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SECD2613 ANALISIS DAN REKABENTUK SISTEM (SYSTEM ANALYSIS AND DESIGN)

Semester II 2023/2024

Phase 2 : Information System Gathering and Requirement

Campus Resource Management System

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SECTION : 3

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1.0 OVERVIEW OF THE PROJECT

In the ever-changing educational environment, universities and colleges are struggling with the task of managing resources effectively in the face of changing demands. Traditional methods often prove inadequate, lacking the transparency and efficiency needed to meet modern expectations. To address these challenges, we propose the development of a Campus Resource Management System (CRMS) specifically tailored to the needs of educational institutions.The CRMS serves as a centralized platform that integrates a variety of administrative and operational processes, such as facility booking, event management, and student and faculty management. By integrating these functions, CRMS improves efficiency and communication while optimizing resource utilization. The system empowers stakeholders with an user-friendly interface that promotes productivity and collaboration across the campus community. As educational institutions embrace innovation and technology, CRMS serves as a catalyst for positive change, opening up new possibilities for growth and student success.

2.0 Problem Statement

Poor communication

Communication between faculty, staff and students is disjointed. Consequently, it can lead to misunderstandings and delays in information dissemination. At the same time, it may also result in lack of transparency in decision-making processes.

High possibility of human error in administrative tasks

Human error will increase when using a manual system that highly relies on human resources. Many administrative tasks such as equipment requests and faculty maintenance requests are performed manually. Hence, it can result in a time consuming and error-prone process.

Take attendance manually

Sometimes, the staff need to take students' attendance manually. It is because the system is down and unable to proceed to the next step. Hence, the attendance also will be recorded and stored manually

Inefficient Announcement Delivery and Management

When the system experiences downtime, the staff's announcements will be made through social media platforms such as WhatsApp, which is the primary medium to make announcements to send to the students.

Payment

The primary payment method in the current system is online transfer. However, the system occasionally experiences downtime, leading to temporary closures. Consequently, students are unable to make payments during these periods.

Registration

Currently, all the registration procedures undergo a manual process such as filling out forms manually. During registration, most of the personal information, including private and sensitive information of students and parents will be collected. However, this manual process is prone to errors and delays. Therefore, there is a pressing need to enhance security, and improve the overall registration experience.

3.0 Proposed Solutions

The Campus Resource Management System (CRMS) will act as the central hub for coordinating and optimizing various campus resources. It will streamline various administrative and operational processes within a university. At the same time, this system will serve as a centralized platform for overseeing a multitude of campus resources, encompassing facilities, events, students, faculty and staff. Additionally, the CRMS aims to improve overall campus efficiency, communication and resource utilization too. Ultimately, it will not only be enhancing the efficiency of resource management but also improve overall campus operations. As the saying goes, kill two birds with one stone. Not to forget that the primary purpose of CRMS is to provide a centralized platform for managing various campus resources, including facilities, events, students, faculty and staff.

Since the system has poor communication problems, we decided to add some communication features in order to avoid misunderstandings. For instance, Introducing communication tools such as announcements, notifications and collaborative spaces within the system. It will not only improve communication between staff, students and stakeholders, but also foster collaboration between each other. Hence, effective communication will occur. Besides, we need to modify the manual settings into automation. For example, automation of administrative tasks. By implementing this automation of administrative tasks into our system, it is able to reduce manual effort and minimize errors. Furthermore, the processes such as student registration, faculty scheduling and decision-making processes can be streamlined and executed with precision. So, effectiveness in managing campus resources will be increased.

To solve the problem of inefficient announcement delivery, we need to develop a dedicated mobile application for the system that allows users to receive notifications directly on their smartphones. At the same time, ensuring that the system will be accessible via mobile devices is a must for us to develop so that everyone can use it at any time, anywhere. The system will allow us to access resource information, perform tasks on-the-go and enhance convenience and productivity. This is not only saving time and effort but also ensures consistency and accuracy.

To ensure continuous availability of the payment processing system , we are able to build backup servers to avoid the unexpected downtime. For example, when the main system triggers a downtime period of the payment, it will automatically switch to the backup system. Consequently, it can minimize disruption of the payment processing. In addition, constructing an online registration portal can simplify data collection without wasting time. This portal should be user-friendly and accessible from various devices to fit in with different users' needs. Moreover, we should develop continuous improvement and feedback mechanisms from users. It is because the functionality and usability of the CRMS can be improved based on user needs from time to time.

