Faculty of Engineering and Technology

Computer Science Department

COMP433 – Group Assignment Phase 1

<<Project Name: System Modern School>>

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Introduction

Modern Schools was established in 2018 and has now grown to over 500 students, 20 teachers, a school principal, an accountant, a secretary, a registrar, and two cleaning workers. With this growth, it became pretty obvious that a better way was necessary for operation day-to-day that would make life easier for all concerned. Today, the complicated tasks of registration, scheduling, homework, and fee payments are all done manually, which is very time-consuming.

COVID-19 destroyed the world, showing how important such online services have been for keeping students connected with their teachers, even while staying at home. This requires developing a new software system that automates such processes and reduces the intervention of humans in the overall management of the school to improve it.

The school, through manual working processes, still assumes regular activities like registering students, scheduling classes, distributing assignments, and monitoring fee payments. It is a fact that modern schools have a significant number of challenges in managing their operations. These are manual approaches. However, it consumes so much time and creates problems that, in return, delay the efficiency of school administrative and academic functions. Schools have had to switch more frequently between a remote learning mode and an in-person learning mode during the environment of the COVID-19 pandemic, and therefore there is a desperate need for a centralized digital platform where not only students or parents can collaborate on the study contents but also the teachers. Hence, there is a strong case for integrated software that can provide the automation of key processes and reorient the entire process of managing schools.

The goal of developing a **web-based application** Modern School New System is to develop a comprehensive software system where the majority of the school's administrative and educational processes will be reliably automated. As the

education system streamlines student enrollment, timetabling, assignment management, and payment processing, it reduces its weight because each of these tasks is time-consuming for both teachers and educators to plan lessons daily or weekly depending on the subject or course taught. Also, it will ease communication among students, teachers, and parents through one portal, where schedules can easily be shared among them. Assignments or grades can be communicated for important announcements. The goal of the school is to become more efficient in all areas of its operation while supporting remote and in-person learning and promoting community atmosphere access to information.

The **web-based** Modern School New System has been designed in such a way that it caters to the needs of different user types, such as a student, parents, and other stakeholders that need to be present in each row and column, in other words, an activity that is linked with their school. Used mainly by schools and their related internal segments, such as students, for example, who could now have an easy look at their class schedules, assignments due dates, and so on, or teachers to ease little management work with the aid of such things as class material betterment: handling students` progress. Parents will also be one of the major users because they can track their child's academic performance outcomes/events and payment status now. Some of the key stakeholders are the principal/headmaster or administrative staff, like registrars or accountants, who will be using this platform to accelerate fast process automation related to student enrollments, payroll management, financial tracking, etc. It aims at fulfilling these different groups' requirements, thus offering better support and connection to all its school's different parts.

Modern School New System Guidelines are intended to be mandatory rules and regulations governing the right management, conduct, and quality of education in a school. For instance, the more labor-intensive administrative tasks like student registration, class scheduling, and payment processing can all be automated, thereby freeing up administration work but also reducing mistakes that can save employee

engagement to focus on other important tasks. This frequency of communication means that it can provide all students, teachers, and parents with updated information at their fingertips more effectively compared to assignments, grades, etc. The platform bifurcates the capabilities to assist remote and in-person learning, giving the school increased agility to deal with uncertain teaching environments. Generally speaking, this makes education at large more systemic in an organized way, integrated so that it responds better to one and all.

Proposed Solution

1. Student and Teacher Registration

Enter registration information (full name, email address, gender, contact number, medical information, academic background) by providing a simple user interface that was designed to be obvious and speed up the procedure. This form is described as fast and responsive, meaning it reacts promptly to user inputs, minimizing delays and making the process efficient. Student and teacher information is highly protected to ensure that only authorized people can change any feedback. It provides a simple user interface allowing the users through easy instruction and error messages. Storage is also done to maintain its integrity and the user can resume registration on interruption.

2. Payments and Salary Management

This web-based application facilitates the conduct of financial transactions by permitting users to make rapid and safe payments using efficient providers like PayPal and Stripe, as well as facilitating the use of other payment mechanisms like credit cards, bank deposits, and electronic wallets. This also observes robust safety procedures such as PCI-DSS.

Parents are able to review their payment transactions (such as balances, history, and discounts) easily, and more so, emails, SMS, and/or in-app notifications are also sent out. On the other hand, such updates can be provided at desired intervals so as to control finances in a better manner.

Payments are overseen by issuers account, who also process sibling or early bird discounts, and prepare remittance statements in PDF, Excel, and CSV forms elucidating income and expenses. The application has a flexible payroll management system that enables the addition of various salary items such as including but not limited to, overtime, deductions, bonuses, etc. Payroll slips are available to teachers and staff members, while the payroll authorization is performed by the accountants while automatically generated payroll slips are securely kept for future reference.

3. Schedule and Class Management

The platform makes it possible for the registrar to create and adjust schedules with ease utilizing the drag-and-drop functionality. It guarantees efficient updates of classes and or the timetables, without the need to redo the entire set of schedules, thus reducing the amount of time wasted. The system takes into account factors such as teachers' free time,

number of available rooms, type of subjects, and number of students enrolled to come up with a feasible schedule that has no clashes. The registrar can make schedule changes but the system will warn of possible conflicts. In cases where any class is inserted or changed, the system also reschedules the corresponding timetables and updates the system in the background. All users (both teachers and students) see the updated information instantly. Also, there is a process running in the background, which frequently looks at the previous scheduling constructs to come up with the most suitable ones. It's even possible that, when a new booking order has been placed, the system straightaway picks up the next best schedule for the user's convenience.

4. Teacher and Student Communication

This system of communication helps in creating a proportional message delivery time between teacher, student & parent. The messages are secure with a mechanism that makes sure that messages are only available to authorized users by adding a layer of trust and confidentiality to the system, therefore quite user-friendly in terms of sending direct messages with group chat or announcement anytime by using a clean and simple design with clear labels, buttons, and icons. The notifications can be customized based on your preference.

5. Grading and Assignment Submission

The enhanced marking and submission system being developed is designed not only to facilitate the grading and maintenance of academic records but also to protect data and enhance the convenience of users. It attaches grades to courses, students, and teachers using unique identification numbers to reduce manual input errors. Faculty members can assess the works, add remarks to them, and synchronize that information with the academic history of a student, all in real-time.

In a bid to ensure justice in evaluation and to minimize the tendency of prejudice in scoring, assignments are submitted in a blind fashion, with students' identities hidden from the teachers during the grading period. After the process has been concluded, however, the blinding identifiers are released to allow further interaction without compromising the fairness of the process.

Grade changes are also monitored by the system which notes such modifications together with their justifications as well as the dates and times they were made to enable scrutiny. Grade changes can be seen by both students and teachers.

6. Reporting and Monitoring (Management Dashboard)

The management dashboard offers comprehensive real-time information track important data across a range of school operations. These reports contain financial summaries, such as payment status, outstanding balances, payroll information, and budget tracking; operational insights, such as resource utilization and schedule efficiency; and academic summaries, such as attendance records, grade distributions, and trends in student performance; and teacher performance metrics, such as attendance and class engagement. Every report is presented in an easy-to-understand manner, complete with graphs and trend charts for simple analysis. By using secure credentials and two-factor authentication, only authorized personnel such as administrators and the principal are able to access these reports. The system also allows for customization, so new report templates can be added to accommodate changing school requirements.

7. Publishing of Teaching Material

Through a specialized, user-friendly interface, educators can effortlessly upload and arrange their instructional materials using a variety of file formats, including Word documents, PDFs, and videos. The system makes sure that resources can be easily accessed by classifying them by topic, grade, or subject. In order to minimize "any hassle," the platform includes features like drag-and-drop uploading, automatic file optimization to enhance loading speed on various devices, and real-time progress indications while uploading. Furthermore, only registered users with distinct login credentials can view uploaded materials, guaranteeing security and avoiding unapproved distribution. Additionally, the system incorporates adaptable design and automated file compression to guarantee smooth access on a range of devices, improving user experience.

8. Parent Portal for Tracking Student Progress

Parents may easily access grades, assignments, and payment information thanks to the portal's user-friendly design, which includes an intuitive interface with simple navigation menus and search capabilities. Features like segmented tabs for various information (such as academics and financial) and real-time updates make it easy to navigate and guarantee that parents can effectively track their child's progress. Role-based access control, secure login with two-factor authentication, and end-to-end encryption of all data transfers guarantee high data protection. By guaranteeing that only authorized users, including registered parents, have access to private student data, these safeguards limit unwanted access. To preserve the greatest level of data protection, the portal is also constructed with strong cybersecurity processes, such as frequent security audits and vulnerability testing.

9. Library & Resources Management

This feature helps in the administration of the school library resources like books, emedia, and other educational resources. Students will be able to browse the catalog and place reservations for books as well as monitor the due dates of the books over the Internet fully. The system also relates to sending notifications for overdue materials as well as allows for teacher's recommendations for particular subjects. The library staff in turn can observe members' borrowing patterns and maintain the stock appropriately.

10. Online Exam and Quiz Management

With the help of this feature, teachers will be able to create, schedule, and run online tests and quizzes. There are various types of questions supported (multiple choice, short answer, or essay questions) and objective-type questions can be scored automatically. Additionally, the system can randomize question sets to help minimize instances of cheating. Exams are secured to students whose IDs are confirmed, after which objective questions are submitted and graded immediately to students. Results can be seen by the teachers with the possibility of looking for a tendency in performance as well as providing comments for open-ended questions.

11. Attendance Tracking Management

Students can track their attendance records, seeing any missed classes or absences. This ensures that they are aware of any gaps that might need to be filled. Teachers can take attendance within the system, absences and tardiness are logged, and reports can be generated for administrative purposes.

12. School events board

This feature contains all school events details -the event place and time-, throw this board the students can register and apply to be part of the event, events can be science events, cultural events, or sports competitions, and the students and their parents throw the portal can only see the announcements and register, but teachers and school principal are responsible for announcing about the events.

13. Academic calendar

The academic calendar contains the start and end dates of all holidays, it also shows when the semester starts and ends, the calendar must be updated by the school secretary every year and keep it updated, students and their parents can only access the calendar from the main page of the portal.

Quality Attributes for the System:

- Performance:

  The system must process every user action in a period of 2 seconds for 95% of all operations in a normal without excessive load conditions. The system must also accommodate up to a thousand concurrent users without a notable drop in responsiveness.

- Usability:

  At least 90% of the target users should be able to perform significant operations (e.g. registration, payment) without help within 3 minutes. The

interfaces shall be accessible to users in no less than 4 out of 5 in connecting surveys.

- Reliability:

  The system's monthly uptime must be 99% which is equivalent to 45 minutes of time in a month. Please ensure that system checks on data integrity should ensure detection and correction of errors in 99% of cases.
- Security:

  All sensitive data (e.g., financial information, personal details) in the system must have 256-bit encryption. The agent should allow only 1% of unauthorized access attempts. In the course of the operation, these standards must be followed: PCIDSS and GDPR compliance will be audited each year.

- Scalability:

  The system should be able to accommodate 50% more users and transaction volume with no additional hardware upgrading expenses.

- Maintainability:

  System upgrades and patches should be installable a maximum of an hour after release. In 90 percent of cases, resolution of a critical problem must not take more than 24 hours.

- Availability:

  The system shall be able to recover from critical failures within 1 hour and restore all services. Maintenance windows, if needed, should be no longer than 4 hours per month and planned for off-peak time.

Software development process:

For The Modern School New System implementation, we have selected the **Agile software development process.** Therefore, it is suitable for this project since it allows for innovation in response to changing needs and feedback from users, it is designed to deliver working software frequently and involves the end-user since they are embraced in the process. They found that due to the heterogeneous and complex nature of the system, Agile can be implemented incrementally and adapted frequently to meet the operational requirements of the school. The system will be developed in **four phases/releases**. Every release is dedicated to adding and providing a portion of associated features to check on functionality and its relevance to users.

Release 1:

Core features for student and teacher management:

New Student and Teacher Registration

Salary and remunerations are a core of the payment system which is also an important part of human resource management.

