WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

SmartFee Alert: Deadline Notification System & Payment History Analytics

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ABSTRACT :

This project develops a comprehensive web application by using the Django framework to strengthen the fee management processes in educational institutions; it especially targets the automation of on-time reminder email services to students regarding their fee payments. There will be notifications on all the crucial dates that are 15, 10, 5, 2, and 1 day prior to the deadline for making payments. It will ensure students are reminded of their payments using Django's default email sending capability.The application also boasts a dynamic student dashboard, which will enable users to secure access to their payment history, tracking deadlines, and confirm reminders received. A personal interface capability will empower the student to take ownership of fee payments while building transparency into their financial status at the institute.Administrators have a mighty control panel. The usage of this feature has resulted from the powerful Object-Relational Mapping (ORM) by Django; thus making the management of student accounts smooth and easy. Administration can thus determine deadlines over fees, check payment and monitor status, or indeed produce real-time financial report. It is intended that it should make administrators take on other duties that abound with large volumes of students.To further fortify the security structure of the application, role-based access control is instituted wherein sensitive information could only be accessed by authorized personnel. This means that data integrity would improve and student and institutional data would be protected from unwanted entry.

Keywords— Object Relational Mapping, SMTP Integration, Payment Remainder System, User Authentication, Email Automation.

INTRODUCTION :

In many educational institutions, effectively communicating fee-related information is a persistent challenge. Fragmented communication often leaves students unaware of upcoming deadlines, resulting in confusion and potential financial mismanagement. Missed due dates are common when students don't receive timely reminders or lose track of their responsibilities, leading to late fees or penalties. Additionally, limited access to payment history complicates financial tracking, making it difficult for students to monitor pending amounts, verify completed payments, and maintain a clear overview of their financial obligations. This lack of transparency increases the administrative burden, as staff must frequently address payment-related queries and resolve disputes. To streamline fee communication and address these pain points, we propose a Fee Management Notification System built with React frameworks. This system automates fee reminders and centralizes access to payment records, reducing missed payments and strengthening financial compliance. Students will receive automated email notifications at strategic intervals before each fee deadline, Additionally, the system features an intuitive dashboard where students can review their payment history, enhancing transparency and accountability. Unlike traditional methods that rely on manual reminders and fragmented tracking, this platform leverages automation and real-time updates to reduce administrative effort. Designed for scalability, the system utilizes modern web technologies for optimal performance and security, with role-based access control to protect sensitive financial data.

With reliable email delivery, the integration consists of external SMTP services. Thus, it is really essential in the reduction of instances of missed payments, making overall adherence for a financial institution better. This is an application through the Web intended to ease financial matters within educational institutions by creating a simple and automated approach in managing the students' own fees and reminders for payments.

It seeks not only the automatic handling of fees but an integrated tool that shall make benefits available to the both parties-the students and administrators-leading to a well-coordinated, efficient environment financially for any educational institution.

LITERATURE REVIEW :

