Fit Track: A Gym Member Monitoring System with Predictive Analytics for Almo Fitness Gym

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Abstract: A Web-Based Gym Member Monitoring System Using Predictive Analytics and Decision Tree Algorithm focuses on enhancing gym operations and member management through data-driven automation. The system integrates QR code attendance tracking, automated payment processing, and predictive analytics to improve efficiency, accuracy, and decision-making at Almo Fitness Gym in Taguig City. The Linear Regression algorithm in the Almo Fitness Gym system can predict future attendance trends and revenue based on members' historical usage patterns. Logistic Regression helps classify members as active or at risk of cancellation by analyzing their visit frequency and payment behavior. Meanwhile, Random Forest and K-Means Clustering enhance predictive analytics by improving the accuracy of retention forecasts and grouping members into segments for targeted fitness programs and personalized promotions. The platform's web-based interface allows both administrators and members to access real-time information on attendance, payments, and progress tracking. The development process followed the Agile methodology, ensuring flexibility, user feedback integration, and iterative improvements across system modules. Evaluation was conducted using ISO 25010 software quality standards, focusing on functionality, reliability, usability, efficiency, and security. Results from 50 respondents comprising 30 gym users and 20 IT experts showed that the system performed excellently in reliability, efficiency, and security, confirming its effectiveness and user-friendliness. Users found the interface intuitive and responsive, while experts validated its compliance with standard software design principles. Findings demonstrated that predictive analytics and the Decision Tree algorithm are effective in optimizing gym operations, supporting data-informed decisions, and personalizing fitness management. Overall, FitTrack serves as both a technological and operational solution that transforms manual gym processes into an intelligent, automated system. The study recommends further development through mobile integration, offline functionality, and enhanced security measures to ensure scalability, accessibility, and long-term system sustainability.

Keywords: FitTrack, Predictive Analytics, Decision Tree Algorithm, Gym Member Monitoring, QR Code Attendance, ISO 25010, Agile Methodology, Web-Based System

I. Introduction

The growing demand for technology-driven fitness management systems has transformed how gyms handle operations and improve member engagement. Fitness centers today face challenges in monitoring attendance, managing payments, and understanding member activity patterns. Traditional manual systems often result in delays, errors, and inefficiencies in handling gym data. To overcome these issues, organizations are now adopting intelligent systems that combine automation and data analytics. Gym monitoring systems integrated with predictive analytics provide a structured way to turn raw data into useful insights that enhance operational performance and member satisfaction.

The Gym Member Monitoring System with Predictive Analytics for Almo Fitness Gym integrates multiple algorithms to improve data-driven management and member retention. Linear Regression is utilized to forecast gym attendance, membership growth, and revenue trends based on historical usage data, enabling the management to plan staffing and facility resources effectively. Likewise, Logistic Regression classifies members according to their likelihood of renewal or dropout by analyzing variables such as attendance frequency, duration of membership, and payment consistency, allowing the gym to proactively address potential cancellations (Kaur & Kumari, 2022; Zhang et al., 2021; Patel & Sharma, 2020; Singh et al., 2022).

Random Forest enhances predictive accuracy by combining multiple decision trees to identify key factors influencing member satisfaction and engagement. The K-Means Clustering algorithm segments members into groups—such as highly active, moderately active, and inactive—to help personalize fitness programs and promotional offers (Ahmed et al., 2023; Lee & Park, 2021; Rivera & Gomez, 2022; Thompson & Li, 2023). These algorithms collectively support Almo Fitness Gym in implementing a smart monitoring system that enhances service quality, operational efficiency, and customer loyalty. Through predictive analytics, the system transforms raw data into actionable insights that foster continuous improvement and sustainable growth.

The proposed system, FitTrack: A Web-Based Gym Member Monitoring System Using Predictive Analytics, aims to modernize the operations of Almo Fitness Gym by automating attendance through QR codes, tracking payments, and analyzing data for performance prediction. The system's design follows the ISO 25010 software quality model to ensure functionality, usability, and reliability. By adopting an agile methodology, the development process promotes flexibility, continuous improvement, and user-centered design.

Through predictive analytics and automation, the FitTrack system helps gym administrators make informed decisions, improve service quality, and anticipate member needs. This integration not only streamlines gym operations but also strengthens member

relationships and supports long-term efficiency. Predictive analytics thus serves not only as a technical tool but also as a strategic resource for achieving smart fitness management and organizational growth.