Schedule and Class Management

These fundamental modules will augur in the application and the other core read-write data and process control to support user onboarding and first-level user activities.

Release 2:

Communication and academic functionalities:

Symbiotic Relationships Between Teacher and Student

Assessment methods also entail grading and assignment submission and this makes the course convenient for everyone.

Publishing Teaching Materials

Students can also communicate with teachers, there will be an easy grading process, and teachers can share different materials.

Release 3:

Administrative and tracking features: consumers and the Parent Portal and the ability to monitor student progress.

The Library and Resources Management

This activity means tracking management, especially about attendance. These features will bring extended ability of the system to involve parents and administrative staff as well as facilitate the monitoring and the resources distribution.

Release 4:

Event and time management tools:

Online Examination and Quiz Conducting

School Events Board

Academic Calendar

This final release will make sure that the system can already offer a solution to the academic and extracurricular scheduling.

Phase 2: User & System Requirements for a Modern School System

UR1: Payment and Salary Management:

UR1.2: The system shall include an online payment option through multiple receivables, including credit/debit cards, bank transfers, and digital wallets, for tuition fees.

- **SR1.2.1** The system shall integrate with the PayPal API to handle credit/debit card and digital wallet payments.
- **SR1.2.2** The system shall support bank transfer payments by generating a unique reference number for each transaction.
- **SR1.2.3** The system shall ensure compliance with the Payment Card Industry Data Security Standard (PCI-DSS).

UR1.3: The successful payment shall generate an automated payment receipt in the form of an email to the users of the system.

- **SR1.3.1** The system shall send an email containing the respective receipts of payments to the payer's registered email address after the payment is made successfully.
- **SR1.3.2** The payment receipt shall contain the transaction details such as the date, the amount paid and a unique receipt ID allocated for purposes of tracking the receipt.

UR1.4: An interface shall be created such that the manager can view the total fees deposited for the students and also the unpaid fees.

- **SR1.4.1** The system shall provide an administrative dashboard showing real-time metrics of collected and unpaid tuition fees.
- **SR1.4.2** The dashboard shall include filtering options by date range, class, and individual student accounts.

UR1.5: The administrators shall be able to generate financial reports concerning the payments and salaries on either a monthly or annual basis.

- **SR1.5.1** The system shall allow administrators to generate and export financial reports in PDF and Excel formats.
- **SR1.5.2** Financial reports shall include a summary and detailed breakdown of payments to a salary disbursed for the selected period.

UR1.6: The system shall not be limited to one kind of payment modification such as error corrections but shall rather be open to other modes as refunds and bonuses.

- **SR1.6.1** TThe tool shall allow admin to effect payment adjustments such as corrections, refunds, and bonus allocations.
- **SR1.6.2** All payment adjustments shall be logged for auditing purposes, including the reason and administrator responsible.

UR2: Schedule Management:

UR 2.1: The system shall be able for students and teachers to build and manage their class schedules.

- **SR2.1.1:** The system shall provide a form for administrators to create a schedule, specifying details such as class name, teacher, subject, time, and location.
- **SR 2.1.2:** The system shall facilitate teachers and students updating, rescheduling, or canceling any class and notifying the affected users.
- **SR2.1.3:** The system shall check that the schedule does not have a conflict between two classes assigned to the same teacher or room.
- **SR 2.1.4:** The system should allow for the total school timetable to be exported in the formats of a .pdf document or .csv file.

UR 2.2: The system shall create a setting that allows teachers to access their class schedules for viewing, alterations, and overall management.

- **SR 2.2.1:** The system shall provide a weekly schedule for each teacher that indicates the name of their classes along with the subjects, times, and places in which they occur.
- **SR 2.2.2:** The system shall allow teachers to request schedule changes, which are routed to administrators for approval.
- **SR 2.2.3:** The system shall enable teachers to designate a class as "completed" and append any class notes or assignments as attachments.
- **SR 2.2.4:** The system shall inform the teachers whenever their schedule is modified or has something that changes regarding their assigned classes. **UR 2.3:** The system shall provide students with class schedule data in a layout that is more friendly, with less effort required to understand.
- **SR 2.3.1:** The system shall display a student's weekly schedule, including class names, subjects, teachers, times, and locations, in a calendar format.
- **SR 2.3.2:** The system shall provide filters of means of which students can view their selected schedule based on day, week, or subject.

- **SR 2.3.3:** The system shall notify students any adjustment to the schedule, rescheduled, or canceled classes.
- **SR 2.3.4:** The system should enable students to download their scheduled days of the week in .pdf format for future offline access.

UR 2.4: The system shall communicate an alert to notify users in case of any changes in the schedule or conflicts therein.

- **SR 2.4.1:** The system shall send a notification to affected users when a class is rescheduled or canceled, specifying the updated details or reason for the cancellation.
- **SR 2.4.2:** The system shall notify administrators if there are schedule conflicts, such as overlapping classes for a teacher or classroom.
- **SR 2.4.3:** The system should inform a teacher regarding the class schedule changes requiring that teacher to prepare for the class at an earlier time than planned.

SR 2.4.4: The system shall allow administrators to configure notification preferences, enabling or disabling various notifications.

UR3: Grading and Assignment Submission:

UR 3.1: The system shall allow students to submit and view their assignments and grading through an online interface.

- **SR 3.1.1**: The system shall display all assignments that are assigned to students, including the title, description, deadline, and current status of the assignment (pending, submitted, overdue).
- **SR 3.1.2**: The system shall enable students to send their assignments through different file formats, such as .pdf, .docx, or .jpg format, and set a file size limit of 50 MB for each upload.

- **SR 3.1.3**: The system shall be able to verify assignment submissions regarding appropriate file type and size and done before allowing submission.
- **SR 3.1.4**: The system shall record and keep the data and the time of each submission in the database.

UR 3.2: The system shall allow teachers to generate, share, and assess assignments with adjustable settings.

- **SR 3.2.1**: The system shall provide a form for teachers to create assignments specifying details such as title, description, deadline, maximum grade, and any attachments.
- **SR 3.2.2**: The system shall enable teachers to assign work assignments to either a class, or group, or individual students by means of selection criteria.
- **SR 3.2.3**: The system shall provide an interface for teachers to input grades and written feedback for each assignment submission.
- **SR 3.2.4**: The system shall enable teachers to upload a .csv file with grades and feedback for bulk grading.

UR 3.3: The system shall inform students and teachers about assignment-related deadlines and grades.

- **SR 3.3.1**: The system shall alter students two days before any assignment deadline that they might have pending submission by sending a notification.
- **SR 3.3.2**: The system shall send daily prompts to the teachers to remind them of pending grading tasks until they have graded all the assignments.
- **SR 3.3.3**: The system shall notify the students when an assignment is graded. Provide the link to view the grade and feedback as well
- **SR 3.3.4**: The system shall provide users with an option to enable or disable specifying types of notifications via their profile settings.

UR 3.4: The system shall allow students to view assignments, grades and feedback on their dashboard.

- **SR 3.4.1:** The system shall display assignment grades and feedback in a dedicated section on the student dashboard, grouped by subject.
- **SR 3.4.2:** The system shall allow students to filter and sort graded assignments by submission date, grade, or subject.
- **SR 3.4.3:** The system should provide a "Download Feedback" button to export feedback as a .pdf file.
- **SR 3.4.4:** The system should include a "Request Grade Review" feature, which notifies the teacher and logs the review request in the database.

UR 3.5: The system shall enable teachers to define, enforce, and override penalties for late submissions.

- **SR 3.5.1:** The system shall allow teachers to define a penalty rule, specifying the percentage deduction per day for late submissions.
- **SR 3.5.2:** The system shall calculate and apply penalties to late submissions based on the defined rule.
- **SR 3.5.3:** The system shall notify students when a penalty has been applied to their submission, including the amount deducted and the reason.
- **SR 3.5.4:** The system shall allow teachers to override calculated penalties with a manual adjustment and record the reason for the override.

UR4: Reporting and Monitoring (Management Dashboard)

UR4.1 The system shall allow the generation of reports on financial, operational, academic, or even on the performance of the teachers at any given time without any delays.

- **SR4.1.1** The system will generate and present financial summaries generation information, including payment status, debts, employee salaries, and expenditure management.

UR4.2 The system will allow the users to view the financial summary and payment status of all the payments made, payments due, and those concerning payrolls and budget utilization.

- **SR4.2.1** The system ensures the computation of operational information revealing factors such as classroom occupancy and schedule efficiency, from the timetable usage and resources.

UR4.3 The system will also have academic Reporting such as those for attending, grades distribution, and improvement of the performance of the students.

- **SR4.3.1** The system retrieves educational information such as class attendance and performance grades and offers information on performance over time.

UR4.4 The system should provide the tools to assess the effective covering of the teacher classes as well as the active participation of teachers in teaching.

- **SR4.4.1** The system will capture and aggregate the attendance and assignment engagement of the instructors to enhance their performance.

UR4.5 The system will include graphs, trend charts, and other pictures in appreciation of all reports for better understanding purposes.

- **SR4.5.1** The system will make use of its existing models for the creation of graphical reports to present data easier.

UR4.6 The system must prevent any form of prejudice to users who have valid credentials and above verification, especially concerning sensitive content like reports which may be limited to administration and principals only.

- **SR4.6.1** The system shall introduce access control based on user roles as well as the implementation of two-factor authentication to protect access to the reports.

UR4.7 The system should provide the executive with the ability to design, edit, and save report designs aligned with the dynamics of the institution and privacy.

- **SR4.7.1** The system shall contain an application that allows modifications for administrators to create and store editable report formats.

UR5: Publishing of Teaching Material

UR5.1: The system shall provide for teachers to generate and publish teaching materials for their classes.

- **SR5.1.1:** The system shall include a form for teachers to be able to upload resource materials which may consist of fields such as title, description, subject, class, and topic.
- **SR5.1.2:** The system shall let teachers upload files in formats that they want such as .pdf, .docx, .pptx, .jpg, and .mp4, while the maximum file size is at least 50MB for each upload.
- **SR5.1.3:** The system shall enable teachers to modify or eliminate previously published materials.
- **SR5.1.4:** The system shall ensure that only authorized teachers can publish materials for their assigned classes and subjects.

UR5.2: The system shall enable students to access and download published teaching materials.

- **SR5.2.1:** The system shall display all published teaching materials relevant to a student's enrolled classes on their dashboard.
- **SR5.2.2:** The system shall enable students to search materials according to their title, subjects, topics, or date of publication.
- **SR5.2.3:** The system shall allow students to download published materials for offline use.

- **SR2.4:** The system shall track and log student downloads, including the date, time, and file name, for audit purposes.

UR5.3: The system shall help arrange teaching materials according to class, subject and topic.

- **SR5.3.1:** The system shall require teachers to categorize teaching materials by class, subject, and topic during the upload process.
- **SR5.3.2:** The system shall organize materials into a folder structure or tagged list that allows filtering by class, subject, and topic.
- **SR5.3.3:** The teacher shall create topic-based collections of materials for facilitation of easy navigation (e. g., "Week 1: Introduction to Algebra").
- **SR5.3.4:** The system shall put the teaching materials to be displayed visually with the aid of icons, headings, and dates of upload.

  UR5.4: The system shall inform the students once new educational materials become available.
- **SR5.4.1:** The system shall send an automated notification to students when a new material is published for any of their enrolled classes.
- **SR5.4.2:** The system shall include a link in the notification directing students to the newly published material.
- **SR5.4.3:** The system shall group notifications for multiple materials published at the same time into a single summary notification.
- **SR5.4.4:** The system shall allow students to configure notification preferences for teaching material updates via their profile settings.**UR6: student and teacher registration**

UR6: student and teacher registration

UR6.1: The system shall provide a user-friendly interface for registering students and teachers.

- **SR6.1.1**: The system shall have separate registration forms with tailored fields for students and teachers.
- **SR6.1.2**: The system shall validate the input field (like required fields, phone numbers, and email formats.)
- **SR6.1.3**: Registration pages shall load within 2 seconds with up to 500 concurrent users under peak load conditions.

