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E-Church: A Web and Mobile-based Church Management System for Holy Rosary Parish Church

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Abstract

The traditional structure of church management has evolved over the years, adapting to the changing needs of congregations and the advancements in technology. This abstract explores the development and implementation of a Church Management System designed to streamline administrative processes and foster community engagement specifically to the Holy Rosary Parish. The study presents tangible results obtained through the implementation of the Church Management System. Evaluating effectiveness involved gathering feedback from 30 users, 1 admins, 5 IT Professionals and 28 multiple-choice questions for the users, gathered through a community-based survey via ISO 25010-based surveys. The researchers plan to use a pie chart as a visual tool to present and compare the diverse responses from survey participants based on the provided questionnaire. 4.6.1 User survey result. Efficiency gains are measured in terms of time saved on administrative tasks, improved accuracy in information tracking, enhanced communication among clergy and parishioners, and increased engagement in community events. These results are substantiated with statistical data, demonstrating the positive impact of advance technology implementation on the overall functioning of the Holy Rosary Parish. The paper encourages further exploration and adoption of such systems within religious organizations to adapt to the evolving needs of the modern world while maintaining the core values of faith and community.

Keywords
Management system, Mobile Based, Localization, Networks, Automated.

1. Introduction
According to Barna (2021), the use of computers in churches is widespread, with 96% of pastors relying on them for various purposes. Additionally, almost half of all churches have implemented online giving and tithing options. Churches can benefit from software tools that help manage various aspects of their operations, including the automation of workflows, accounting, service planning, email communication, and social media marketing. A comprehensive church management solution allows pastors, staff, and church administrators to simplify their administrative tasks. Instead of using separate software for membership, online giving, accounting, communications, website and content management, and security, a complete church management system integrates all these features into a cohesive system. This results in fewer logins and passwords to manage, and all the tools work together seamlessly (Elexio, 2021).

1.1 Objectives
The objective of the study is to create a system that can manage church-related events such as mass intentions, and Eucharist while generating a comprehensive report of data analytics. Additionally, the system enables parishioners to book appointments and services online, thereby helping the church manage its work more efficiently. Furthermore, it provides a centralized platform to receive requests from parishioners, consolidating them in one place.

2. Literature Review

2.1 Church Management and Structure on the Growth and Development of the Church

According to Nieuwhof (2018), churches encounter various difficulties when it comes to managing their administrative responsibilities, which include handling finances, and facilitating efficient communication. In the absence of a complete church management system, churches may find it challenging to overcome these obstacles and could face inefficiencies, inaccuracies, and communication breakdowns that could impede their ministry initiatives. Furthermore, without an effective management system in place, churches may overlook opportunities for growth. Thus, there is a requirement for a dependable and effective church management system that can assist churches in tackling these challenges.

3. Methods

The study employed a quantitative research approach, which involves the collection and analysis of numerical data. This approach enables the researchers to identify trends and draw conclusions based on a large sample (Bhandari, 2022). Through the use of survey questionnaires, this method assisted the researchers find suggestions and recommendations for the system. The research follows the spiral model system. It is a system development lifecycle method used for risk management with many repeating elements. The figure is a spiral or a diagram with many coils. The number of coils or repeatable phases depends on the project itself; therefore, the design is flexible and any changes for the development of the system can easily be incorporated (Martin, 2023).

4. Data Collection

The data collected was recorded, arranged, and analyzed using a quantitative approach. The statistical analysis used to examine the data from the initial survey included frequencies, case counts, and percentages.

$$\% = \frac{f}{N} \times 100$$

Where: % = Percent
f = Frequency
N = Number of cases

The post-test data was analyzed using statistical methods, specifically the Weighted Mean formula, and a Likert Scale with ratings ranging from (5-Strongly Agree, 4-Agree, 3-Good, 2-Fair, and 1-Poor) for interpreting the average rating.

$$\bar{x}_w = \frac{\sum w_i w_i}{\sum w_i}$$

The researchers used a weighted mean formula, to calculate the weighted average you need to calculate the sum of products for each value and its corresponding weight, combine these results, and subsequently divide the total by the sum of all weights in the dataset.