Scope

This study centers on the design and development of FitTrack: A Gym Member Monitoring System, a web-based application developed to streamline gym operations and improve the overall experience of members at Almo Fitness Gym in Taguig City. The system provides a centralized and efficient platform for managing essential gym activities, including user management, membership registration, payment transactions, attendance tracking, progress monitoring, equipment management, posting of announcements, gathering of feedback, and generation of analytical reports.

The key features integrated into the system include:

- QR Code-Based Attendance Tracking – automatically generates a unique QR code for each member to log attendance efficiently. (Linear Regression algorithm)

- Online Payment Module – enables members to submit proof of payment online, which the admin can review and approve for accuracy.

- Progress Tracking Feature – records and monitors workout sessions, body measurements, and individual fitness goals. (Random Forest algorithm)

- Equipment Management Function – allows administrators to update and track the status and availability of gym equipment.

- Announcement and Feedback Feature – acts as a communication platform between the gym and its members for sharing updates and collecting feedback.

Limitation

This study only focuses on creating a web-based system and does not include a mobile app or physical security features such as RFID or biometric access. The QR code scanning can only be used through a web browser.

The system is made only for Almo Fitness Gym and is not meant to be used in other gym outlets. Its accuracy and performance depend on the correct data entered by the gym staff and having a stable internet connection for it to work properly.

Theoretical Framework

The Gym Member Monitoring System with Predictive Analytics integrates several machine learning algorithms to improve data-driven decision-making and member management. The Linear Regression algorithm functions to forecast trends such as attendance rates, revenue growth, or membership renewals based on historical data, helping the gym anticipate future demands. Meanwhile, Logistic Regression classifies members according to their likelihood of remaining active or discontinuing their membership by analyzing behavioral and transactional patterns. Together, these regression models enable the system to provide accurate predictions that support operational planning and member retention strategies.

In addition, the Random Forest algorithm enhances prediction accuracy by combining multiple decision trees to identify key factors influencing member satisfaction, progress, and engagement. The K-Means Clustering algorithm groups gym members with similar fitness behaviors or progress levels, allowing trainers to design targeted workout plans and personalized support. These algorithms collectively transform raw gym data into actionable insights, promoting a more efficient and responsive management system. Through this integration, the system achieves its goal of providing intelligent monitoring, predictive analysis, and improved fitness outcomes for both members and management.

Significance of The Study

This system offers a digital approach to streamline operations such as attendance tracking, membership management, and payment recording. This is important to the following group of people:

- Gym Staff – For employees, the platform provides an easier and faster way to manage member details, post announcements, and track daily attendance. It lessens repetitive tasks, allowing staff to focus on customer assistance and service improvement.

- Gym Members – Users can conveniently access their attendance records, review payment history, and get instant updates about schedules and announcements. This transparency promotes better engagement, satisfaction, and loyalty among members.

- Future Researchers and Developers – The study serves as a useful reference for those planning to create or improve web-based fitness management systems. It demonstrates how integrating algorithms for analytics and decision-making can enhance both system performance and user experience.

II. Review of Related Literature

Zhao, Wang, and Zhu (2023) developed a gym management system using B/S architecture with JSP and MySQL for real-time booking and analytics, while Sharma, Abhishek, and Esha (2022) created the MyGym website using PHP and MySQL to manage registration and workout plans securely. Kim and Park (2021) introduced a cloud-based fitness system with AI feedback, and Zhang, Li, and Wu (2023) applied decision tree algorithms for personalized workouts. Other studies, such as those by Suryawanshi et al. (2024) and Hadawale et al. (2025), emphasized automation and secure data handling to improve efficiency.

Local research also supports digital innovation in gyms. Olofernes et al. (2021, 2022) developed systems for Groovy Fitness Gym to manage registration and attendance, while Villanueva, Sevilla, and Verecio (2025) created a QR code-based system for Olympic Fitness Gym. The E-SIMS study (2018) automated sales and attendance tracking for better accuracy. Overall, these studies show that web-based systems enhance gym operations, inspiring the FitTrack system to combine automation, predictive analytics, and user-focused design for improved management and member satisfaction.