Last but not least, we will develop a user-friendly interface within the CRMS system that provides students, staff and stakeholders with easy access to all information. We hope that this system can enhance the working experience of everyone.

4.0 INFORMATION GATHERING PROCESS

4.0 Information Gathering Process

Information collecting is important to learn as much as possible about the AS-IS system. These facts were acquired from Dr Rozeela Zain, a shareholder in our project based on the AS-IS system and UTM students who used our system as users.

4.1 Method Used

To obtain deep insights about the AS-IS system, we conducted interviews and administered a questionnaire that comprised open-ended questions and closed-ended questions. Google forms us used to conduct the survey.

Interview

- Open-ended question

1. Can you describe how the Campus Resource Management System (CRMS) enhances efficiency in resource allocation on campus?

CRMS do enhance the efficiency in resource allocation on campus by providing real-time visibility. With the user-friendly interface, it can help stockholders to track resource usage effectively in order to make better decisions. At the same time, by streamlining the resource allocation process, it not only saves overall costs but also boosts productivity for our campus-wide too. Hence, it will result in a more efficient and responsive campus environment.

2. What do you think is the weakest of the current system?

The weakest aspect may be the communication gap and lack of announcement that should be talked and informed via system. It is crucial to address this by facilitating effective communication and ensuring important information is promptly shared. By improving communication channels and establishing a mechanism for regular announcements, we can bridge the gap and keep everyone informed. Then, it will foster better collaboration among all stakeholders. Besides, this can lead to an efficient and productive campus community.

3. How to improve the weakest of the current system?

To improve the weakest aspect, we could implement a system that automates communication and announcement processes. It is able to reduce manual work and ensure data consistency. As the saying goes, we can kill two birds with one stone by addressing both issues simultaneously.

- Closed -ended question

1. Is the CRMS system designed to accommodate various types of resources, including physical facilities, personnel, and equipment?

Yes. A well-designed CRMS system is typically built to accommodate various types of resources, including physical facilities, personnel and equipment. It serves as a centralized platform that manages not only users' interactions but also the resources involved in reservations or services. For instance, the system may schedule booking at physical facilities. Hence, it can enhance overall performance on campus.

2. Does the Campus Resource Management System (CRMS) offer real-time updates on resource availability?

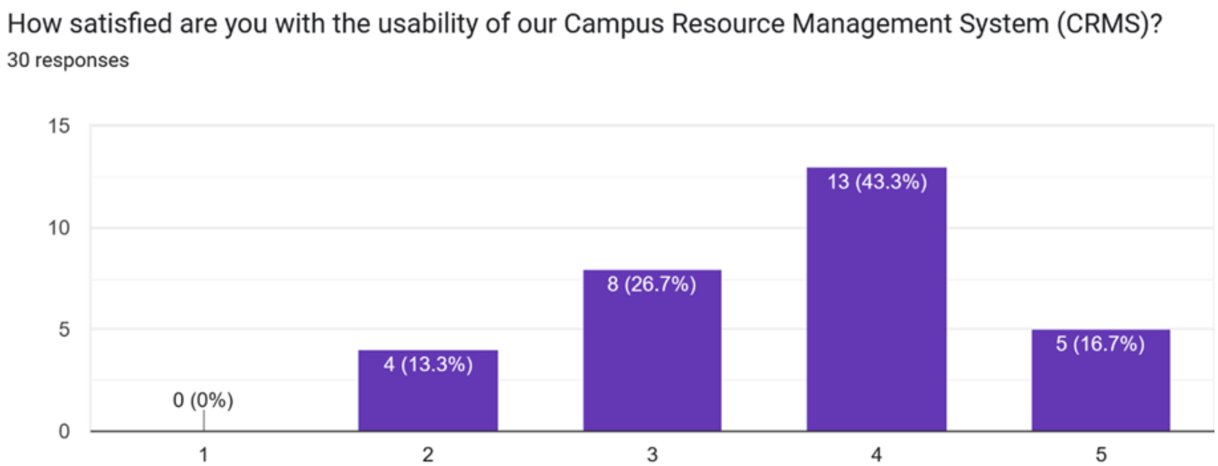
Yes. It provides real-time updates on resource availability through the tracking resource mechanisms. By implementing this, it ensures users have keep up-to-date information about the availability of resources such as equipment and facilities. Furthermore, it also enables better scheduling and utilization of campus resources too. Thus, the productivity of the system will eventually be increased. Last but not least, real-time updates really help administrators make quick decisions and keeping things running smoothly

3. What are the characters involved in the system?

Students, faculty, staff and administrators.