5. Results and Discussion

5.1 Numerical Results

The User Survey Results indicates a Strongly Overall satisfaction with the system, as reflected by a total weighted mean of 4.62. Users highly appreciate the functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. The system has consistently fulfilled or surpassed user expectations in all assessed aspects (Table 1).

Table 1. Survey Results

Criteria	Categories	1	2	3	4	5	Weighted Mean	Remarks
Functional Suitability	Functional Completeness	0	0	1	12	17	4.60	Strongly Agree
	Functional Correctness	0	0	0	13	17	4.62	Strongly Agree
	Functional Appropriateness	0	0	1	13	17	4.62	Strongly Agree
Performance Efficiency	Time Behavior	0	0	1	16	13	4.47	Agree
	Resource Utilization	0	0	1	16	13	4.47	Agree
	Capacity	0	0	1	18	11	4.47	Agree
Compatibility	Co-existence	0	0	0	9	21	4.74	Strongly Agree
	Interoperability	0	0	0	12	18	4.65	Strongly Agree
Usability	Appropriateness Recognizability	0	0	1	8	21	4.84	Strongly Agree
	Learnability	0	0	0	12	18	4.65	Strongly Agree
	Operability	0	0		14	16	4.66	Strongly Agree
Reliability	User Error Protection	0	0	1	17	12	4.44	Agree
	User Interface Aesthetics	0	0	0	15	15	4.56	Strongly Agree
	Accessibility	0	0	0	14	16	4.59	Strongly Agree
	Maturity	0	0	0	16	14	4.52	Agree
	Availability	0	0	0	11	19	4.69	Strongly Agree
	Fault Tolerance	0	0	8	19	11	4.42	Agree
	Recoverability	0	0	1	15	14	4.51	Agree
Security	Confidentiality	0	0	0	8	22	4.77	Strongly Agree
	Integrity	0	0	0	11	19	4.69	Strongly Agree
Maintainability	Modularity	0	0	0	10	20	4.71	Strongly Agree
	Reusability	0	0	0	14	16	4.59	Strongly Agree
	Analysability	0	0	0	15	15	4.56	Strongly Agree

	Modifability	0	0	0	12	18	4.65	Strongly Agree
	Testability	0	0	0	12	18	4.65	Strongly Agree
Portability	Adaptability	0	0	0	8	22	4.65	Strongly Agree
	Instalability	0	0	1	14	15	4.54	Strongly Agree
	Replacability	0	0	0	15	15	4.56	Strongly Agree
Total Weighted Mean							4.62	Strongly Agree

The Admin and IT Professional Survey Results show an Agree rating across all evaluated aspects, with a total weighted mean of 4.39. This is an ok performance in functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability according to admin and IT professional feedback (Table 2).

Table 2. Survey Results 2

Criteria	**Categories**	**1**	**2**	**3**	**4**	**5**	**Weighted Mean**	**Remarks**
Functional Suitability	Functional Completeness	0	0	1	1	4	3.86	Strongly Agree
	Functional Correctness	0	0	1	4	1	4.0	Agree
	Functional Appropriateness	0	0	1	2	3	4.33	Strongly Agree
Performance Efficiency	Time Behavior	0	0	0	4	2	4.33	Agree
	Resource Utilization	0	0	1	2	3	4.33	Strongly Agree
	Capacity	0	0	0	0	6	5.0	Strongly Agree
Compatibility	Co-existence	0	0	0	2	4	4.67	Strongly Agree
	Interoperability	0	0	0	4	2	4.33	Agree
Usability	Appropriateness Recognizability	0	0	0	4	2	4.33	Agree
	Learnability	0	0	0	3	3	4.50	Strongly Agree
	Operability	0	0	0	4	2	4.33	Agree
Reliability	User Error Protection	0	0	1	3	2	4.17	Agree
	User Interface Aesthetics	0	0	0	3	3	4.50	Strongly Agree
	Accessibility	0	0	0	3	3	4.50	Strongly Agree
	Maturity	0	0	0	2	4	4.67	Strongly Agree
	Availability	0	0	0	2	4	4.67	Strongly Agree
	Fault Tolerance	0	0	0	2	4	4.67	Strongly Agree
	Recoverability	0	0	0	4	2	4.33	Agree
Security	Confidentiality	0	0	0	1	5	4.83	Strongly Agree
	Integrity	0	0	0	3	3	4.5	Strongly Agree