III. Methodology of The Study

The study "A Gym Member Monitoring System with Predictive Analytics" is a Developmental (Applied) Research type that focuses on designing and creating a technological solution to improve gym operations and member management. It applies predictive analytics and machine learning algorithms such as Linear Regression, Logistic Regression, Random Forest, and K-Means Clustering to forecast trends and categorize member behavior. This research aims to enhance decision-making and service efficiency through data-driven insights.

Data Gathering and System Evaluation

Before system creation, data were gathered through surveys, interviews, and observation of gym operations to identify problems in tracking attendance, monitoring member progress, and managing renewals. After development, the system was evaluated using the ISO 25010 software quality model, focusing on Accuracy, Reliability, Efficiency, Security, and Portability to measure its performance and usability. Respondents, including gym staff and members, rated each criterion using a 5-point Likert scale: 5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, and 1 – Strongly Disagree. The collected data were interpreted through weighted mean analysis to determine the overall system effectiveness and user
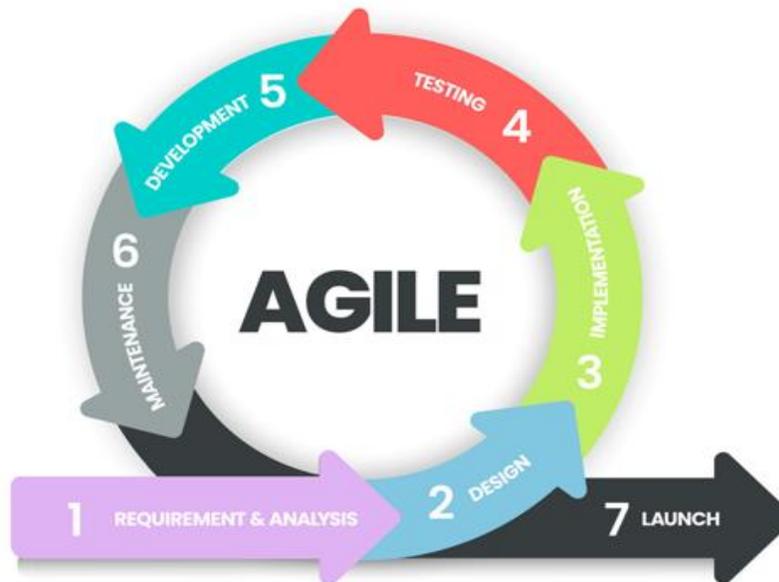

Figure 2: SDLC Agile Model

The FitTrack system follows the Agile Model of the System Development Life Cycle (SDLC), which emphasizes flexibility, collaboration, and continuous improvement. This model is chosen because it allows the team to build the system in small, manageable parts (called sprints), ensuring that feedback from users and staff is regularly applied before moving to the next phase.

The database design of the FitTrack system is created to store and manage gym-related data efficiently and securely. It includes both the logical and physical structure of the database, supporting core features such as member registration, attendance tracking, payment processing, and reporting.

The database maintains proper relationships between tables to ensure data consistency and accuracy across all system functions. Shown below is an illustration of the context diagram of the FitTrack System.
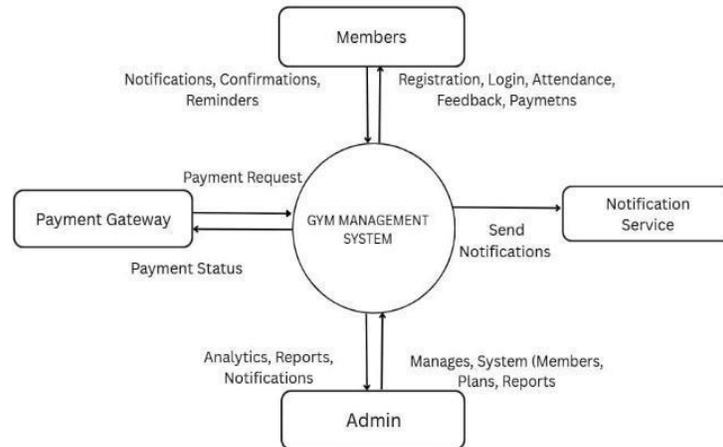
Figure 3: Context Diagram of the FitTrack System

Figure 3 shows how the main users members, admins, payment gateways, and notification services interact with the system.