UR6.2: The registered users shall receive a confirmation message (email/SMS) upon successful registration or notify users of failure registration with a clear message.

- **SR6.2.1**: Error message shall clearly explain the issue (e.g., "Invalid email format").
- **SR6.2.2**: A confirmation email or SMS message shall be sent automated upon successful registration.
- **SR6.2.3**: The system shall handle up to 500 concurrent registration requests without performance degradation.

UR6.3: The system shall register students by providing (fall name, address, date of birth, class with grade, parent contact, phone number, and email address) in the arrangement data field.

- **SR6.3.1**: The system shall validate input for required fields, including phone numbers and email addresses.
- **SR6.3.2**: The system shall enforce data integrity rules, such as ensuring that dates of birth are in valid date formats.

UR6.4: The system shall collect and validate required details during teacher registration.

- **SR6.4.1**: The system shall validate the completeness and accuracy of all required fields, such as subjects taught and verification documents.
- **SR6.4.2**: The system shall ensure an uptime of at least 99%, excluding scheduled maintenance periods.

UR6.5: Admin shall be able to approve or reject teacher and student registrations after document verification.

- **SR6.5.1**: The system shall provide an interface for administrators to review and approve or reject applications after document verification.
- **SR6.5.2**: The system shall maintain at least 99% availability to support administrative tasks.

UR7: Parent Portal for Tracking Student Progress

UR7.1: The system shall allow parents to view their child's academic performance, including grades, attendance, and assignment submissions.

- **SR7.1.1:** The system shall retrieve and display academic data, including grades, attendance records, and assignments, from the database in real-time.
- **SR7.1.2:** The system shall ensure that updates to grades, assignments, and attendance are displayed to parents in real-time using notifications and reminders.

UR7.2: The system shall allow parents to access payment-related information, including outstanding balances, payment history, and upcoming due dates.

- **SR7.2.1:** The system shall retrieve payment details, including outstanding balances, transaction history, and due dates, and display them in a financial summary report.
- **SR7.2.2:** The system shall ensure that updates to payments are displayed to parents in real-time using notifications and reminders.

UR7.3: The system shall provide real-time updates on grades, assignments, attendance records, and payment statuses.

- **SR7.3.1:** The system shall retrieve and display academic data, including grades, attendance records, and assignments, from the database in real-time.
- **SR7.3.2:** The system shall retrieve payment details and display them in a financial summary report.

- **SR7.3.3:** The system shall ensure that updates to grades, assignments, attendance, and payments are displayed to parents in real-time using notifications and reminders.

UR7.4: The system shall include an intuitive interface with segmented tabs and search functionality for easy navigation of academic and financial information.

- **SR7.4.1:** The system shall include segmented tabs for academic and financial data, with a search bar that allows parents to locate specific information quickly

UR7.5: The system shall restrict access to authorized users (registered parents) based on role-based access control mechanisms and provide a secure login process.

- **SR7.5.1:** The system shall implement role-based access control to ensure only authorized parents can access specific student information.
- **SR7.5.2:** The system shall use secure login mechanisms, including username/password authentication and two-factor authentication via email or SMS.

UR7.6: The system shall ensure end-to-end encryption of all data transfers to protect sensitive information.

- **SR7.6.1:** The system shall use secure login mechanisms, including username/password authentication and two-factor authentication via email or SMS.

UR7.7: The system shall allow parents to receive customized notifications for critical events, such as low grades, missed assignments, or overdue payments.

- **SR7.7.1:** The system shall ensure that updates to grades, assignments, attendance, and payments are displayed to parents in real-time using notifications and reminders.

2.3: Effort & Cost Estimation

User Requirement	Function Points	Total Functions Points	# of Days
Student and Teacher Registration	3	60	15
Payment and salary management	5	100	25
Schedule and class management	3	60	15
Management dashboard	4	80	20
Grading and assignment submission	4	80	20
Publishing of teaching material	2	40	10
Parent Portal for tracking student progress	4	80	20
Total	**25**	**500**	**125**

The total function points = 25 function points

The conversion factor is 20 hours/function point

Total effort = total function points*Conversion factor

= 25 function point * 20 hours/function point = **500 hours**

The estimated time to deliver the system is 6 months, 4 developers will be working on the project, and their salaries per month are

1100$+1100$+1100$+1100$ = **4,400$, for** six months **26,400$**, with profit: min = 30%, max = 50%, so:

The min total cost will be 34,320$

The max total cost will be 39,60

Phase 3: Scenarios & Use-Case Diagrams for Modern School System

3.1: Scenario Analysis

Student & Teacher Registration (Mohammad Assi-1212395)

Normal Flow

1. The user (student or teacher) goes to the school's registration portal.
2. The user clicks one of the two options: Student Registration" or "Teacher Registration.
3. The user populates the registration form with the relevant fields:

   1- For **students**-name, age, grade level, parent/guardian info, contact details 2- For **teachers**, subject specialization, qualifications, experience, and contact.
4. The user clicks on the "Submit" button after it has filled in the information.
5. The system checks the data before sending the user confirmation via email about the registration details.
6. After that, a school administrator looks into the registrations submitted.
7. Now, this user will have to be added to the school database in case they are accepted.
8. Thus, a final notification would be sent to the user confirming the successful registration so that he may follow the next step.

Alternative Flow

1. **The user is required to modify the information before the submission:**

   1.1 On completion of the form, the user realizes that something was forgotten to change.

   1.2 The user clicks on the 'Edit' button.

1.3 The system allows such editing while keeping the already entered data.

1.4 The updated form is submitted by the user.

2. **Would encourage a user by all means to ask for help when registering:**

2.1 The user is taken aback with the registration form.

2.2 Click on the "Help" button.

2.3 Access the live support chat along with the FAQ.

2.4 Thereafter the user proceeds in registration after having received assistance.

Error Flow

1. Missing required fields:

1.1 The user clicks on the registration form without filling in all important fields.

1.2 The system will display an error message containing which fields are missing.

1.3 The user is prompted to fill in the required fields and submit again.

2. Invalid email format:

2.1 The user writes an incorrect email address in the contact details field.

2.2 At the first submission, the system finds the error and then displays an error message.

2.3 The user has to correct his/her email address and submit the form again.

3. Duplicate registration:

3.1 If a user attempts to register with the same email address as in the database:

- The system will show an error message showing that an account with this email already exists.

- The user will have the option to log in to the system instead of recovering their password if they forget it.

Publishing of Teaching Material (Aws Shaheen-1212585)

Normal Flow

The teacher accesses the "Upload Material" field and fills out a form containing the title, description, subject, class, topic, and the material in formats such as .pdf, .docx, .pptx, .jpg, or .mp4, ensuring the file size is less than 50MB. After clicking the "Upload" button, the system verifies the teacher's authorization and checks whether the class and subject are assigned to them. Upon successful validation, the system sends an automated notification with a link to the students in the respective class and subject, directing them to the published material. When a student clicks on the link, the system redirects them to the material, allowing them to view and download it.

Alternative Flow 1)

From student:

After uploading the material from the teacher on the dashboard, a student accesses the material through the dashboard and will be allowed to view and download the material.

2) **From teacher**

After uploading the material, the teacher realized that he uploaded the wrong file, then he chose the edit option and removed the previous file and attached the required file, then the system sends a notification to the students that there is an update on the material.

Error flow

After filling out the form by the teacher, the material was more than 50MB, after clicking on the upload button the material will not be uploaded.

Schedule Management (Mohammad Khadour-1212517):

Scenario 1: Administrator Creates a New Class Schedule

Normal Flow:

The administrator starts by accessing their unique credentials.which include a username or email address and a password, Once successfully logged in, the administrator navigates to the schedule management section from the system's dashboard. Here, they initiate the process of creating a new class schedule by entering essential details such as the class name, the assigned teacher, the subject being taught, the scheduled time, and the location for the class. The system performs a validation process to verify the availability of the selected teacher and the room at the specified time, ensuring there are no scheduling conflicts. If the system confirms that the inputs are valid and no conflicts exist, the administrator proceeds to save the new class schedule, which is then stored in the system and made available to relevant users.

Alternative Flow:

If the system detects that the selected teacher or room is unavailable, it displays a conflict message with details about the issue, such as the class or event already scheduled for the selected time and location. The administrator reviews the conflict and selects a different teacher, room, or time. Once the administrator updates the schedule, the system re-validates the changes. If the new details do not have conflict, the schedule is saved, and notifications are sent to relevant stakeholders. If conflicts remain, the administrator can retry or choose to abort the process.

Error Flow:

If the system detects overlapping times or other conflicts, it provides a detailed error message, prompting the administrator to correct the schedule.

Parent Portal for Tracking Student Progress (Alhassan-Manasra-1211705)

Normal Flow

The parent begins by navigating to the school's online portal and logging in with their credentials. Upon successful authentication, they are directed to the dashboard, where they can access various features. The parent selects the "Academic Performance" option from the main menu. The system retrieves and displays the child's grades, attendance records, and assignment submissions in a structured and easy format. After reviewing this information, the parent clicks on the "Financial" tab to view payment-related details. The system presents an overview of outstanding balances, payment history, and due dates. If there are overdue payments, the parent can click the "Pay Now" button to initiate a transaction. Once the payment is processed successfully, the system updates the balance and displays a confirmation message on email, ensuring the parent that their payment has been recorded.

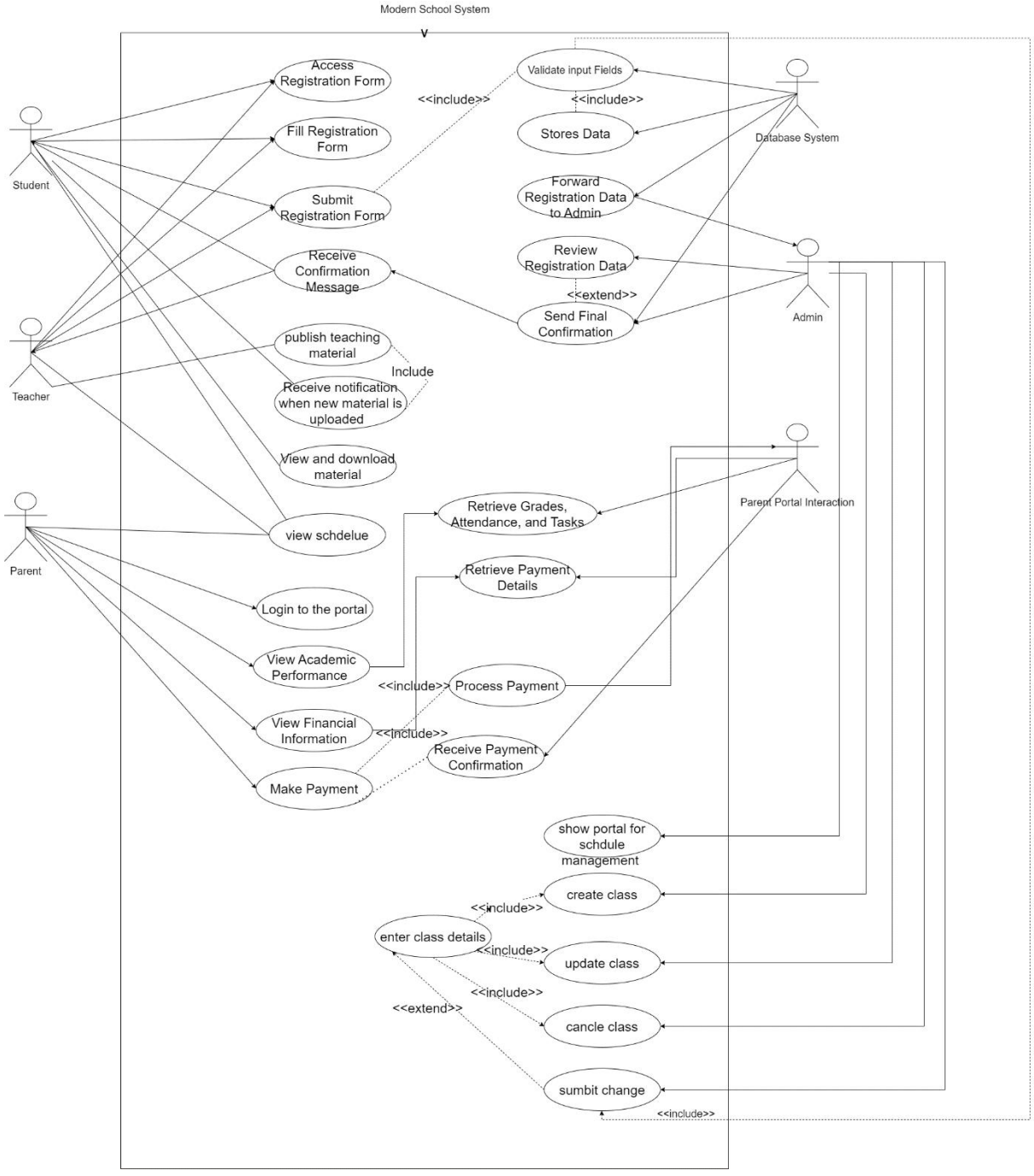
Alternative Flow

If the parent wishes to review older grades or filter payment history, they can access the "Search" or "Filter" feature available in the academic or financial sections. By specifying a term or date range, such as a specific semester or payment period, the system retrieves the relevant data and presents it in a clear, organized format for easy review. Additionally, the parent can manage notifications by navigating to the "Notification Preferences" option in the settings menu. Here, they can enable or disable specific alerts, such as SMS notifications for missed assignments or email reminders for upcoming payments. Once the preferences are updated, the system immediately saves the changes and displays a confirmation message to the parent. After completing these actions, the parent can return to the dashboard to continue exploring other features or log out of the portal.