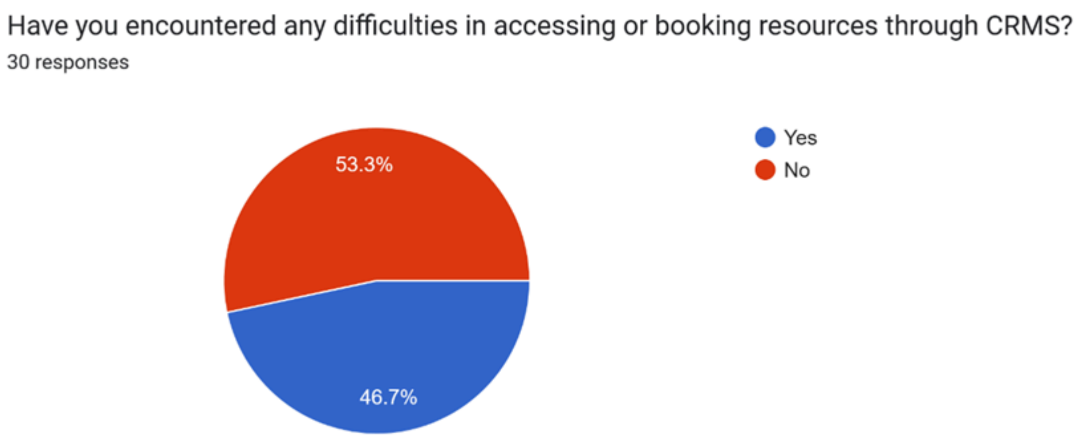
Questionnaire (google form)

1.



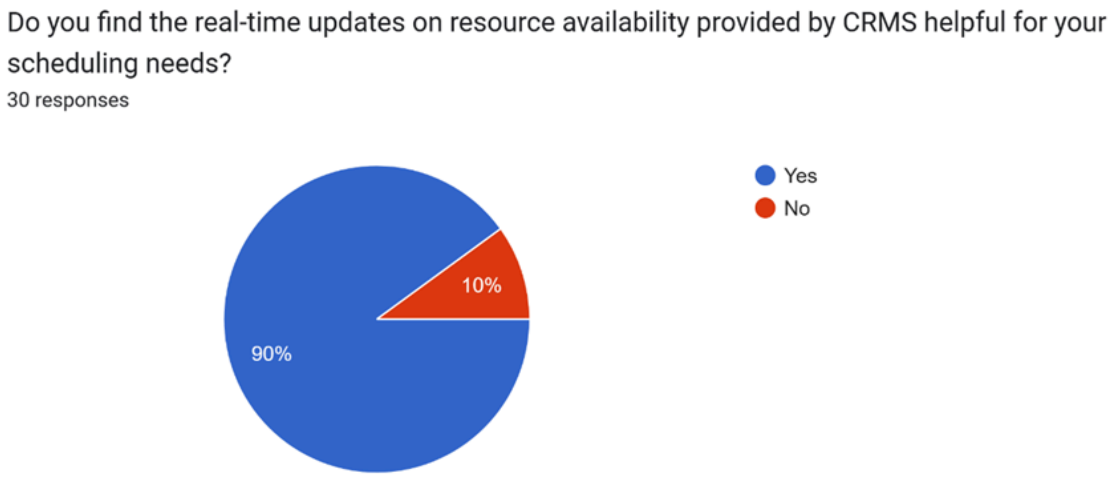
Based on the scale of 1 to 5, where 1 indicates not satisfied at all and 5 very satisfied. The bar chart above shows that users are generally quite satisfied with the current system. While the system may not be overly complex, its functionality appears to effectively meet users' basic needs. However, there may still be opportunities for improvement for the system as users' needs evolve from time to time.

2.