Maintainability	Modularity	0	0	0	4	2	4.33	Agree
	Reusability	0	0	1	3	2	4.17	Agree
	Analysability	0	0	0	3	3	4.5	Strongly Agree
	Modifability	0	0	0	4	2	4.33	Agree
	Testability	0	0	0	4	2	4.33	Agree
Portability	Adaptability	0	0	1	4	1	4.0	Agree
	Instalability	0	0	0	2	4	4.67	Strongly Agree
	Replacability	0	0	1	3	2	4.17	Agree
Total Weighted Mean							4.39	Agree

5.2 Graphical Results

The researchers distributed survey forms to the clergy and users to assess their personal experience with the web application. Thus, the researchers provided the research questionnaire to (1) admin, (30) users, and (5) IT professionals. The survey consists of (28) multiple-choice questions for the admin and IT professionals, and (28) multiple-choice questions for the users, gathered through a community-based survey. Utilizing the ISO 25010 survey to measure and evaluate the software product quality of the system. The admin and users survey was assessed using an ISO 25010 survey and was measured using 5-point Likert scale. All of the respondents were given enough time to read the questionnaires that the researchers provided in order to get ground knowledge about the proposed web application. Additionally, the researchers provided respondents with sufficient time to test the proposed web application and fill out the survey form after testing. The researchers plan to use a pie chart as a visual tool to present and compare the diverse responses from survey participants based on the provided questionnaire.4.6.1 User Survey Result (Figure 1).

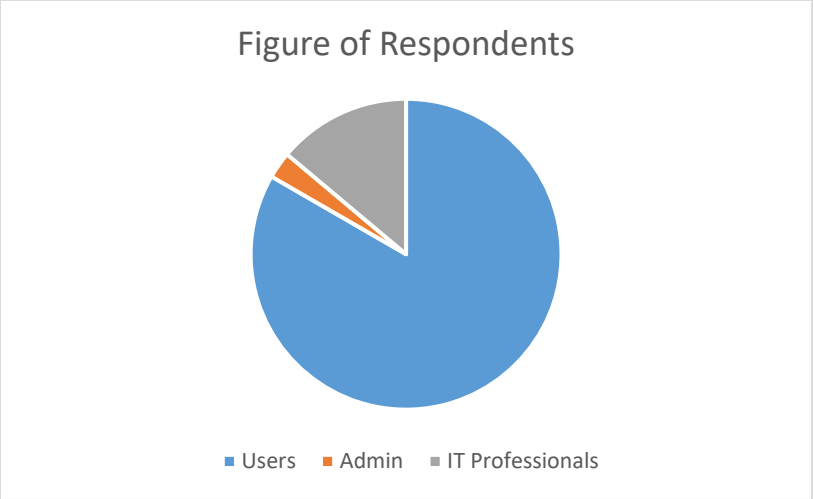

Figure 1. Figure of Respondents

6. Conclusion

The Holy Rosary Parish, situated on Santo Rosario Street in Angeles City, implemented a management system. This system assisted in organizing, assigning, and scheduling tasks and events to achieve the church's goals. The project's outcomes lead to the conclusion that introducing and implementing this software would not only enable the church to accomplish its stated objectives but also result in the reduction or elimination of paperwork from the system.

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Biographies

Carlitos S. Bernardino, currently in my fourth year as an IT student specializing in Web Development at Angeles University Foundation. My exploration of the expansive realm of Information Technology has been a thrilling ride, characterized by a profound passion for technology and an unwavering commitment to acquiring knowledge.

