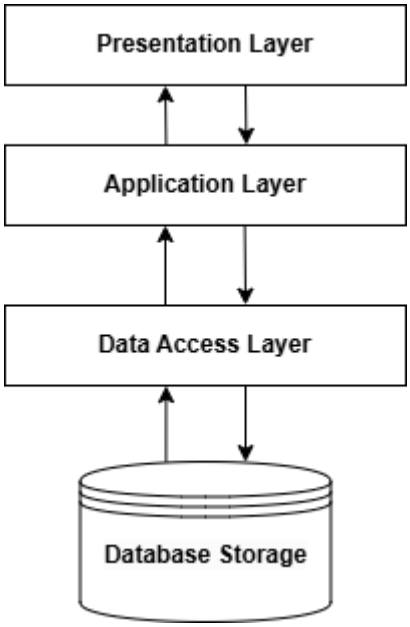

Figure 3. System Architecture Layer

The **Presentation Layer** is the front-end of the system that was developed using HTML, CSS, and Bootstrap combined with the Laravel Framework using Blade. It manages all user interactions and data displays,

including event calendars, member directories, resources, financial tracking, and announcements.

The **Application Layer** is the core logic of the system and was built using PHP and Laravel Framework implemented to process the user's requests, interact with the database, and apply business logic.

The **Data Layer** serves as the Database Management System uses MySQL for storing all data required by the application and PHPMyAdmin is used for database administration tasks.

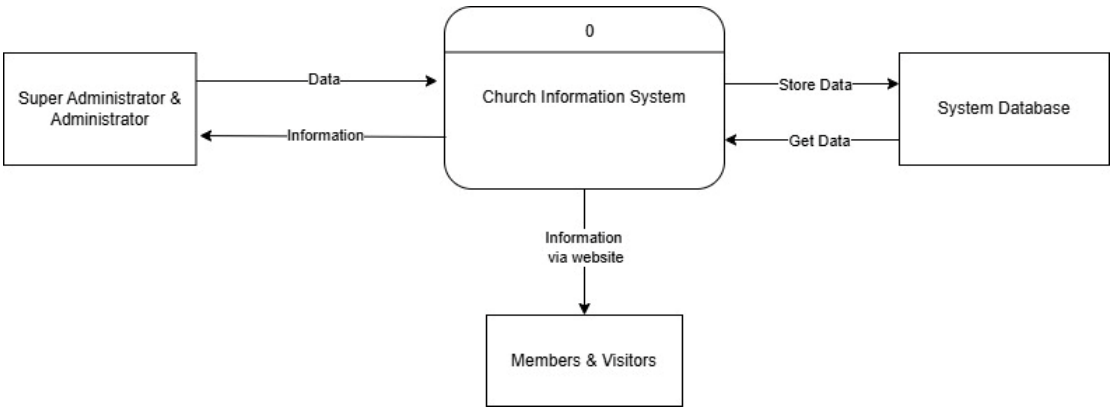

Figure 4. Context Diagram of Information System

Note: The system's entire process and context are highlighted in this context diagram

The Information System is managed by administrators who oversee all aspects of church data, including member profiles, event schedules, financial tracking, ministry list, email announcements, and church resources. This information system is connected to a secure system database designed to store all sensitive data, ensuring its protection and integrity.

In addition to managing internal data, the Information System is integrated with the church's public-facing website, which is accessible to both members and visitors. The website displays important church events, informative church resources, and other relevant content. The system plays a crucial role in maintaining this integration by automatically syncing data with the website to ensure consistency and accuracy across all content.

This integration allows for efficient data management and seamless communication between the internal system and the public website, supporting the church's mission and activities.