Error Flow

Occasionally, the system may experience downtime, preventing the parent from accessing academic or financial data. In such cases, an error page displays a message stating, “Service Temporarily Unavailable,” and the parent is advised to refresh the page or try again later. If the parent enters incorrect login details, the system promptly shows an “Invalid Credentials” message and provides an option to reset the password. After three consecutive failed attempts, the account may be temporarily locked, requiring the parent to complete additional security verification steps. For payment processing failures, such as a timeout or rejection by the payment gateway, the system displays an error message stating, “Payment could not be processed please try again.” The parent can retry the transaction or contact technical support for further assistance.

3.2: Use Case Diagram



- **Semantic Descriptions:**

2. Access Registration Form:
   A user can gain an entry to the system interface for selecting the option of opening the registration form, through any means, by menu or by a direct linking.

3. Fill Registration Form:
   The user provides their personal and required details in the form fields.

4. Validate Input Fields:
   System examines the data entered through a registration form for errors or contradictions (such as email format or obligatory fields).

5. Submit Registration Form:
   After completing the form, the user submits it for further processing.

6. Store Registration Data:
   The registration form data entered by the user gets scored by the system and stored by it in the database, where it is kept safe for later processing.

7. Forward Registration Data to Admin:
   The system sends the registration data to an administrator for review and approval.

8. Review Registration Data:
   After comparing it against established criteria or rules, the administrator will assess the registration information and thereafter approve or deny the registration.

9. Send Final Confirmation:
   If necessary, following review and subsequent approval, the administrator forwards a final confirmation to the user.

10. Receive Confirmation Message:
    The user receives a confirmation message, signaling the successful completion of the registration process.

11. Publish teaching material:
    Teacher uploads the material through the portal, to allow the students to view and download it.

12. Receive notification when new material is uploaded:

After uploading the material from the teacher, students receive notification that a new material was uploaded.

13. View and download material:
    After the material is uploaded the students can view and download the material.

14. Log in to the portal:

    Allows the parent to avail of the authentication credentials to access the features and services of the portal.

15. View Academic Performance:

    Parent-specific academic performance records such as grades, absences, and assigned tasks can thus be retrieved by parents.

16. View Financial Information:

    Parents can thus view their financial records as far as fee payments, dues, and other transactions occurred in account history.

17. Retrieve Grades, Attendances, and Tasks:

    The system presents the particulars of results available from different departments.

18. Retrieve Payment Details:

    The system shall mobilize information for the display to a parent in respect of the payment due at that time.

19. Make Payment:

    At this stage, the complete payment procedure for the outstanding balance and payment history shall be followed by the user.

20. Process Payment:

    It manages the payment process that the parents do, in terms of payment transactions and proper validation and execution of those transactions.

21. Receive Payment Confirmation:
    Attachment of imposing receipts of successful payment by parents alongside a confirmation message to approve the payment process would be done.

22. **Show Portal for Schedule Management:** The admin accesses a centralized portal to manage all class scheduling operations.

23. **Create Class**: The admin initiates the process of adding a new class by entering its details.

- **Includes**: Enter class details.

24. **Update Class**: The admin modifies an existing class's details such as timing or location.
    - **Includes**: Enter class details.

25. **Cancel Class**: The admin cancels an existing class, removing it from the schedule.

- **Includes**: Enter class details.

26. Submit Changes *(Extended Use Case)*: After creating, updating, or canceling a class, the admin submits the changes to finalize the operation.

- **Includes**: Verifying input fields, storing class data.
- **Extends**: Create Class, Update Class, Cancel Class.

27. Send Messages: Admin or teachers send messages to notify students and staff about class changes, updates, or announcements.
28. View Schedule: Teachers and students view the finalized schedule to check their class details.

- **Use case Diagram for class and schedule management:**

29. Enter Class Details *(Included Use Case)*: The admin inputs details about the class, such as subject, time, location, and teacher.
30. Verifying Input Fields *(Included Use Case)*: The system validates the input to ensure all fields are correctly filled and meet predefined requirements.
31. Store Class Data *(Included Use Case)*: The system saves validated class information into the database for future reference.

3.3: Use case Description:

Modern School System
Registration as Student
Mohammad Assi-1212395

1.1 Brief Description

This particular use case explains the method by which a student registers in the modern school system. The student tends to provide the personal details and the academic details, which are verified and stored in the system. The registration underwent review by an admin before the final approval.

1.2 Actor

1.2.1 **Student**

The main actor of this use case will interact with the system to accomplish the registration process. 1.2.2 **Database System**

This supporting actor stores and retrieves the user registration data.

1.2.3 **Admin**

This secondary actor reviews and approves the registration submissions.

2 Preconditions

1- The student shall be allowed access to a portal for school registration.
2- The access portal must be operational, as well as attached to the database system.

3 Flow of Events

3.1 **Basic Flow – Student Registration:**

3.1.1. The student goes to the school's registration portal.

3.1.2. The student clicks on "Student Registration".

3.1.3. The system demonstrates the registration form for the student with the important details of name, age, grade level, parent/guardian info, contact details

3.1.4. The student fills out the registration form and then clicks on the "Submit" button.

3.1.5. The system checks the data before sending the user confirmation via email about the registration details.

3.1.6. If the data is valid, the data will be stored in the database.

3.1.7. Finally, the student receives a confirmation email that the registration is successful.

3.1.8. The use case has ended.

4. Alternative Flow

4.1 Missing Required Field

4.1.1 If the student tries to submit the form without filling all fields, the system shows an error message showing the missing fields that were not filled.

4.1.2 The student fills in the missing field and submits it again.

4.2 Invalid Data

4.2.1 If the student inserts incorrect data such as incorrect email address format, the system shows an error message to correct the specific field.

4.2.2 The student corrects the specific fields and submits it again.

5. Postconditions

5.1

1. The student's data will be stored in the data.
2. A confirmation email is sent to the student after successful registration.
3. The registration is marked for admin review.

6. Special Requirements:

6.1

1. The system will enforce data verification for all mandatory fields and types specified such as email addresses.
2. A copy of the confirmation email must also contain its unique registration ID as a reference.

7. Extension Points

7.1

1. Handling errors during validation of data.
2. Connection to the notification system for sending confirmation email messages.

Modern School System

Publishing of Teaching Material

Aws Shaheen-1212585

1.1 **Brief description:**

When the teacher wants to upload a material, he/she shall fill out the form contains the title, description, subject, class, topic, and the material in formats such as .pdf, .docx, .pptx, .jpg, or .mp4, ensuring the file size is less than 50MB, then upload it, the students will receive an automated notification with a link directing them to the published material, it also will be on the dashboard.

1.2 **Actor**

1.2.1 **Teacher**

Teachers are the main actors, they are responsible for publishing the material.

1.2.2 **Student**

Students are the secondary actors, they are allowed to see and download the published material

2 Preconditions

2.1 Students and teacher registered in the school

2.2 teachers shall be authorized

3 Basic Flow Events

3.1 **Basic Flow – publishing material**

3.1.1 Teacher opens the uploading material section

3.1.2 Teacher fills out the form

3.1.3 System makes sure the teacher is authorized and is publishing for his/her assigned classes and subjects

3.1.4 Teacher clicks the upload button

3.1.5 The system sends an automated notification with a link directing them to the published material.

3.1.6 Student clicks on the link, will be able to view and download the material

4 Alternative Flows

4.1 student access the material through the dashboard

4.2 the teacher changes the uploaded file using the edit button to detach the previous file and attach the new file and click save.

5 Post conditions

5.1 system sends an automated notification with a link directing students to the published material.

5.2 Student access the material from the link in the notification message or from the dashboard

6 Special Requirements

6.1 Only authorized teachers can access the upload material field.

6.2 System must validate file format.

6.3 Files larger than 50MB must be rejected.

6.4 Notifications must be sent within 10 seconds of successful upload.

7 Extension Points

7.1 after the teacher submits the form and before the file is uploaded to the system, if the uploaded file is not in the allowed formats (.pdf, .docx, .pptx, .jpg, .mp4), the system displays an error message: “Invalid Format”, and allow the teacher to upload a valid file

Modern School System

Schedule Management

Mohammad Khadour-1212517

1.1 Brief Description

This use case allows administrators to create and establish a new class schedule by specifying essential details such as class name, teacher, subject, time, and location. The process ensures that the schedule is not conflict and integrates seamlessly into the overall timetable. This use case also outlines the process by which the system automatically sends notifications to relevant users like administrators, teachers, and students whenever there are modifications to class schedules, such as rescheduled or canceled classes. The objective is to ensure that all affected parties are promptly and accurately informed about these changes to maintain an organized and efficient academic environment.

1.2 Actor

1.2.1 Administrator

1.2.2 Teacher

1.2.3 Student

2 Preconditions (Entry Condition)

2.1 The administrator or teacher has successfully authenticated and has the necessary permissions to modify class schedules.

2.2 The system has access to up-to-date information about classes, teachers, rooms, and student enrollments.

2.3 Notification preferences for users are configured appropriately within their profile settings.

3. Flow of Events

3.1 Basic Flow - Create Class Schedules

3.1.1 The administrator or teacher logs into the system and navigates to the Schedule Management section to display options to Create, Update, or Cancel class schedules.

3.1.2 The administrator selects the Create New Schedule option.

3.1.3 The administrator fills out the form with the necessary information including class name, teacher selection, subject, time, and location.

3.1.4 The system checks for any scheduling conflicts, ensuring that the selected teacher and room are available at the specified time.

3.1.5 Upon successful validation, the administrator submits the form to create the new schedule. It notifies the administrator of the successful creation of the schedule.

3.1.6 The use case ends.

4 Alternative Flows

4.1 Schedule Conflict Detected

4.1.1 the system detects a scheduling conflict (e.g., the selected teacher is already assigned to another class at the same time or the room is double-booked).

4.1.2 The system displays an error message detailing the specific nature of the conflict, including the conflicting class details or the resource (teacher or room) involved in the conflict.

4.1.3 The administrator reviews the conflict details and decides either to adjust the class time or location, assign a different teacher, or cancel the creation or modification of the conflicting class.

4.1.4 After making adjustments, the administrator resubmits the form with the updated details.

4.1.5 If the administrator decides not to proceed with the conflicting schedule change, the system aborts the creation or modification process and returns to the schedule management dashboard.