- Members use the system to register, log in, record attendance, make payments, and receive updates or reminders.

- Admin oversees member management, handles reports, and monitors gym operations.

- Payment Gateway securely processes transactions and sends back confirmation details.

- Notification Service delivers important alerts and reminders to users.

This interaction ensures smooth communication, accurate data processing, and a more efficient workflow for Almo Fitness Gym.

Respondents of The Study

The respondents of the study are divided into two groups: (a) user respondents and (b) technical experts. A total of fifty (50) participants are involved, consisting of thirty (30) active members, staff, and trainers from Almo Fitness Gym and twenty (20) technical experts with backgrounds in information technology and software development. The user respondents are chosen through purposive sampling since they directly interact with gym operations such as attendance, membership management, and payments. They evaluated the system in terms of usability, accessibility, and satisfaction. Meanwhile, the technical experts assessed the system's functionality, reliability, and compliance with ISO 25010 software quality standards.

Development and Evaluation Procedure

The development of "FitTrack: A Gym Member Monitoring System" is guided by the Agile methodology, allowing the system to evolve through continuous feedback and testing. The researchers used several programming languages and development tools to ensure that the system is functional, user-friendly, and efficient. Each tool played an important role in building and testing both the frontend and backend components.

The main development tools include:

- HTML5: Structured the system's web pages and interface layouts.

- CSS (Tailwind CSS): Designed a responsive, modern, and user-friendly interface for both administrators and members.

- JavaScript: Added interactivity, enabling form validation, dynamic content, and smooth navigation.

- PHP: Served as the main backend language responsible for handling logic, user authentication, and database interaction.

- MySQL: Functioned as the database system for storing user records, attendance logs, and payment transactions.

- phpqrcode Library: Generated unique QR codes for each member to support real-time attendance tracking.

- Font Awesome: Enhanced the visual presentation by adding icons for menus, buttons, and status indicators.

- XAMPP: Provided the local testing environment integrating Apache, MySQL, and PHP.

- Visual Studio Code: Used as the main programming editor for writing and managing code.

The evaluation procedure followed a structured approach to determine the system's functionality, usability, and reliability. The assessment is based on the ISO 25010 software quality standard, which evaluates the following aspects:

1. Accuracy: Verifies that the system records and processes data correctly.

2. Reliability: Ensures consistent performance and data stability.

3. Efficiency: Measures how quickly and effectively the system performs tasks.

4. Security: Examines how well user data and transactions are protected.

5. Portability: Determines compatibility across multiple devices and browsers.

Data Analysis Plan

The evaluation of the system is guided by the ISO/IEC 25010 Software Quality Model. This model is chosen because it aligns with the objectives of FitTrack in ensuring functionality, security, and usability for both gym administrators and members.

To interpret the responses gathered from the evaluation forms, the researchers utilized appropriate statistical tools that helped analyze and validate the system's performance. These methods provided a clear and structured understanding of the overall user perception of the system's effectiveness.

- Weighted Mean: This tool is used to determine the overall level of agreement among respondents for each ISO 25010 criterion. It allowed the researchers to identify how strongly users and technical experts agreed on the quality aspects of the system.

- Frequency Percentage: This statistical tool presented the distribution of responses in percentage form, providing a visual understanding of how often a particular rating was chosen.

A four-point Likert Scale is employed to evaluate respondents' level of satisfaction with the system's usability, efficiency, and reliability. This scale provided a structured way for users to express their perception of system quality.

- The scale ranged from 1 to 4, representing Strongly Disagree (1), Disagree (2), Agree (3), and Strongly Agree (4).

- Each statement in the evaluation form corresponded to one of the ISO 25010 characteristics, enabling the researchers to assess each software quality attribute objectively.

- Responses are then interpreted statistically to determine the overall level of satisfaction and system acceptability.

This rating approach ensured that the evaluation results of the FitTrack system are presented objectively and could be analyzed to measure how effectively the system fulfilled its intended functions based on user and technical feedback.