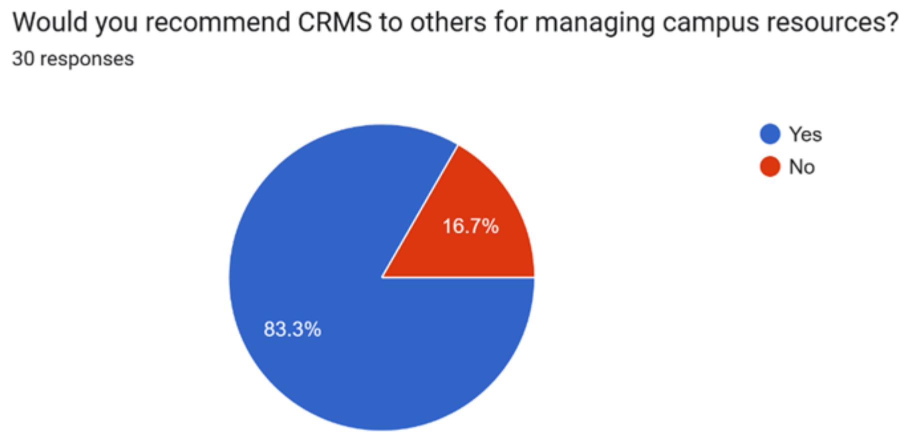
Based on the survey results, it appears approximately 53.3% of users have encountered difficulties in accessing or booking resources through CRMS. This suggests that there are areas within the system that may present barriers for users when attempting to access or book resources. For example, system limitations or insufficient support in the system. On the other hand, approximately 46.7% of users reported not experiencing any difficulties which indicates that they find the system is user-friendly for resource access and booking tasks. Consequently, improvement for this aspect will be considered first.

3.



90% of respondents indicate that real-time updates on resource availability are helpful in the system. It proved that this real-time update plays a vital role in facilitating the system. By having instant access to up-to-date information on resource availability, we can make well-informed decisions and quickly adjust schedules as needed. This feature not only saves time but also helps in avoiding conflicts and ensuring optimal utilization of resources. On the other hand, 10% of respondents expressed dissatisfaction with this aspect. They hope to enhance the accuracy of real-time updates.

4.



83.3% respondents would recommend CRMS to others for managing campus resources. It is because it provides a centralized platform for efficiently coordinating and scheduling campus resources. So, the productivity will be overall enhanced. Since it is also a user-friendly interface, it makes it easy for users to access their information. This ensures those users can have smooth resource allocation. Moreover, 16.7% of respondents did not recommend the system. Their feedback may highlight some areas that need to be improved. For instance, difficulty in accessing CRMS features and functionality on mobile devices which impacted their ability to effectively manage resources while on the go.

5. What additional features or improvements would you like to see implemented in CRMS to enhance its effectiveness?

The responses from users regarding additional features and improvements for CRMS highlight several key areas for enhancement. These include the development of a mobile app for convenient access, integration with personal calendars for scheduling synchronization, implementation of enhanced notifications for timely updates, and improvements in resource descriptions and usage statistics. Users also emphasized the importance of a feedback system, chat box functionality for support and a simplified booking process with improved navigation. Other suggestions included expansion of resource categories, integration with eLearning systems and security enhancements. Last but not least, addressing these suggestions would contribute to improving user experience, efficiency and effectiveness of the CRMS in managing campus resources.

Observation

1. Identify specific locations where CRMS is accessed such as computer labs, administrative offices, or faculty
2. Schedule observation sessions during different times of the day to capture varying usage patterns.
3. Situate yourself inconspicuously within these locations, ensuring a clear view of individuals interacting with CRMS.
4. Use electronic devices to record observations discreetly.
5. Focus on user interactions with CRMS, including logging in, resource searches, bookings, cancellations, and any encountered issues.
6. Note the time, date, and duration of each observation session, as well as any environmental factors influencing CRMS usage (e.g., peak hours, technical difficulties).
7. Document any verbal exchanges between users and CRMS support personnel or administrators, noting questions asked or assistance provided.
8. Avoid making assumptions or interpretations; stick to objective descriptions of observed

behaviors and interactions.

9. After each observation session, review your notes to identify recurring patterns or trends in CRMS usage and user experiences.
10. Use your observations to inform recommendations for optimizing CRMS functionality, improving user experience or providing targeted training and support.