5 Post-conditions (Exit Condition)

5.1 A new class schedule is successfully created and stored in the system without any scheduling conflicts.

5.2 Existing class schedules are successfully updated with the new details, ensuring no conflicts remain.

5.3 The overall school timetable is updated to include the newly created or modified class schedules.

5.4 Relevant notifications are dispatched to affected teachers and students informing them of the new or updated schedules, ensuring all stakeholders are informed of the changes.

6 Special Requirements

6.1 The system must ensure that all required fields are completed with valid data formats before allowing submission.

6.2 The system provides conflict detection in real-time validation to prevent scheduling conflicts.

6.3 The schedule creation and modification forms should be user-friendly and intuitive, facilitating easy input and updates of class details.

6.4 Administrators should have the option to export the updated timetable in .pdf formats.

6.5 The system must allow users to enable or disable specific types of notifications via their profile settings.

7. Extension Points

7.1 After creating or modifying a class schedule, the administrator may choose to export the updated timetable.

7.2 The system logs all schedule creation and modification activities, including who made the changes, what changes were made, and when they were made.

Modern School System
Parent Portal for Tracking Student Progress
Alhassan Manasra-1211705

1.1 Brief Description

This use case describes how a parent accesses the school's Parent Portal to monitor their child's academic performance, including grades, attendance records, and assignment submissions. Additionally, the parent can manage notifications, view financial details, and process payments. The system ensures secure authentication, retrieves and presents data in a user-friendly format, and logs all user activities for accountability and auditing purposes.

1.2 Actor

1.2.1 Parent

The primary actor who logs into the portal to track their child's academic progress, review attendance and grades, manage financial obligations such as overdue payments, and configure notifications for key events like low grades or upcoming deadlines.

1.2.2 System

The system acts as a supporting actor, ensuring secure authentication, retrieving academic and financial data, processing payments through integrated gateways, storing logs of user activities for auditing purposes, and sending automated notifications based on parent preferences and interactions.

2 Preconditions

2.1 The parent must have valid login credentials and an active account in the system.

2.2 The child’s academic records and financial data must be stored in the database and linked to the parent’s account.

2.3 The system must be online and operational to allow access.

3 Flow of Events

3.1 The parent logs into the portal and selects 'View Academic Performance.' The system retrieves the child’s grades, attendance records, and assignment submissions. This data is presented in a clear tabular format, with visual indicators highlighting missing grades, recent updates, or low performance.

3.2. After reviewing academic data, the parent clicks the 'Financial' tab to view an overview of outstanding balances, payment history, and upcoming deadlines. The system displays this information as an interactive table with sortable columns and provides a “Pay Now” button for processing overdue payments.

4. Alternative Flow

4.1 Filtering or Search

If the parent wishes to narrow down the displayed information, they can click the 'Filter' button available in the academic or financial sections. The system provides dropdown menus or date pickers to select a specific term, subject, or date range. Once a filter is applied, the system updates the view to display only the relevant data and confirms the action with a message like "Filter applied successfully".

4.2 Notification Settings

The parent navigates to 'Notification Preferences' in the settings menu, where they can enable or disable alerts using toggle switches. Notifications can include SMS alerts for missed assignments, email reminders for upcoming payments, or system messages for critical academic updates. After making changes, the parent

clicks “Save,” and the system immediately updates the preferences, displaying a confirmation message like “Notification preferences updated successfully.” The parent can then return to the dashboard.

5. Postconditions

5.1 Payments are updated in the system, and a confirmation email with a receipt and transaction ID is sent to the parent. Additionally, the payment history in the portal is updated to reflect the successful transaction.

5.2 Changes to notification preferences are saved immediately and logged in the system for auditing. The parent receives an on-screen confirmation and, optionally, an email summarizing the updates.

6. Special Requirements

6.1 The system must comply with GDPR and local data protection standards, encrypting all personal information during storage and transmission. Access to data must be restricted to authorized users with role-based permissions.

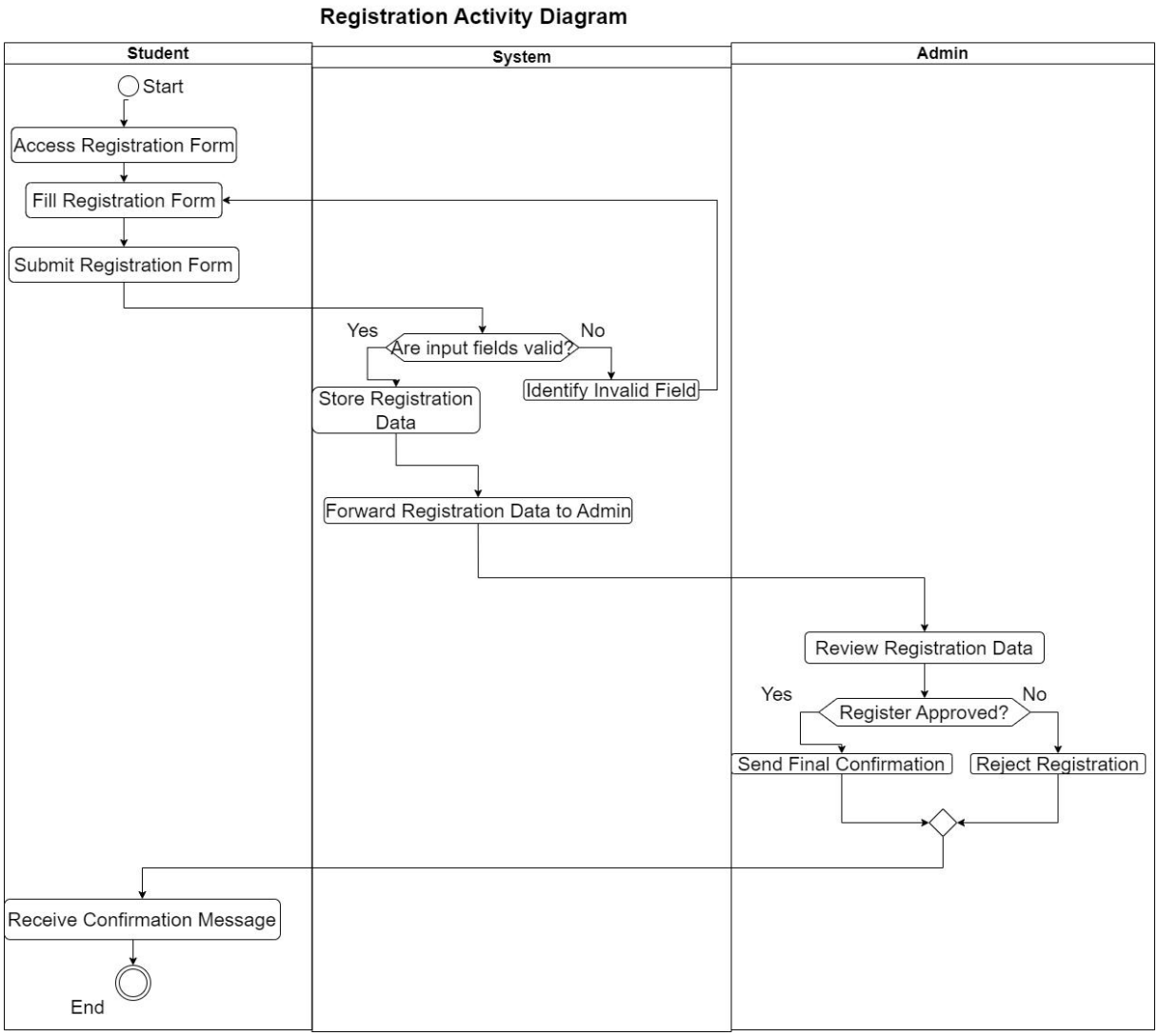
6.2 The system must scale to handle up to 1,000 concurrent users during peak hours without performance degradation, ensuring response times for all critical actions, such as data retrieval or payments, do not exceed two seconds.

7. Extension Points

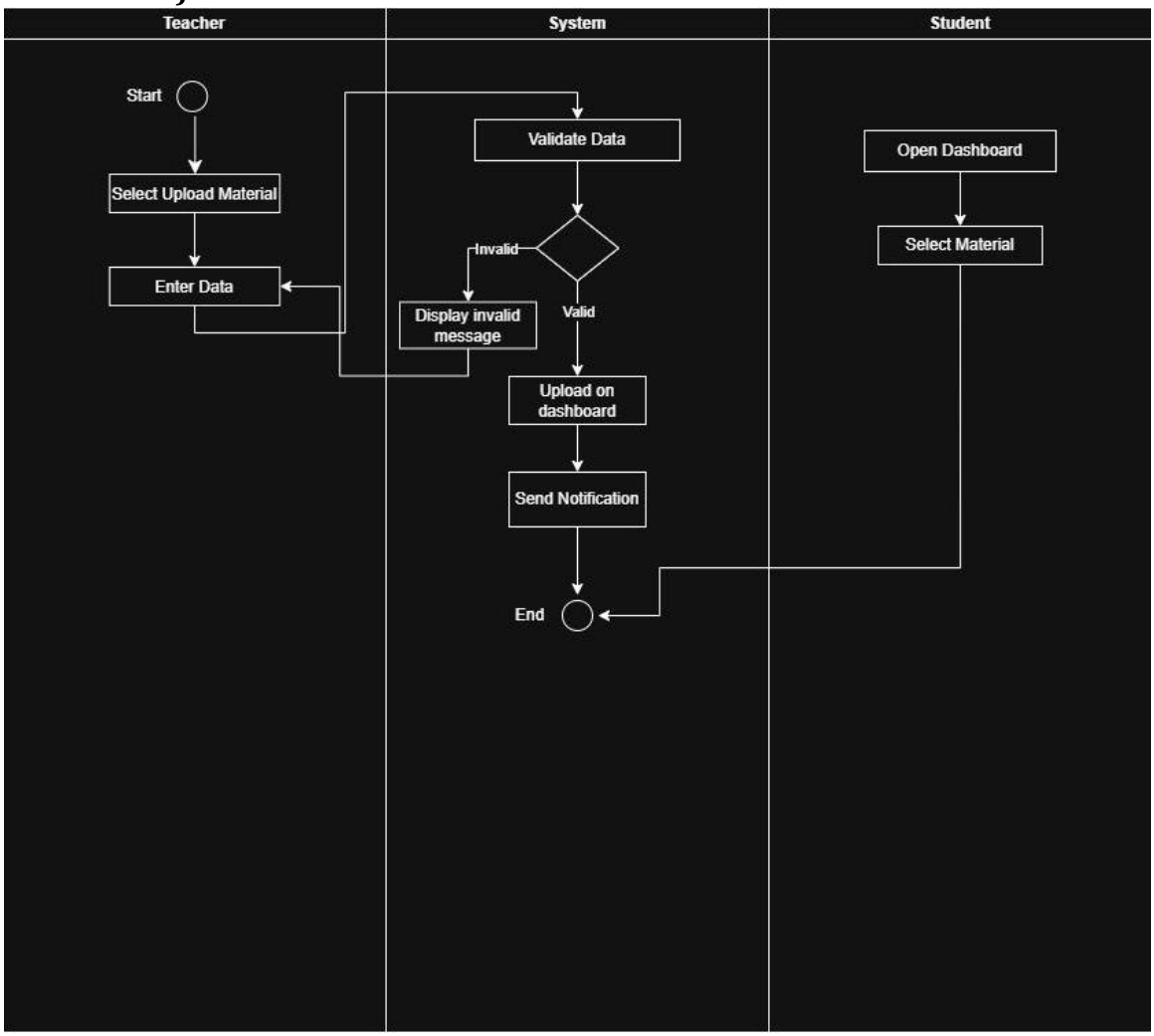
Error Handling: If the parent enters invalid credentials, the system will display an “Invalid Credentials” message and provide a “Forgot Password” link. During system downtime, an error page will display a message such as “Service temporarily unavailable,” advising the parent to try again later. For payment failures, the system will display an error message like “Payment could not be processed” and suggest verifying payment details or contacting support.