The System

The FitTrack Gym Member Monitoring System is a web-based platform designed to enhance the efficiency of gym management by integrating key functions such as membership management, attendance tracking, payment processing, and announcements in one system. It enables members to check in using QR codes and view their membership details, while administrators can easily organize records, monitor activities, and generate accurate reports. The system also uses a Decision Tree algorithm to predict attendance trends and member behavior, helping admins make better operational decisions. Developed using PHP, JavaScript, Tailwind CSS, it incorporates Chart.js for visual reports and Font Awesome for icons. Assessed under the ISO 25010 standards, the system ensures reliability, security, accuracy, efficiency, and portability.
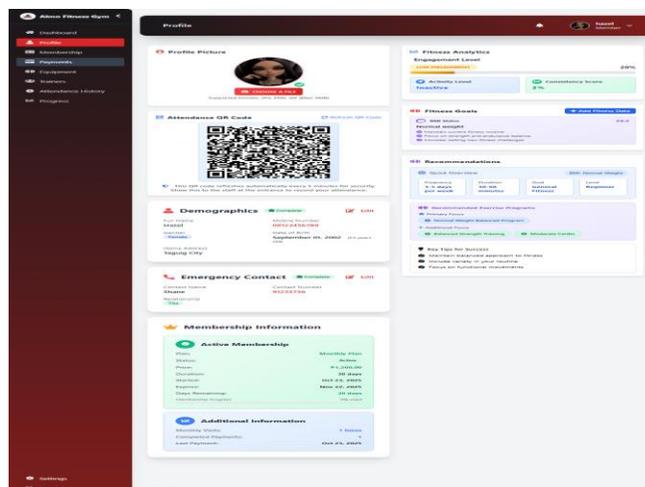

Figure 4: Member Profile Interface

This interface shows the Member Profile Dashboard, where members can view and manage their personal and fitness information. It includes their profile picture, attendance QR code, demographics, emergency contact, and membership details. It also displays fitness analytics, goals, and personalized recommendations to help track progress and improve engagement.
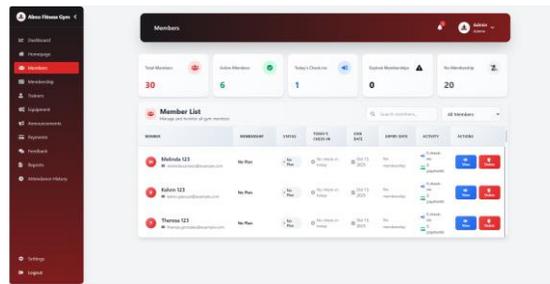

Figure 5: Admin Members Interface

This interface shows the Members Dashboard in Admin page, where admins can track and manage all gym members. It displays total members, active members, check-ins, and membership status. The Member List provides quick access to each member's details, activity, and actions to view or delete records.
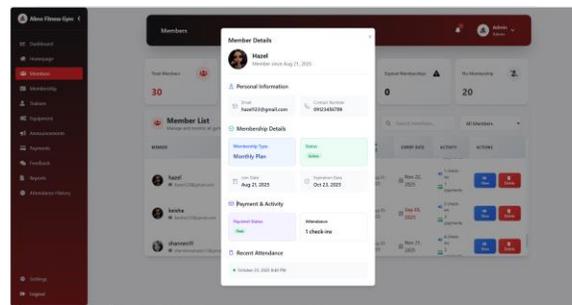

Figure 6: Admin Member Details Interface

This interface shows the Member Details, where admins can view a member's personal information, membership type and status, payment history, and attendance records. It provides a quick overview of the member's activity and account status for easy monitoring.
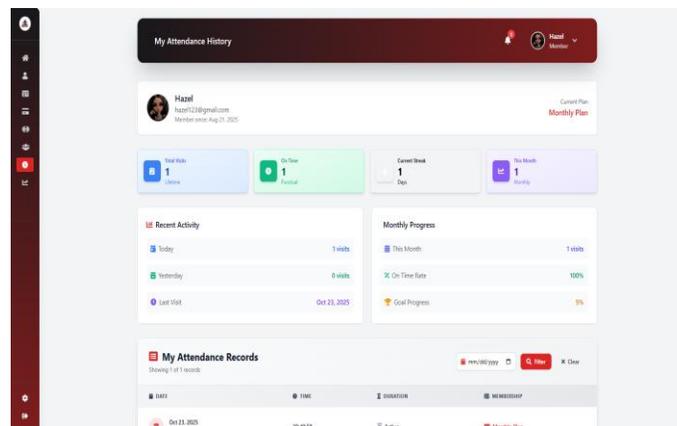

Figure 7: Member's attendance Interface

This interface shows the member's attendance dashboard, where they can track their visits, punctuality, and progress. It displays total visits, on-time rate, and recent activities, along with detailed attendance records. Members can also filter records by date to easily monitor their fitness attendance history.