The paper titled "Integrating Primary School Notification System with SMS Technology" proposed by Ekhsan, Hawa Mohd, Jiwa Noris Hamid, and Nurul Syakilah Mazlan presents SMS technology as an effective alternative for notifying parents about school activities, events, and alerts and ensures that notifications can reach parents regardless of their internet access, making it particularly beneficial for those in rural areas or those who cannot afford internet services[1]ALFarsi, Ghalia, and Maryam ALSinani proposed "Developing a mobile notification system for al Buraimi University College students." Which contributes for the creation of a mobile notification application specifically designed for students at Al Buraimi University College. This tool utilizes SMS technology to facilitate immediate communication between students and educators, enhancing the learning experience[2]Student, Aruzhan Amankossova, and Cemil Turan introduced "Implementation of a real-time alert-notification system for data monitoring in the financial industry".The paper identifies a lack of automated real-time alert systems in the current landscape, particularly those that utilize email notifications. By addressing this gap, the research contributes to the advancement of automated systems that can enhance monitoring capabilities in the financial sector [3]Nik Mustapa, Nik Ruslawati, and Siti Hajar Natasha Mustapa discuss the "Design and development of mobile application for academic reminder system."The Academic Reminder System provides a platform for students to effectively manage their class schedules and assignment deadlines, which helps improve their academic performance[4]Olaleye,Oludare,etal proposed "SMS-based event notification" One of the primary contributions is the design of a system that supports multiple SMS gateways. This feature allows users to select from various SMS vendors without being locked into a single provider, enhancing flexibility and choice for users [5]Mugisha, Emmy, et al proposed. "A secured automatic notification system based on short message service". The paper introduces a comprehensive framework for a secured automatic notification system that integrates SMS and SMTP services. This framework is designed to operate effectively within GSM networks and the Internet, ensuring secure communication [6].Persada,Satria Fadil,et al proposed "Toward paperless public announcement on environmental impact assessment(EIA)through SMS gateway in Indonesia".The study promotes the idea of reducing paper consumption in public announcements by proposing a shift from traditional printed media to SMS-based communication.This aligns with global sustainability goals and supports the realization of a more environmentally friendly approach to information dissemination[7]Sharma, Bibhya N et al. proposed "Use of short message service for learning and student support in the Pacific region". The technology specified in this paper facilitates communication over long distances and in situations where traditional infrastructure may be lacking, making it a valuable tool for institutions. Furthermore,SMS can be utilized for both one-way and two-way communication, enhancing its applicability in various academic environments, such as reminders and information dissemination[8]Prof. Gongxuan Zhang, Prof. Liu Qi Frank and Mr. Lu Yu together proposed a paper with "A Secured Automatic Notification System Based on Short Message Service" as its title. The paper presents an innovative approach to remote control for outdoor security lighting through the integration of SMS and WiFi technology. The paper addresses key issues in security lighting, including energy efficiency, reliability, and ease of control from distant locations,by leveraging SMS and WiFi, the authors propose a dual communication system that ensures flexibility and responsiveness, even in cases where one network might be unavailable[9]linta antony, sami azam,eva,ignatious published "Secure SMS Based Automatic Device Pairing Approach for Mobile Phones".The system specified in this paper is built to address challenges in managing customer information efficiently while offering a streamlined way to communicate with large customer groups. The paper outlines the architecture of the system, focusing on its modular design, which includes customer data storage, retrieval, and notification modules[10].

OBJECTIVES, SCOPE AND METHODOLOGY :

The project is designed to ensure students to get their fee deadline notifications through their college mail-id and help them to pay their fee before the actual deadline that avoid to pay extra fee.

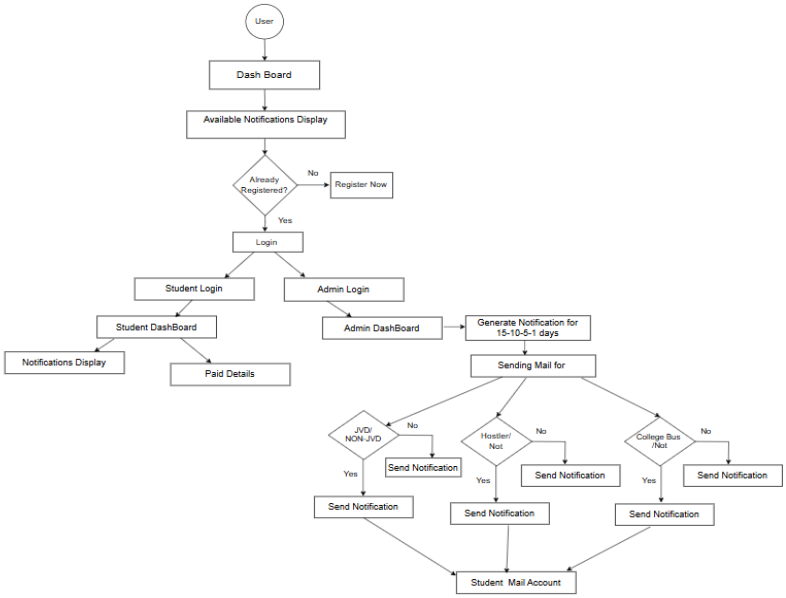


***Fig 1*: Workflow**

Modular Design:

This project involves various modules to develop a responsive website. It consists of modules such as:

i. Student Management Module
ii. Admin Management Module
iii. Payment Module
iv. Email Notification Module
v. Remainder Schedular Module
vi. Login Module

1. Student Management Module:

The Student Management Module is designed to provide students with a personalized dashboard, offering all the relevant information related to their fee payments, notifications, and status updates.