3.4: Instance Activity Diagram

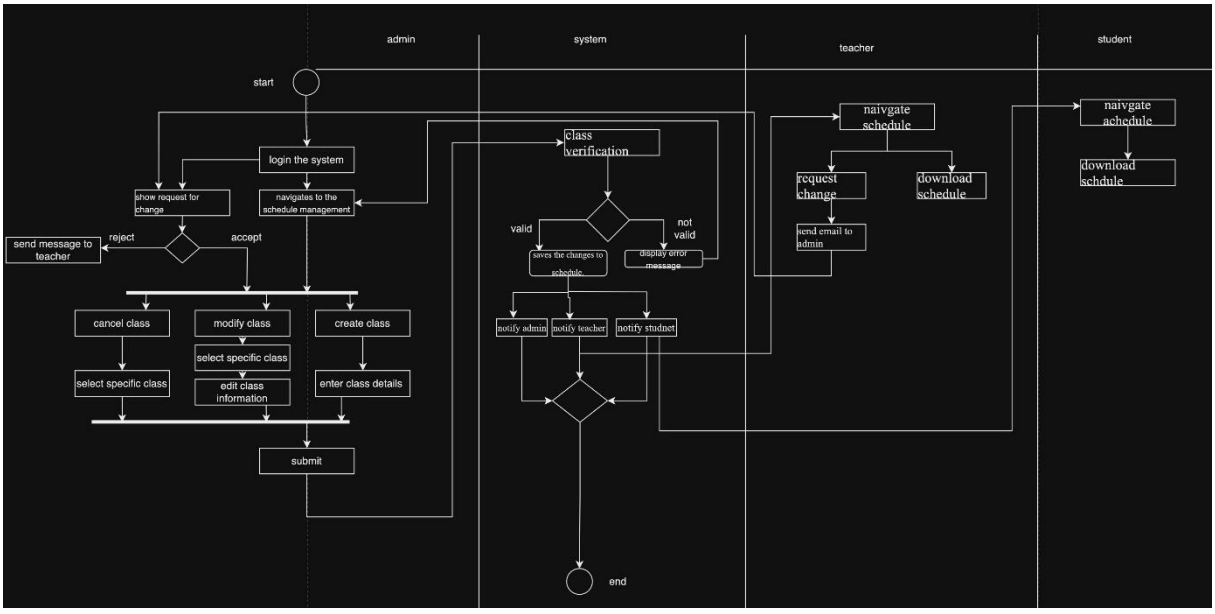
Student registration Activity Diagram Mohammad Assi – (1212395)



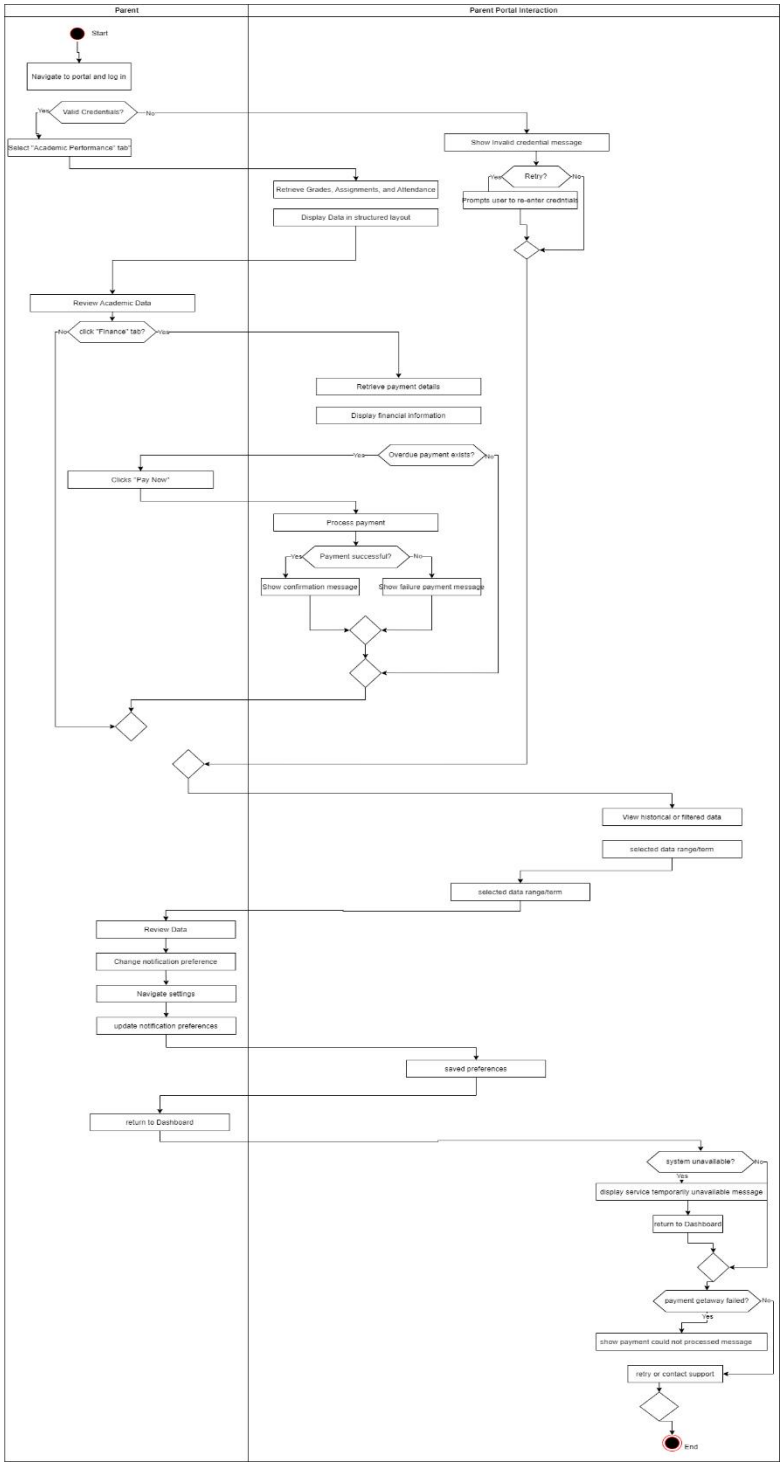
Publishing of teaching material Activity Diagram (Aws Shaheen-1212585)



Schedule Management Activity Diagram: (Mohammad Khadour- 1212517)

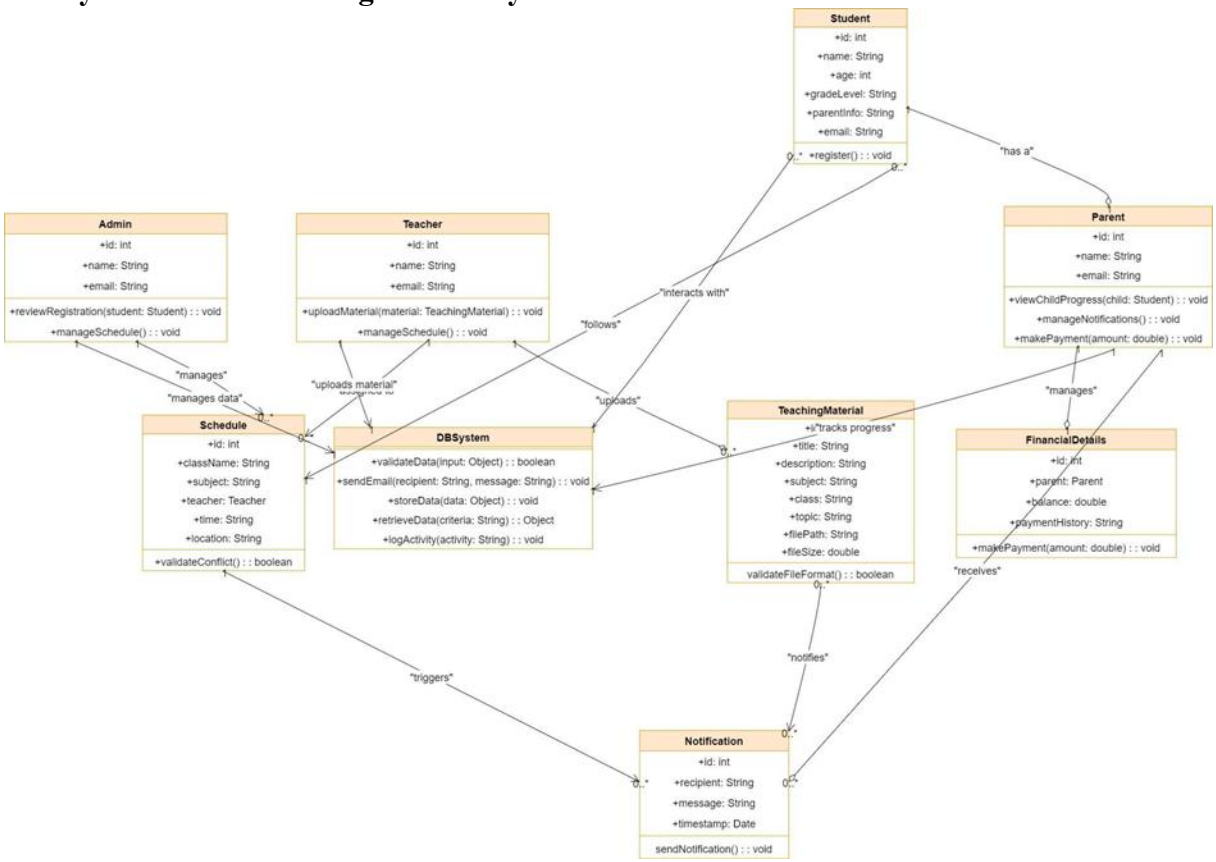


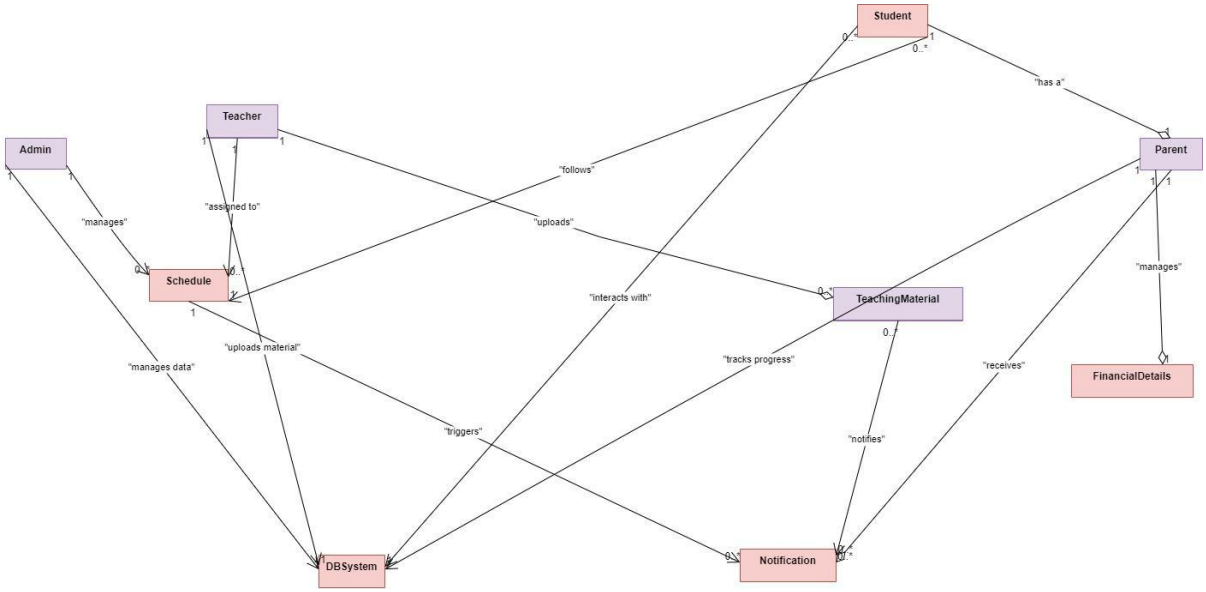
Parent Portal Activity Diagram: (Alhasan Manasra-1211705)



Phase 4: Architecture Diagram

4.1: System Class modeling and Analysis





Class Description:

1- **Student**: This is the representation of students. A student will be able to register for the application, see class schedules, and use notifications.