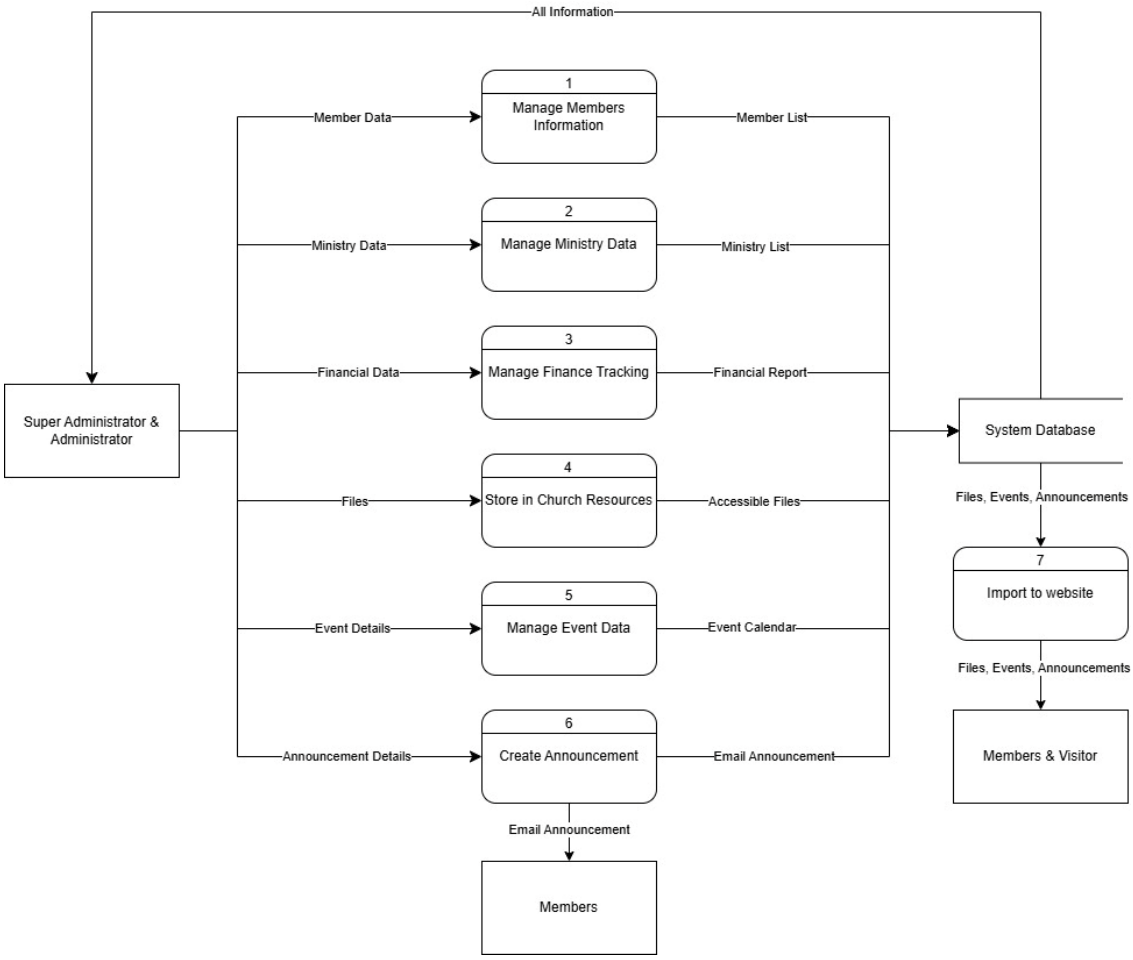

Figure 5. Data Flow Diagram Level 0

Figure 5 illustrates the Level 0 data flow diagram of the Information System. This system is managed by both super administrators and administrators who handle all core inputs, including member data, ministry data, financial tracking, event details, resource files, and announcement details.

These inputs are processed into various informative outputs such as member lists, ministry lists, financial reports, accessible files, event lists, and email announcements, all stored securely in the system database. The system

centralizes these outputs for efficient use in various processes. By centralizing data management and automating the dissemination of information, the Information System ensures consistency, accuracy, and timely communication, supporting the church's mission and enhancing community engagement.

Figure 6. Case Diagram of Administrators and Members

Note: This is a graphic representation of how administrators and visitors related to the information system and the church website

The administrators of the New Ground Generation Church Information System are responsible for managing both the information system and the public church website, as outlined in the use case model. They ensure that the information system operates smoothly and securely, allowing only authorized

church staff to access sensitive data. In contrast, the public can freely view general church information, events, announcements, and various church resources on the website.