- •Student Dashboard: After logging in, students are directed to their personalized dashboard, where they can easily access details about their fee status, payment history, and upcoming fee deadlines. The interface should be intuitive and user-friendly to make it easy for students to navigate.
- •Upcoming Fee Notifications: Based on the student's credentials and data, the system will display notifications related to upcoming fees and deadlines. These notifications will prompt students about what is due and when, ensuring they don't miss deadlines.
- •Payment History: Students can view a detailed history of all their past payments, including the amounts paid, dates of payment, and any outstanding balance. This helps students keep track of their financial obligations and stay organized.
- •Actionable Links: Students can receive links to make payments directly from the dashboard, making it convenient to clear pending dues.

2. Admin Management Module

The Admin Management Module provides administrators with control over the entire system, including student management, notification triggers, and monitoring of payment statuses.

- •Admin Dashboard: Admins have access to a centralized dashboard that allows them to manage all students within the system. They can search for students, view detailed student profiles, and track payments.
- •Student Data Management: Admins can add, update, or delete student records. They can also manage the student's current fee status, payment history, and any special conditions (e.g., fee exemptions or payment plans).
- •Set Notification Rules: Admins can set up automatic rules for fee reminder notifications. For example, reminders can be configured to be sent 10 days, 5 days, and 1 day before the due date. Admins can also choose different message templates for different reminders, ensuring personalized communication with students.

3. Payment Module

The Payment Module is responsible for tracking and managing fee payments made by students.

- •Track Payment History: Every time a student makes a payment, the system records the details of the transaction, including the payment amount, date, payment method (e.g., credit card, bank transfer), and any related notes (e.g., payment reference number).
- •Payment: This module tracks the fee payments made by students, storing detailed payment histories. Each student's record includes information such as the amount paid, payment date, and remaining balance. This helps both the student and the admin keep track of fee payments and ensures accurate records for auditing purposes.

4. Email Notification Module

The Email Notification Module is responsible for sending automatic email reminders to students regarding upcoming fee deadlines.

- •Reminder Content: The email contains essential information, such as the due date, the amount due, and instructions on how to make a payment. It may also include links for students to directly access the payment portal.
- •Customizable Templates: Admins can create customized email templates to ensure the message is clear, friendly, and consistent with the institution's tone. Different templates can be used for different types of notifications (e.g., initial reminder, final warning).
- •Scheduled Notifications: The system sends automated reminders at specified intervals before the fee deadline (e.g., 10 days, 5 days, and 1 day before the due date). These reminders encourage timely payments and reduce the chance of late fees.

5. Reminder Scheduler Module

The Reminder Scheduler Module ensures that students receive timely notifications at appropriate intervals leading up to their fee deadline.

- •Customizable Intervals: Admins can configure the exact intervals for when reminders should be sent. Common intervals include 15 days, 10 days, 5 days, 3 days, and 1 day before the deadline.
- •Tailored Reminder Content: Each reminder can have customized content based on the proximity to the deadline. For example, the first reminder (15 days in advance) might be a general reminder, while the final reminder (1 day before) may include a sense of urgency and a call to action to avoid late fees.
- •Escalation Logic: In case a student hasn't paid after receiving multiple reminders, the system can escalate the notification by increasing the urgency or adding a late fee notice, which helps to encourage prompt payment.
- •Automated Scheduling: Once the reminders are set, the system automatically schedules them to be sent at the specified times, reducing manual work for administrators and ensuring consistent communication with students.

6. Login Module

The Login Module is crucial for securing access to the system. It facilitates the process of user authentication for both new and returning users.