2- **Parent**: This is the representation of parents. They are being followed to ensure that they monitor their child's performance in school, manage payments related to the education of the child, and receive notifications as to what may be going on in terms of school activities.

3- **Teacher**: This is the representation of teachers. The teachers will be uploading their teaching materials and managing their class schedules.

4- **Administration**: Represents the administrators who approve student registrations, create schedules, and manage the entire system.

5- **TeachingMaterial**: Store and validate teaching material uploaded by teachers such that students can have access to it.

6- **Schedule**: Manages all events in classes while avoiding clashes with other events, notifying the concerned parties.

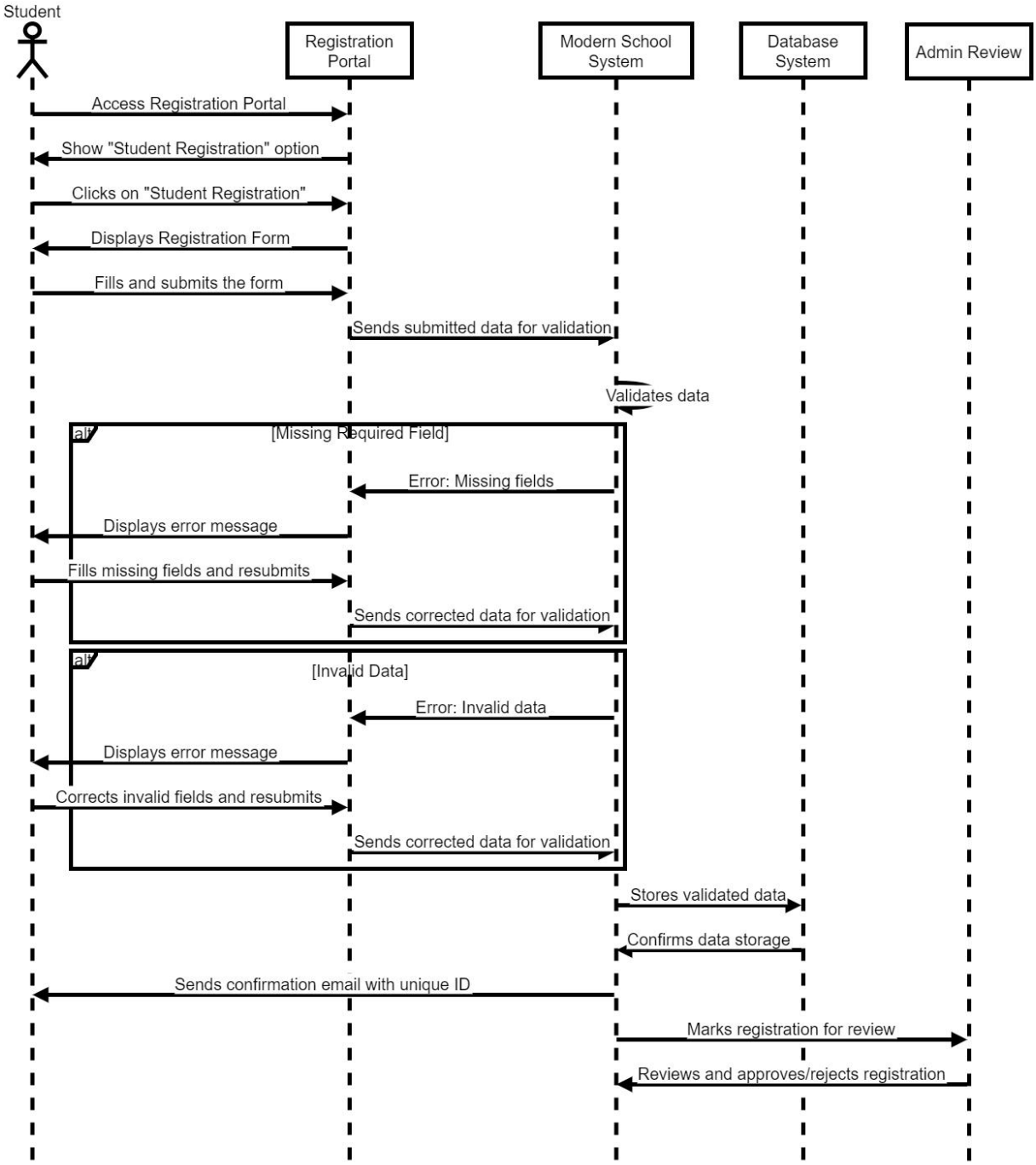
7- **Notification**: Send a message to users (students, parents, teachers) about situations or actions that the users should be aware of.

8- **Financial Details**: Deals with the payments and balances made by parents concerning the financial obligations of their wards.

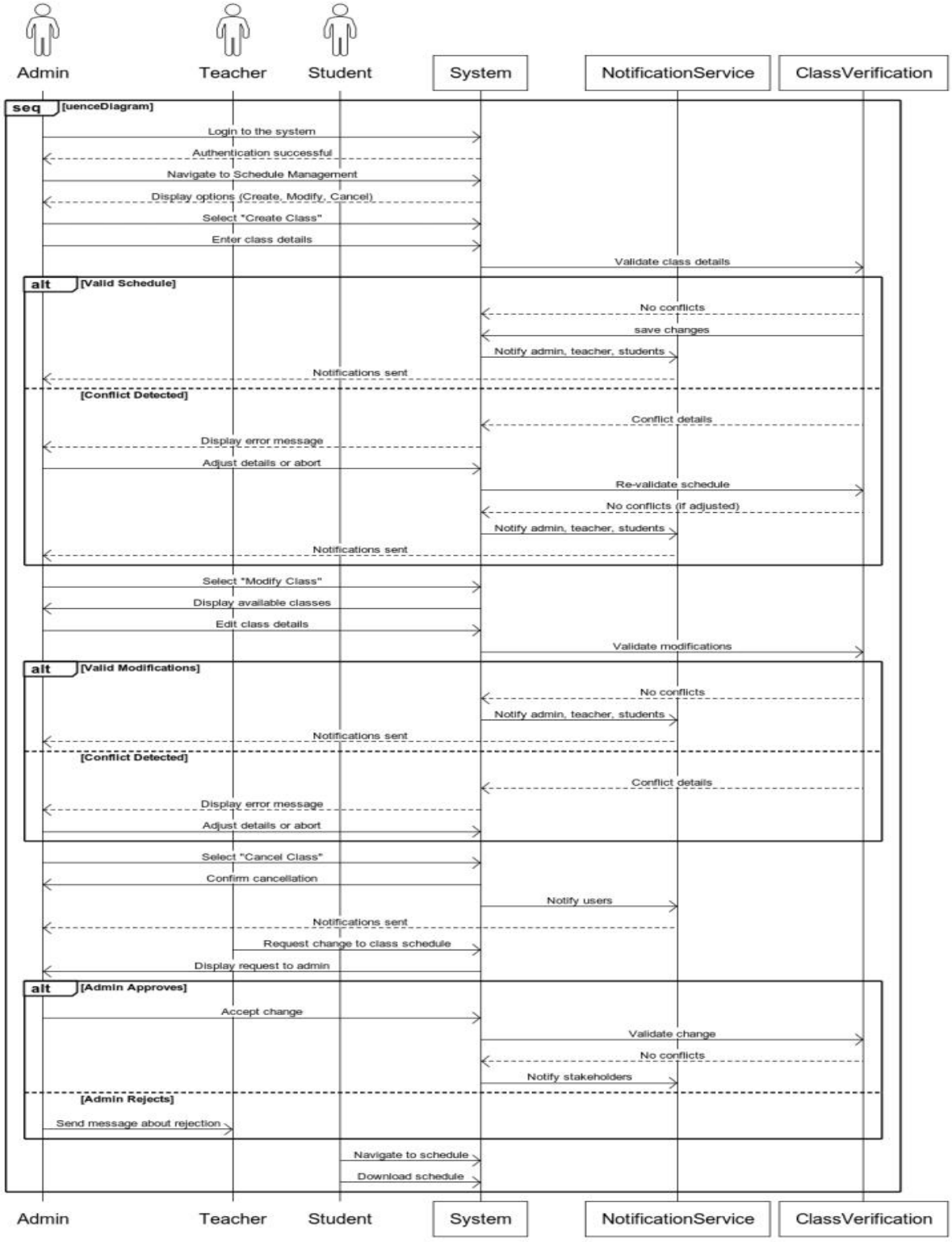
9- **DBSystem**: The heart of school management systems, which handles all data validation, storage, notification functions, and user interaction.

4.2: System Sequence Modelling and Analysis

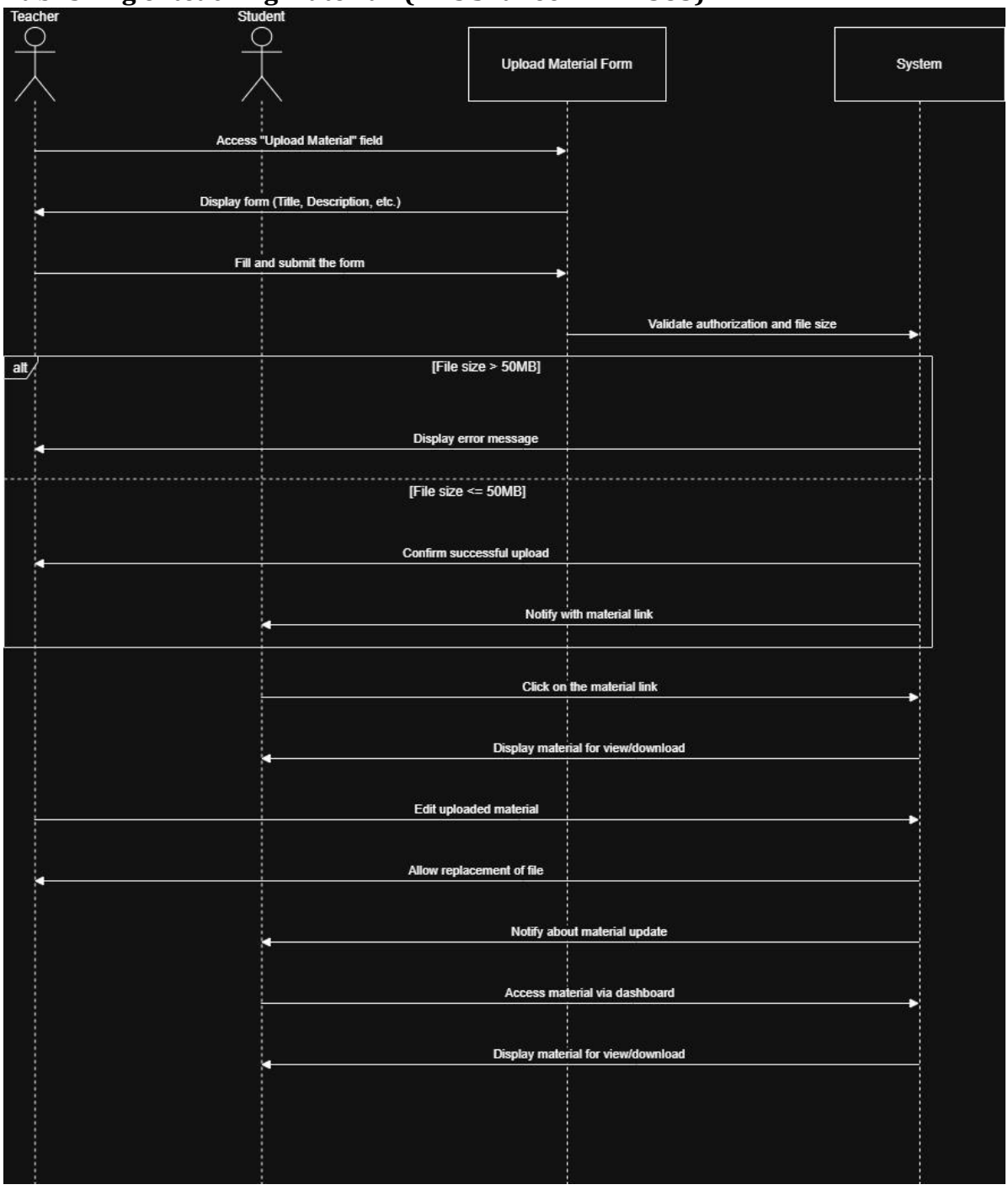
Registration as Student: (Mohammad Assi-1212395)