PROCESS FLOW DESIGN

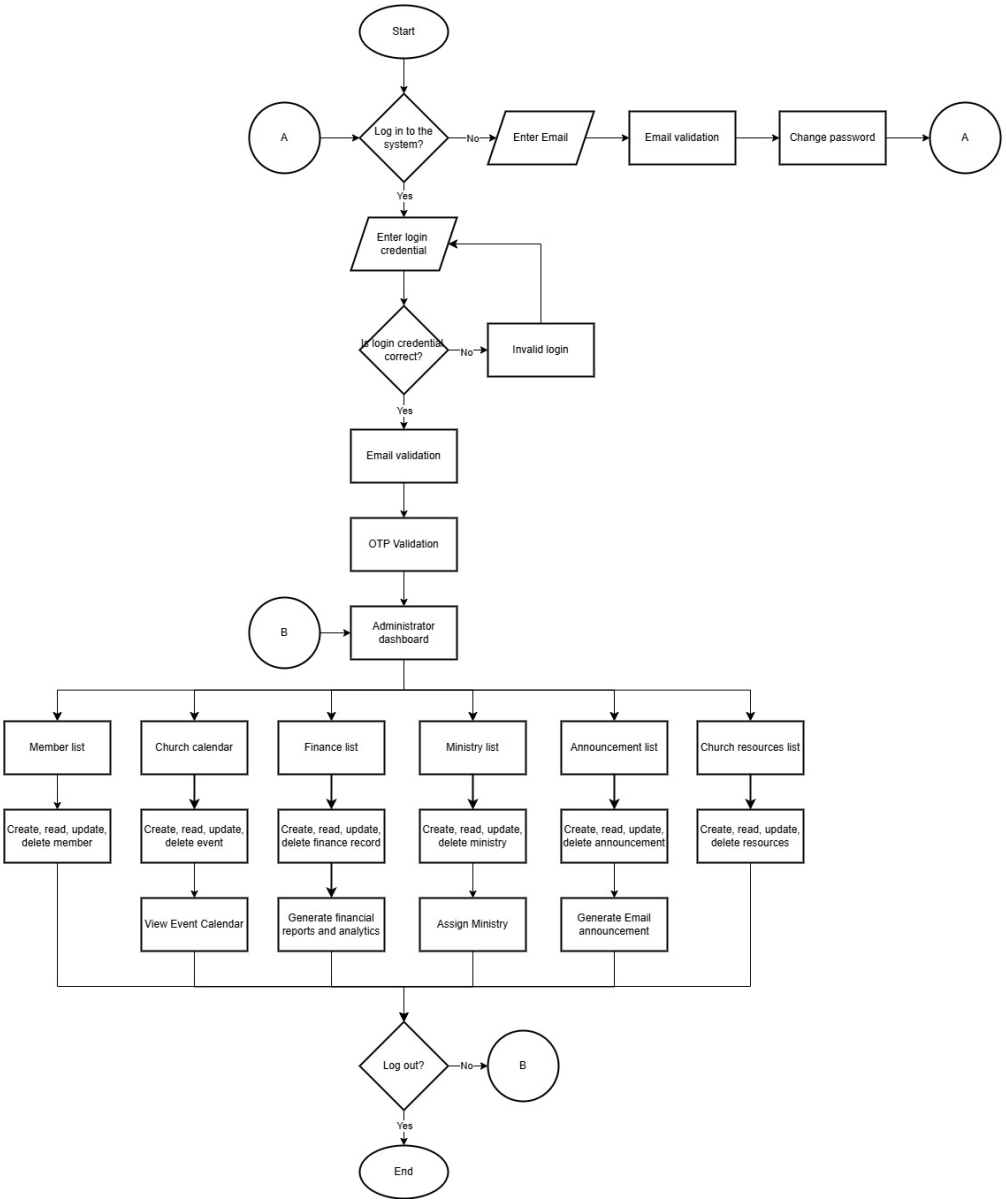

Figure 7. Information System Admin Flow

Figure 7 illustrates the administrator login process for the New Ground Generation Church Information System. This diagram details the steps an administrator follows when using the system. Upon attempting to log in, the system verifies the administrator's credentials against the user database. If the credentials and email OTP are correct, access is granted; otherwise, a password recovery feature is available for administrators who may have forgotten their passwords.