4.2 Summary from Method Used

We were able to learn more about how our stakeholder business system functions from the perspectives of the stakeholder and other users, which helped us better understand how we can design a system that enables CRMS to operate more effectively and efficiently. Our aim is to create a system that allows us to seamlessly collect user interests based on their orders through a questionnaire. Analyzing the survey responses has enabled us to identify priority areas for improvement in our current system.

5.0 REQUIREMENT ANALYSIS

5.1 Current business process (Scenarios, Workflow)

Here are the scenarios and workflow of current business process for stakeholder:

1. Login to the system:

   1.1 Users (students, faculty and staff) enter their id and password to access the Campus Resource Management System (CRMS).

2. Customizing according to preference:

   2.1 Users can set preferences for notifications, display settings and booking options.

3. Main Menu Options:

   3.1 The system displays various options such as Facility Booking and Management, Student Management, Communication and Notification.

4. Facility Booking and Management:

   4.1 Facility Booking

   4.1.1 Users select the option to book a facility .

   4.1.2 Users can filter the facility based on the type, location, equipment and date.

   4.1.3 The system displays a list of available facilities.

   4.1.4 Users can search and view the availability of facilities like classrooms, auditoriums, labs and sports fields.

   4.2 View Facility Details

   4.2.1 Users select a facility to view its details.

   4.2.2 The system displays information such as capacity, available time slots, and amenities.

   4.2.3 Users can also see images about the facility and read reviews that are written by other users.

   4.3 Book Facility

   4.3.1 Users choose a timeslot and date.

   4.3.2 Users enter the booking details and information then confirm the booking.

   4.3.3 The system processes the booking and updates the facility's availability.

   4.3.4 The system will send a booking confirmation to the users after the booking is processed.

4.4 Manage Bookings

4.4.1 Facility managers can define booking policies and rules.

4.4.2 They manage reservations, approve or deny booking requests and track resource utilization.

4.4.3 They make sure that users are aware of the policies and rules by sending notifications.

4.5 Check Booking And Payment Status

4.5.1 Users can view their booking history and status of their current bookings.

4.5.2 Check payment status for the booking and pay.

4.5.3 The system provides multiple payment options that includes cash, online banking, TNG and credit card.

4.5.4 Receipt will be send to the users via email or SMS if the payment is successful.

5. Student Management:

5.1 Manage Student Enrolment

5.1.1 Administrators select the enrollment management option.

5.1.2 The system displays a list of enrolled students.

5.1.3 Administrators can add new students, update student information and maintain academic records.

5.2 Course Registration

5.2.1 Students can select the course registration option.

5.2.2 The system displays available courses for the semester.

5.2.3 Students choose courses and register.

5.2.4 The system confirms registration and updates the student's schedule.

5.2.5 Check payment status after registration is done.

5.3 View Academic Profiles