- •User Registration: New users (students and admins) must create an account by providing necessary details such as name, email, password, student ID, etc. This information is securely stored in the database, ensuring sensitive data is kept confidential.
- •Token-based Authentication: Once a user registers, a JWT (JSON Web Token) is issued to them for session management. This token is used for authenticating requests and ensuring that users remain logged in without requiring frequent re-authentication. The token is stored securely, often in local storage or session cookies, and is used to validate the user's identity for every interaction with the backend.
- •Login Process: Returning users enter their credentials (email and password), which are verified against the stored records in the database. If successful, the user is granted access to their dashboard or the relevant section of the system. In case of incorrect login attempts, error messages are shown, and multiple failed attempts may trigger additional security checks.
- •Password Encryption: Passwords are securely hashed using algorithms like bcrypt before being stored, ensuring that even in the event of a database breach, user passwords remain protected.

IV.RESULTS :

The results of implementing a web-based deadline notification system indicate several advantages and challenges. Key benefits include improved speed and efficiency in notifying about fee dues, which significantly outpaces traditional methods, and enhanced individual access to information, promoting transparency and accountability among students. Additionally, the system reduces the managerial burden by sending notifications periodically.

Fig 2: Home Page

Fig 3: Creating Notifications

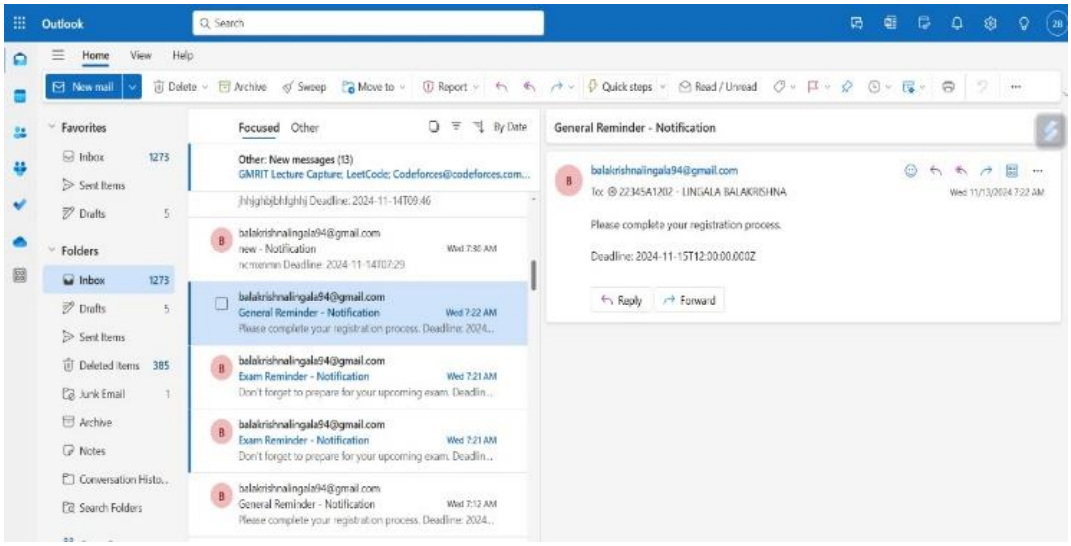


Fig 4: Outlook Portal

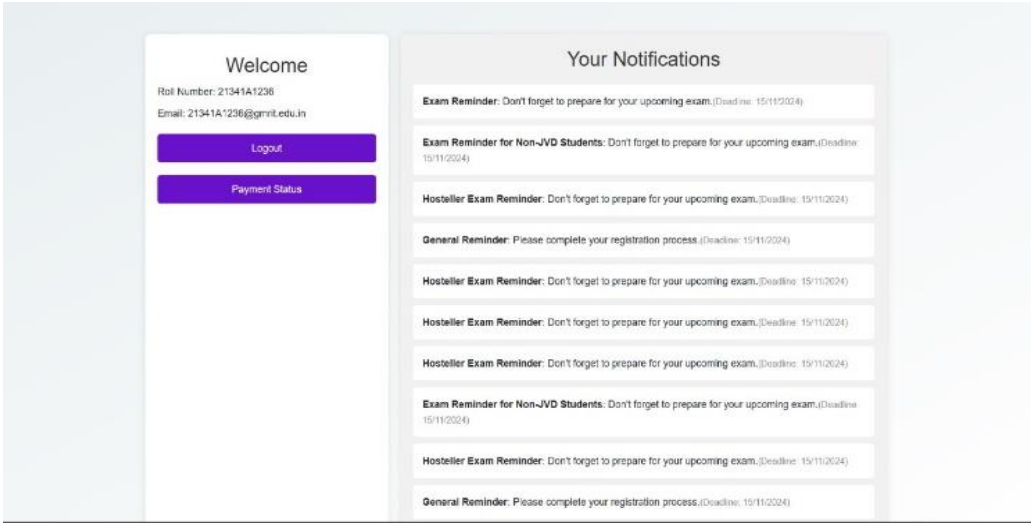
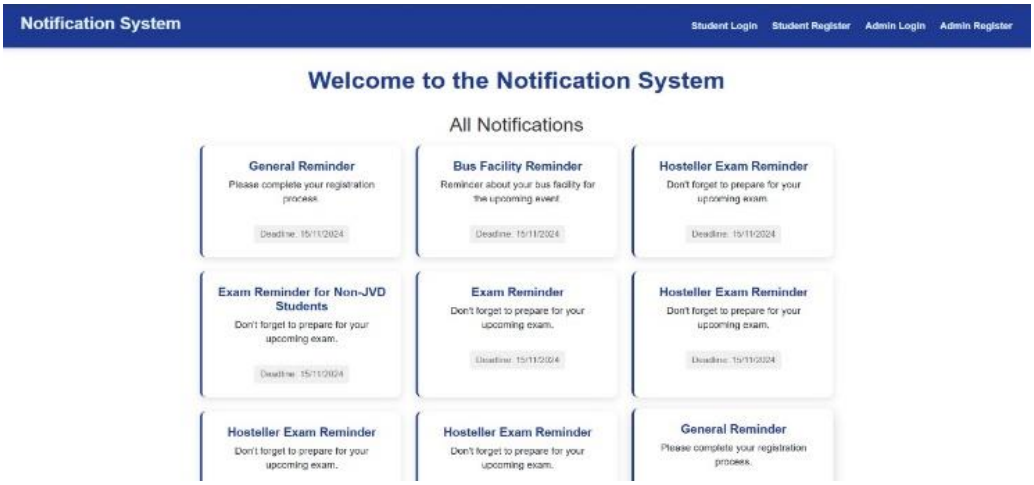


Fig 5: Notification Centre