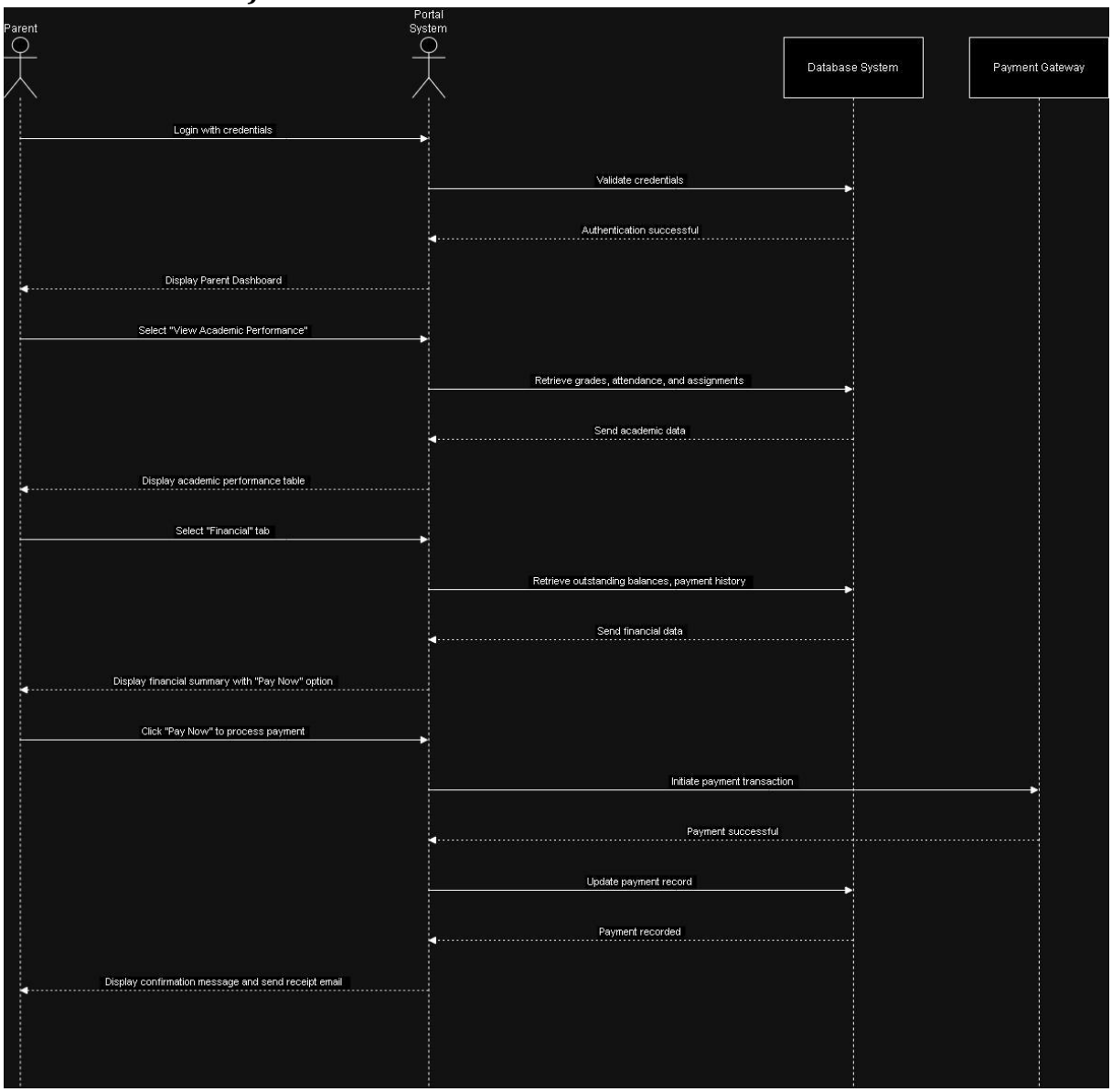
Schedule Management: (Mohammad Khdour - 1212517)



Publishing of teaching material: (Aws Shaheen 1212585)



Parent Portal for Tracking Student Progress: (Alhasan Manasra 1211705)



4.3: System Design Goals

When formulating the plans for the Modern School System we made the priority to make it absolutely sturdy, smooth maintenance and the enjoyment of users interacting with it. With the help of this, we worked towards the realization of three main objectives:

1. Low Coupling

What does this mean?

We have made sure that the distinct components of the system are independent so it is as if the teams never interacted until now to avoid misunderstandings. If the other pieces grow or change, they will not be affected by the one part that does.

How we did it:

Where in the past there was only one big block of code that was supposed to do it all, now each module (e.g., registration, validation, or payments) does a particular job. Throughout the conversation, they are guided by carefully specified "rules" (APIs).Take the following example: the registration module stores a new user's personal information (including user name and emails, as well as the password) into a database. Whenever we change to a faster database, we will only have adjustments in the database, but not in the registration module itself.

Why it matters:

It makes the system easier to fix and upgrade.

If we need to add new features, we can do so without breaking other parts.

2. High Cohesion

What this means:

Each part of the system has one job, and it does that job well. This avoids messy overlap and keeps things simple.

How we did it:

We grouped similar tasks into separate modules. For example:

A Validation Module checks if user inputs are correct.

A Notification Module sends confirmation emails and SMS messages.

Each module is like a tool designed for a specific task, avoiding the problem of one big "do-it-all" tool.

Example:

The notification module only handles communication, not user data validation or payments. This keeps it focused and easy to improve.

Why it matters:

Developers can easily understand and work on specific parts without digging through unrelated code.

Bugs are easier to find because responsibilities are clearly divided.

3. Performance Optimization

What this means:

The system should feel snappy and reliable, even when many people use it at the same time.

How we did it:

- **Caching:** We store frequently needed data (like available class slots) temporarily, so the system doesn't have to look it up repeatedly.
- **Asynchronous Tasks:** Time-consuming tasks, like sending confirmation emails, run in the background, letting users move on quickly.
- **Load Balancing:** If many people use the system simultaneously (like at the start of a school term), we spread the workload across multiple servers.

Example:

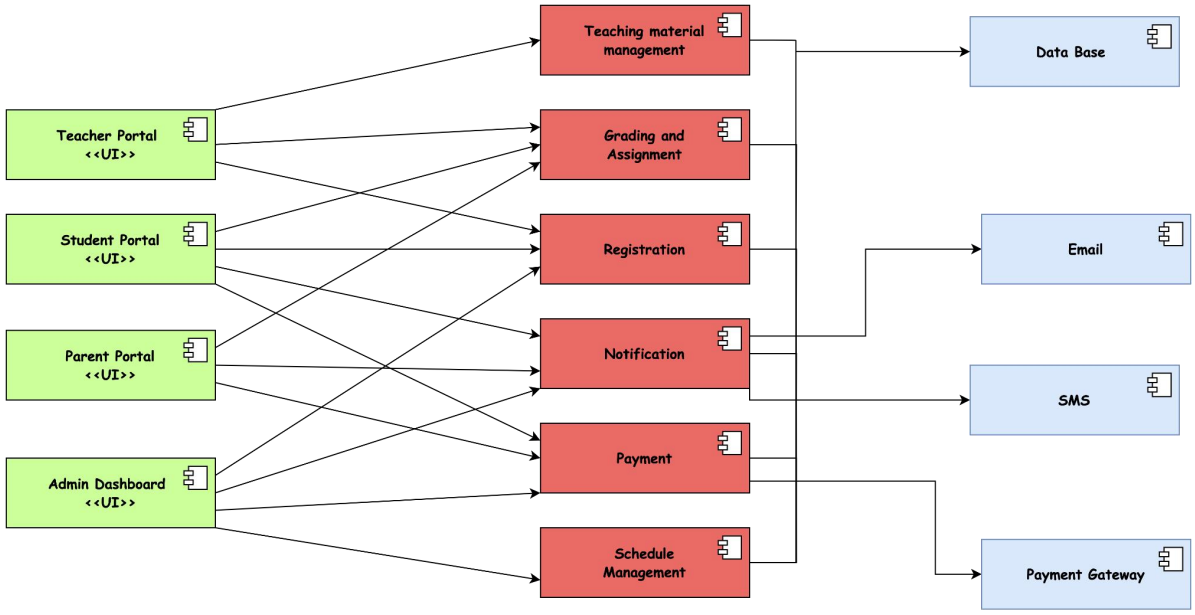
During peak registration times, users get real-time validation for their data. Emails confirming the registration are sent in the background, so they don't have to wait.

Why it matters:

Users stay happy because the system feels fast and responsive.

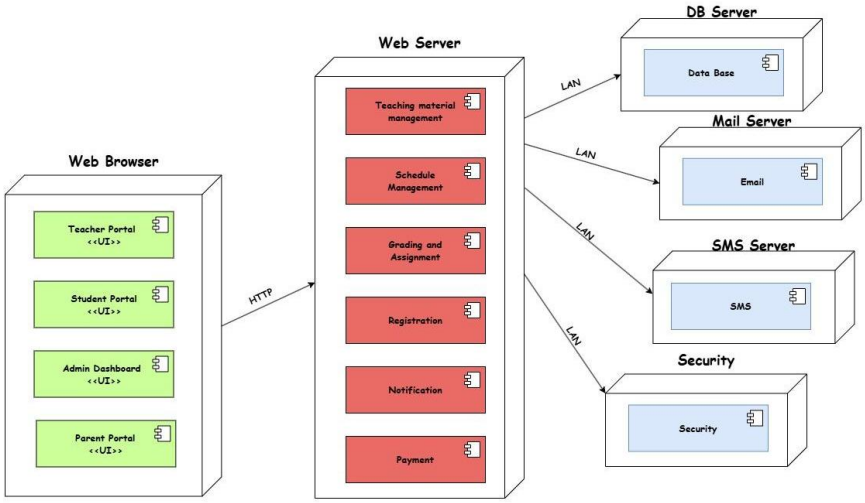
The system can handle growth as the school expands without major rewrites.

4.4: component diagram:



The component diagram showcases the modular design of the Modern School System, emphasizing Low Coupling, High Cohesion, and Performance Optimization. Each component, such as Registration, Notification, and Payment, operates independently, interacting through defined interfaces to minimize dependencies and ensure scalability. High cohesion is achieved by assigning specific tasks to each module, such as Teaching Material Management handling educational content or Grading and Assignment managing assessments, simplifying maintenance and upgrades. The system integrates with external services like Email, SMS, and Payment Gateway to offload tasks, improving performance. User interfaces, including the Teacher Portal, Student Portal, Parent Portal, and Admin Dashboard, connect users to relevant modules, ensuring a streamlined and efficient experience. This design supports maintainability, scalability, and responsiveness, even during peak usage.

4.5: Deployment Diagram



The deployment diagram is a model for a web-based educational management system, showing how the parts of the system work with one another. The system consists of the Web Browser which is the client side that consists of different user interfaces for teachers, students, administrators, and parents. These portals facilitate users to manage and access features like teaching materials, assignments, schedules, notifications, and student progress. The Web Server acts as the main point from where central core functionalities are carried out, these core functionalities include teaching material management, schedule management, grading and assignment handling, registration, notifications, and payment processing. It communicates with the DB Server to store and retrieve data, such as user information, schedules, and grades. The Mail Server and SMS Server are also integrated to send email and SMS notifications that will keep users fully informed. Furthermore, a Security Server is put in to guarantee that the transmission of data and the user authorization process is secure and encrypted. More to the point, the Web Browser will communicate with the Web Server through HTTP, whereas the Web Server will communicate with the backend servers over a LAN connection to allow seamless data flow and system integration. This design ensures separability, scalability and safety on the educational platform.