5.3.1 Students can access their academic profiles.

5.3.2 The system displays academic records, grades and progress.

5.4 Manage Student Activities

5.4.1 Administrators oversee students activities and events.

5.4.2 The system logs activities and tracks student participation.

5.5 Track Academic Progress

5.5.1 Students view their academic progress and performance reports.

6. Communication and Notification:

6.1 Send Announcements

6.1.1 Administrators select the option to send announcements.

6.1.2 The system displays an announcement creation form.

6.1.3 Administrators enter the announcement details and select recipients.

6.1.4 The system sends the announcement via email, messaging and notifications.

6.2 Receive Notifications

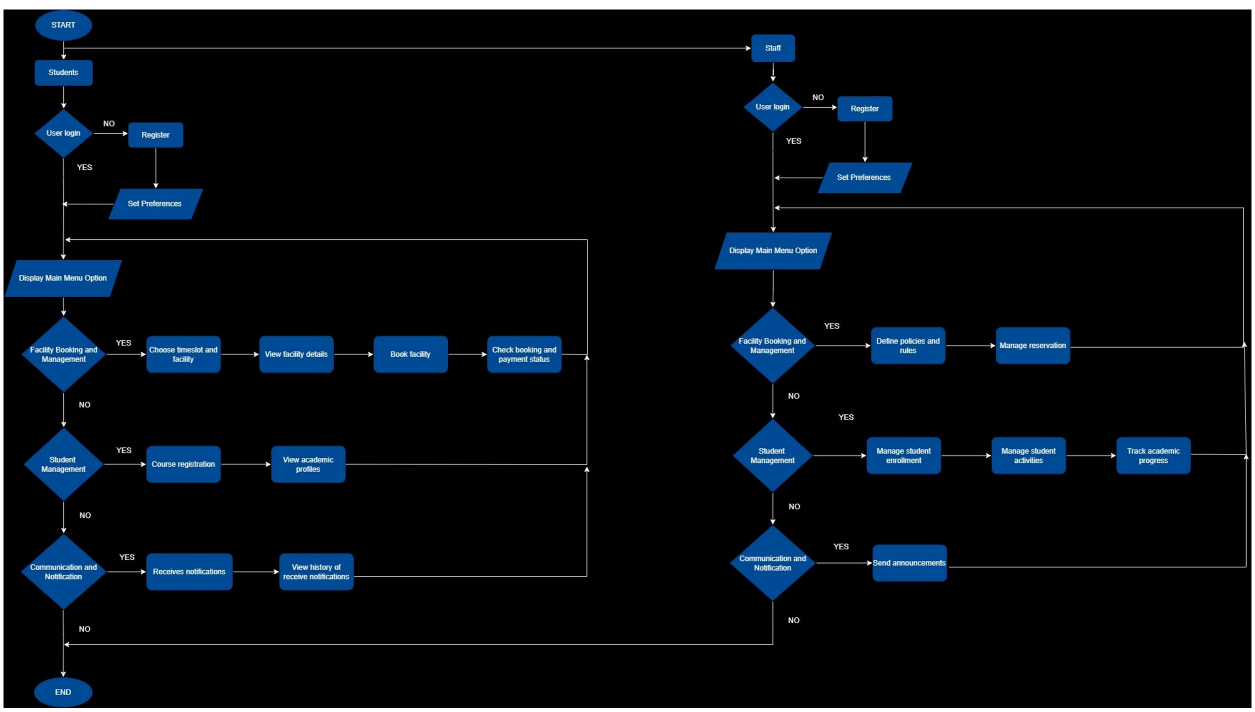
6.2.1 Users receive notifications about important updates, upcoming events, booking confirmations and deadlines.

6.2.2 The system displays notifications on the user's dashboard and sends alerts via email or messaging.

6.3 Check Notification History

6.3.1 Users can view the history of received notifications.

6.3.2 The system displays past announcements and alerts.



5.2 Functional Requirements (Input, Process, Output)

5.2.1 Context Diagram

Process	Input	Output
Campus Resource Management System	• User Preferences • Facility Information • Student Data • Payment Status	• Announcement Details • Facility Availability • Booking Confirmations • Updated Student Records • Sent Notifications • Valid Payment Details

5.2.2 Level 0 Diagram

Process	Input	Output
Book Facilities	• Facility Information • User Preferences	• Facility Availability • Booking Options • Payment Options
Manage Student Enrolment	• Student Data	• Updated Enrolment Records

Register Course	• Course Information • Student Preferences • Student ID • Schedule Data • Payment Status	• Registration Confirmation • Academic Profiles • Student Schedules • Valid Payment Details
Maintain Academic Records	• Academic Data	• Updated Academic Records
Manage Student Activities	• Activity Data	• Activity Logs
Access Academic Profiles	• Student ID	• Academic Profiles
Send Announcement	• Announcement Details • Recipient List	• Sent Notifications
Receive Notifications	• Notification Preferences	• Notifications Alerts

5.2.3 Child Diagram

5.2.3.1 Process: Book Facilities

Process	Input	Output
Search Facility	● Facility Information ● User Preferences	● Available Facilities
Select Facility	● Facility ID	● Facility Details ● Facility Images and Reviews
Choose Time Slot	● Timeslot Preferences	● Booking Confirmation
Confirm Booking	● Booking Data	● Updated Booking Status
Confirm Payment	● Payment Status	● Valid Payment Details
View Booking History	● User ID	● Booking Records And Payment Status

5.2.3.2 Process: Register Course

Process	Input	Output
View Available Course	• Course Information	• Available Course List
Select Course	• Course ID	• Course Details
Register for Course	• Registration Form	• Registration Confirmation
View Course Schedule	• User ID	• Course Schedule Details
Payment	• Payment Status	• Valid Payment Details

5.2.3.3 Process: Send Announcement

Process	Input	Output
Create Announcement	• Announcement Text • Recipient List	• Announcement Draft
Send Announcement	• Announcement Details	• Sent Notifications

5.3 Non-functional Requirements

5.3.1 Performance Requirements:

5.3.1.1 Response Time:

- The system must respond to user actions (e.g. logins, bookings) within 3 seconds.