Once logged in, administrators have access to a comprehensive range of C.R.U.D. (Create, Read, Update, Delete) operations, enabling them to manage various aspects of the church's data. This includes managing administrator accounts, member profiles, church events, financial tracking, and resource files. Additionally, administrators can compose and send email announcements to all member email addresses, ensuring effective communication with the church community.

This structured login and management process ensures that only authorized personnel can access and modify critical data, maintaining the system's security and integrity.

Development Process

System Development and Life Cycle

The proponents used the Agile Model in the design and development of the New Ground Generation Church's Web-based Information System.

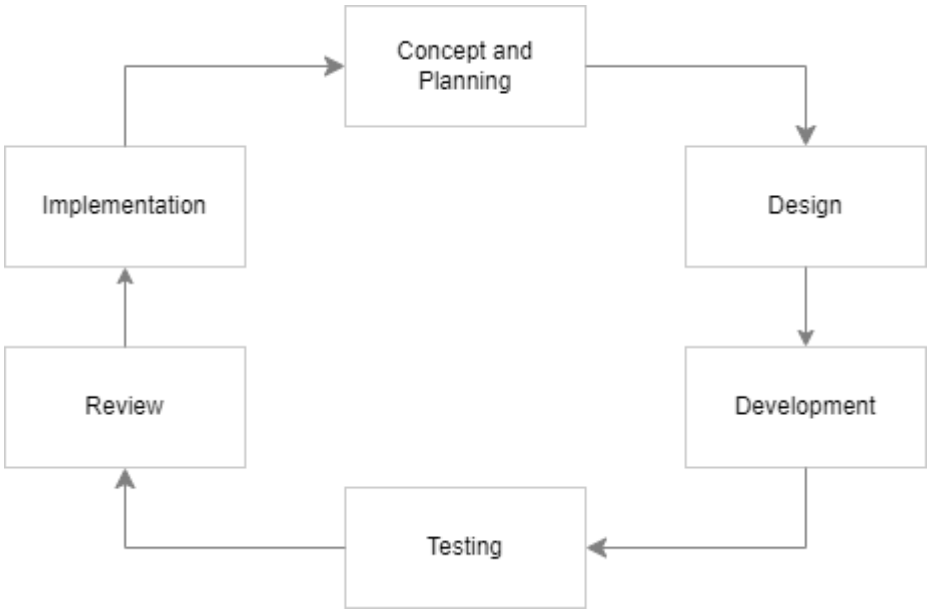

Figure. 8 Agile – Software Development Lifecycle

In the Agile model, there are 6 stages to be undertaken by the proponents. The first one is the **planning stage**. This is the stage where proponents have brainstormed ideas to plan and discuss what problems or needs the New Ground Generation Church needs and solutions will be developed to alleviate those problems or needs. The researchers decided to make a web-based information system to make an all-in-one digital toolbox that exponentially lessens administrative tasks and centralizes church operations. The proponents have

decided to use the PHP, Laravel, MySQL, and Bootstrap to develop the New Ground Generation Church's information system

The second stage of the development is the **designing stage.** This is where the proponents have created the design and prototype using Figma for the information system and church website that will be followed in the development of the system. The design for the official website is where church members and the public can visit and gain essential information about the church and other information such as events, ministries, and resources. The design of the information system is where super administrators can add, edit, and delete administrators, members, events, finance record, ministry, resources, and announcements. They are provided a dashboard that presents the data from the system, such as the total number of administrators, members, upcoming events, and donations. The admin can also upload and download files in the church resources to be the central repository of their media. The main inspiration for the design and color of the whole system is the New Ground Generation Church's logo.

After the designing stage, the proponents will start the **development stage.** They built the website and information system using Laravel framework. The backend is Laravel Framework, the frontend is Bootstrap, and the database is MySQL. The email services used for the development of this web application are Mailtrap for testing and Gmail for production.