Since the outset, I've been fascinated by the endless possibilities that technology offers. Born on July 4, 2001, in Angeles City, Pampanga, my insatiable curiosity from a young age eventually led me to pursue a journey in IT. As I navigate through my final year of college, I find myself reflecting on the remarkable experiences and skills that have played a pivotal role in shaping my academic and professional identity. As a web developer, my journey began with mastering the fundamentals – HTML and CSS. These languages lay the groundwork for web development, and I took great pleasure in refining my skills to craft visually appealing and functional websites. Soon after, I embraced the power of frameworks such as Bootstrap and Tailwind CSS, streamlining my development process and staying abreast of design trends. My skills extend beyond the front end as I delved into the intricacies of back-end development, mastering languages like PHP and Angular. JavaScript, a constant companion in my coding journey, bridges the gap between front-end and back-end, adding depth to my skill set. In the coding arena, I feel most comfortable in Visual Studio Code, where I bring my ideas to life. The seamless integration and powerful features of this tool enhance my coding experience, enabling me to create solutions that seamlessly blend functionality with aesthetics. My journey is not just about mastering technologies; it's about embracing a mindset of continuous learning. I firmly believe in staying ahead of the curve in this ever-evolving field.

Marcus Mathew B. Calaguas, currently embarking on my fourth year as an IT student with a focus on Web Development at Angeles University Foundation. My expedition through the expansive landscape of Information Technology has proven to be an exhilarating journey, marked by an intense passion for technology. From the very beginning, I've been enthralled by the boundless possibilities that technology unfolds. Born on May 11, 2001, in Angeles City, Pampanga, my insatiable curiosity since a young age naturally guided me towards a path in IT. As a web developer, my odyssey commenced with mastering the essentials – HTML and CSS. These foundational languages are the bedrock of web development, and I took immense pleasure in refining my skills to craft visually appealing and functional websites. The integration of version control became paramount as I immersed myself in collaborative projects, courtesy of Git. Its efficiency in managing code changes and facilitating teamwork has proven indispensable throughout my academic endeavors. In the realm of coding, I find my most comfortable space within Visual Studio Code, where I breathe life into my ideas. The seamless integration and robust features of this tool enhance my coding experience, empowering me to create solutions seamlessly. My quest transcends mere mastery of technologies; it's a commitment to embracing a mindset of continuous learning. I firmly believe in staying ahead of the curve in this ever-evolving field.

Miguel Carl D. Basilio, currently progressing into my fourth year as an IT student specializing in Web Development at Angeles University Foundation. My exploration of the vast landscape of Information Technology has been a thrilling adventure, characterized by a deep passion for technology and an unyielding commitment to knowledge acquisition. Since my early years, I have been captivated by the limitless potential that technology presents. Born on November 19, 2001, in the City of San Fernando, Pampanga, my insatiable curiosity naturally directed me toward a career in IT. As I navigate the final phase of my college journey, I find myself contemplating the noteworthy experiences and refined skills that have significantly molded my academic identity. Embarking on my journey as a web developer, I began by mastering the fundamentals – HTML and CSS. These foundational languages serve as the cornerstone of web development, and I took great pleasure in honing my skills to create visually appealing and functional websites. Progressing further, I embraced the power of frameworks like Bootstrap, effectively streamlining my development process and staying updated on current design trends. The incorporation of version control became crucial as I engaged in collaborative projects, utilizing Git for its efficiency in managing code changes and facilitating teamwork, proving invaluable throughout my academic pursuits. Venturing into the dynamic realm of front-end development, I explored ReactJS, discovering the joy of crafting interactive and user-friendly interfaces. My proficiency extends beyond the front end as I navigated the complexities of back-end development, mastering languages such as PHP and Angular. JavaScript, a steadfast companion in my coding journey, serves as a bridge between front-end and back-end, adding depth to my skill set. My challenge involves more than just mastering technologies; it revolves around adopting a mindset of perpetual learning. I strongly advocate for staying at the forefront of this constantly evolving field.