5.3.1.2 Scalability:

- The system must support up to 10000 concurrent users without performance degradation and be scalable to handle future increases up to 50000 concurrent users.

5.3.1.3 Availability:

- The system must have an uptime of 99.9% with scheduled maintenance outside peak hours.

5.3.2 Security Requirements:

5.3.2.1 Data Privacy:

- The system must comply with relevant data protection regulations (e.g. GDPR).

5.3.2.2 Data Integrity:

- All transactions must be logged and any changes to critical data must be auditable. Regular data backups should be performed and integrity checks should ensure data consistency.

5.3.3 Usability Requirements:

5.3.3.1 User Interface:

- The system must have a user-friendly interface that is intuitive and easy to navigate, suitable for users of all technical levels.

5.3.3.2 Accessibility:

- The system must comply with accessibility standards (e.g. WCAG 2.1) to ensure it is usable by individuals with disabilities, including features like screen reader compatibility, high-contrast mode and keyboard navigation support.

5.3.4 Compatibility Requirements:

5.3.4.1 Platform Independence:

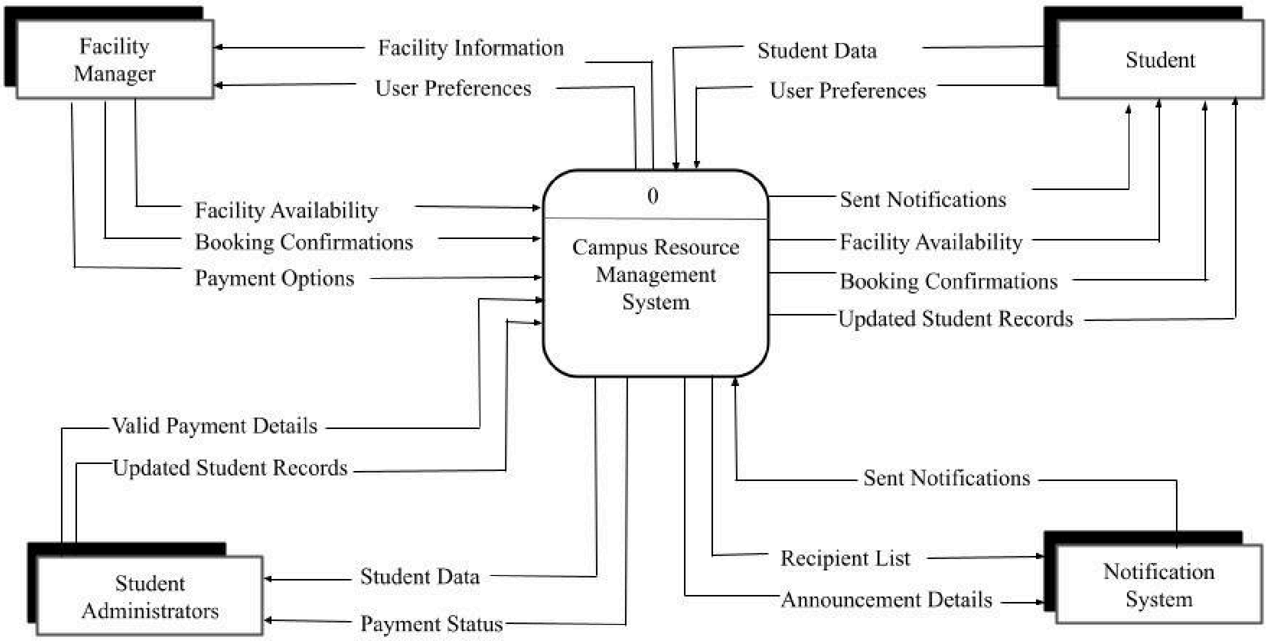
- The system must be accessible from multiple platforms, including web browsers (Chrome, Firefox, Safari) and mobile devices (iOS, Android).