Assessment: Summary of Respondents on The System

The table presents the distribution of respondents involved in the system evaluation, categorized into user and technical groups. The assessment is conducted following the ISO 25010 Software Quality Model to ensure a fair and reliable evaluation of the system's usability and technical performance. This classification provides a clear overview of the participants who contributed feedback based on their experience and expertise.

Respondents (groupings)	Size (n)	Percentage
Users	30	60%
Technical	20	40%
Total (n)	50	100.0%

Table 1: Distribution of the Respondents

Table 1 presents the total number and percentage of participants who took part in evaluating the system. Among the 50 respondents, 30 individuals or 60% are users, and 20 persons or 40% are technical evaluators. This indicates that the majority of the feedback is gathered from users, while the technical group contributed expert assessments to ensure the system's functionality and performance are properly reviewed.

Criteria (ISO25010)	Respondents (50)			
	Users (30)		Technical (20)	
	WM	VI	WM	VI
1. Accuracy	3.57	SA	3.93	SA
2. Reliability	4.00	SA	3.90	SA
3. Efficiency	4.00	SA	3.68	SA
4. Security	4.00	SA	3.88	SA
5. Portability	3.70	SA	3.85	SA
Overall Average Mean	3.85	SA	3.85	SA

Table 2. Summary of Respondents' Assessment on the FitTrack System Based on ISO 25010 Standards

Table 2 presents the overall summary and comparison of evaluations from both user and technical respondents based on the ISO 25010 criteria. The user group obtained an overall average mean of 3.62, interpreted as Strongly Agree, while the technical group achieved an average mean of 3.85, also interpreted as Strongly Agree. Among all the criteria, Portability received the highest rating from users with a weighted mean of 3.67, whereas Accuracy received the top score from technical respondents with a weighted mean of 3.93, showing strong confidence in the system's accessibility and stable performance. Meanwhile, Efficiency earned the lowest rating from users with a weighted mean of 3.54, indicating slight areas for enhancement in system speed and responsiveness. In general, both groups agreed that the system satisfies the ISO 25010 standards, reflecting overall confidence in its functionality, reliability, and ease of use.

Ethical Considerations

The development and use of the Gym Management System prioritizes the privacy, security, and accuracy of member data. All personal and financial information are handled responsibly, following data protection laws and ethical standards. Developers and staff ensure that the system is used fairly and transparently, avoiding unauthorized access, misuse of data, or discrimination among members. Additionally, regular maintenance and updates are done to uphold system integrity, reliability, and trustworthiness, ensuring that the technology used benefits both gym staff and members ethically and responsibly.

IV. Summary

The Gym Management System is a web-based tool that helps gym staff efficiently manage member attendance, payments, and daily operations. It features a user-friendly interface accessible on various devices. Based on ISO 25010 standards, the system scored highly in Reliability, Efficiency, and Security, with minor improvements needed in Accuracy. Overall, it is a reliable, secure, and easy-to-use system that streamlines gym management.

V. Conclusion

The Gym Management System is a web-based platform that helps staff manage attendance, payments, and daily tasks efficiently. It is user-friendly, accessible on multiple devices, and rated highly in Reliability, Efficiency, and Security under ISO 25010 standards, with slight improvements needed in Accuracy. Overall, it's a secure, reliable, and easy-to-use system that simplifies gym operations.

VI. Recommendation

Future researchers and developers are encouraged to improve and expand the Gym Management System to make it more useful for gym operations. This could include creating a mobile app for easier access and adding security features like RFID or fingerprint scanners to improve attendance tracking.

To address the limitation of browser-only QR code scanning, future versions could allow the system to work offline or temporarily store data when the internet is unavailable. Adding automated checks can help ensure attendance and payment records are accurate. Regular updates, maintenance, and technical support would keep the system running smoothly, and analytics features could help gym staff track member attendance, payments, and engagement for better management.

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