After developing the system, the proponents then started the **testing stage**. After developing different features of the website and information system, the proponents then started alpha testing and evaluated whether components of the system are properly functioning and give correct results based on the plan from the concept and planning stage.

After testing the system, the proponents began the **reviewing stage**. This is where the proponents assessed whether components and functions from the system needed further enhancement and changes to better suit the process and effectiveness for smoother church operations. This is also where the changes would be done before continuing to the implementation stage.

The last will be the **implementation stage**. After making changes from the alpha testing, the proponents then started the beta testing of the system with the selected beneficiaries, including pastors and administrators. During this phase, proponents collected feedback on the system's performance, usability, and functionality in a real-world environment. Any issues or suggestions were promptly addressed, ensuring the system met the needs and expectations of its users. This comprehensive testing paved the way for a smooth and successful deployment of the Church Information System.

Testing

Testing Process for the Web-Based Information System

Unit Testing

This phase involves testing individual components or modules of the system to ensure they function correctly. Automated testing tools are utilized to run tests on each function and method within the codebase, verifying that they work as intended.

Integration Testing

During this phase, different modules or services of the system are tested together to verify that they work seamlessly. The interactions between integrated components, such as the database and user interface, are tested to ensure data flows correctly and that there are no issues with integration.

System Integration Testing

This phase evaluates the complete and integrated system to ensure it meets the specified requirements. End-to-end testing scenarios that mimic real-world usage of the system are conducted to verify that all components work together as expected.

User Acceptance Testing (UAT)

In this phase, actual users (such as church staff and members) are involved in testing the system. Their feedback on usability, functionality, and

overall experience is gathered to confirm that the system meets their needs and expectations.

Performance Testing

The system's performance is assessed under various conditions, including load and stress testing. Multiple users accessing the system simultaneously are simulated to evaluate response times and stability, ensuring the system performs well under different scenarios.

Security Testing

This phase focuses on identifying vulnerabilities and ensuring the system is secure from potential threats. Penetration testing and vulnerability assessments are conducted to safeguard sensitive data and maintain the security of the system.

Regression Testing

New code changes are tested to ensure they do not adversely affect existing functionalities. Previously completed tests are re-run after updates to confirm that everything still works as expected and no new issues have been introduced.

Documentation of Test Results

All testing activities and outcomes are meticulously recorded. This documentation includes findings, issues encountered, and resolutions, providing

a clear overview of the testing process and ensuring transparency and accountability.

Feedback Loop

A continuous improvement process is implemented based on user feedback and testing results. Users can report issues and suggest enhancements, which are addressed in future updates to refine and improve the system over time.

Ethical Considerations

Privacy and Confidentiality of Data

Make sure that any private data gathered from users is protected and kept private. Put safeguards in place to preserve private information and adhere to applicable data protection regulations.

With Knowledgeable Consent

Prior to gathering user data, get their informed consent. Provide them with a clear explanation of the purposes, storage, and sharing of their information so they may decide whether or not to participate.

Accessibility of Users

Make sure that everyone, including people with impairments, can utilize the system. To ensure that the system serves the needs of the entire church community, think about adding features that can be adjusted to meet different demands.

Transparency

Preserve openness regarding the capabilities and constraints of the system. Users should be made fully aware of the system's capabilities and limitations, as well as any possible hazards associated with utilizing it.

Interaction with the Community

Churchgoers should be included in the development process to make sure the system satisfies their requirements and expectations. The community may develop a sense of trust and ownership as a result.

Cultural Awareness

Keep the church community's cultural and religious beliefs in mind. Make sure that these ideals are upheld by the system and that no group is unintentionally offended or alienated.

Measures for Security

Put strong security measures in place to shield the system from online threats and illegal access. Keep security measures up to date to protect user data.

The Moral Application of Technology

Encourage users to use the information system responsibly. Promote appropriate conduct on the platform with regard to data sharing and online interactions.

Feedback System

Provide a way for users to provide feedback so that problems or concerns about the system can be reported. Any moral conundrums that might come up while using it can be resolved in this way.

Durability and Upkeep

Take the system's long-term viability into account. Plans for continuing upkeep and assistance should be in place to handle any ethical issues that might come up in the future.

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