However, there are notable challenges associated with the system. The complexity in implementation may lead to confusion among institutions and students, necessitating additional training . Furthermore, reliance on accurate data is critical; inaccuracies can result in irrelevant notifications to the students.Overall, while the system offers significant operational improvements,careful consideration of its implementation and ongoing management is essential to mitigate associated risks.

V.CONCLUSION :

The proposed Fee Management Notification System offers a comprehensive solution to the challenges educational institutions often face in managing fee payments and communication. By automating fee deadline notifications through email reminders, the system ensures that students are consistently informed about upcoming deadlines at key intervals—15, 10, 5, 3, and 1 day prior to the due date. This proactive approach significantly reduces the likelihood of missed deadlines, late fees, and penalties, which are common issues in traditional systems that rely on manual reminders. In addition to timely notifications, the platform provides students with easy access to their payment history, allowing them to track past transactions, view pending amounts, and verify completed payments. This transparency empowers students to manage their finances more effectively and reduces the need for them to seek administrative assistance. The system is designed to improve administrative efficiency by centralizing payment tracking and automating the notification process. Administrators can easily monitor fee status and ensure that all students receive the necessary reminders without the need for manual intervention. By incorporating role-based access control, the platform ensures that sensitive financial data is protected, giving both students and administrators a secure, reliable solution. The system is built using modern technologies such as React and Django, ensuring scalability and flexibility to accommodate future growth. Overall, the Fee Management Notification System enhances financial compliance, reduces administrative burden, and creates a more streamlined and transparent process for managing fee payments, making it an invaluable tool for educational institutions.

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