5.3.4.2 Integration:

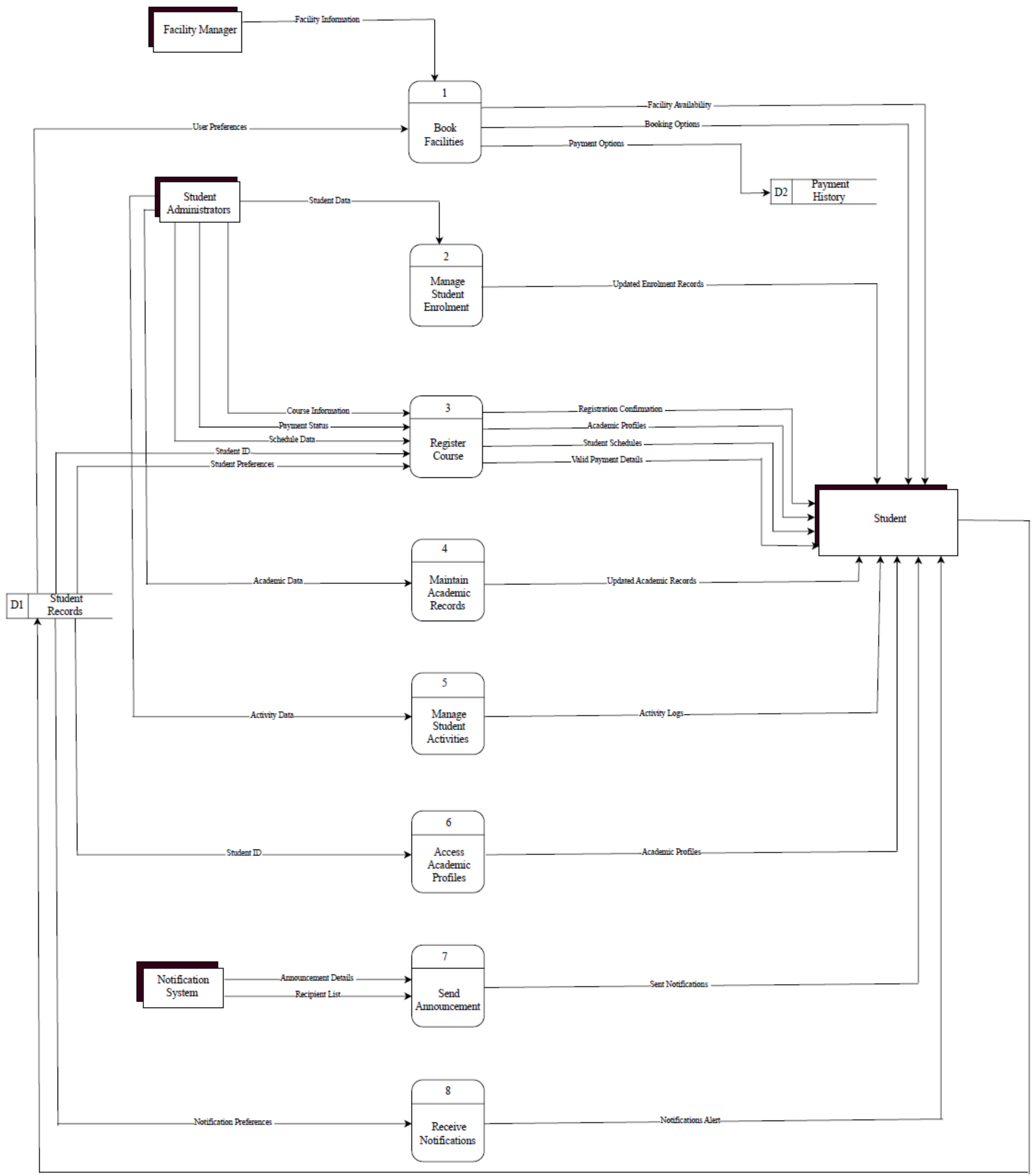
- The system should support integration with other systems via standard APIs, ensuring seamless data exchange and interoperability.

5.4 Logical DFD for AS-IS System

5.4.1 Context Diagram

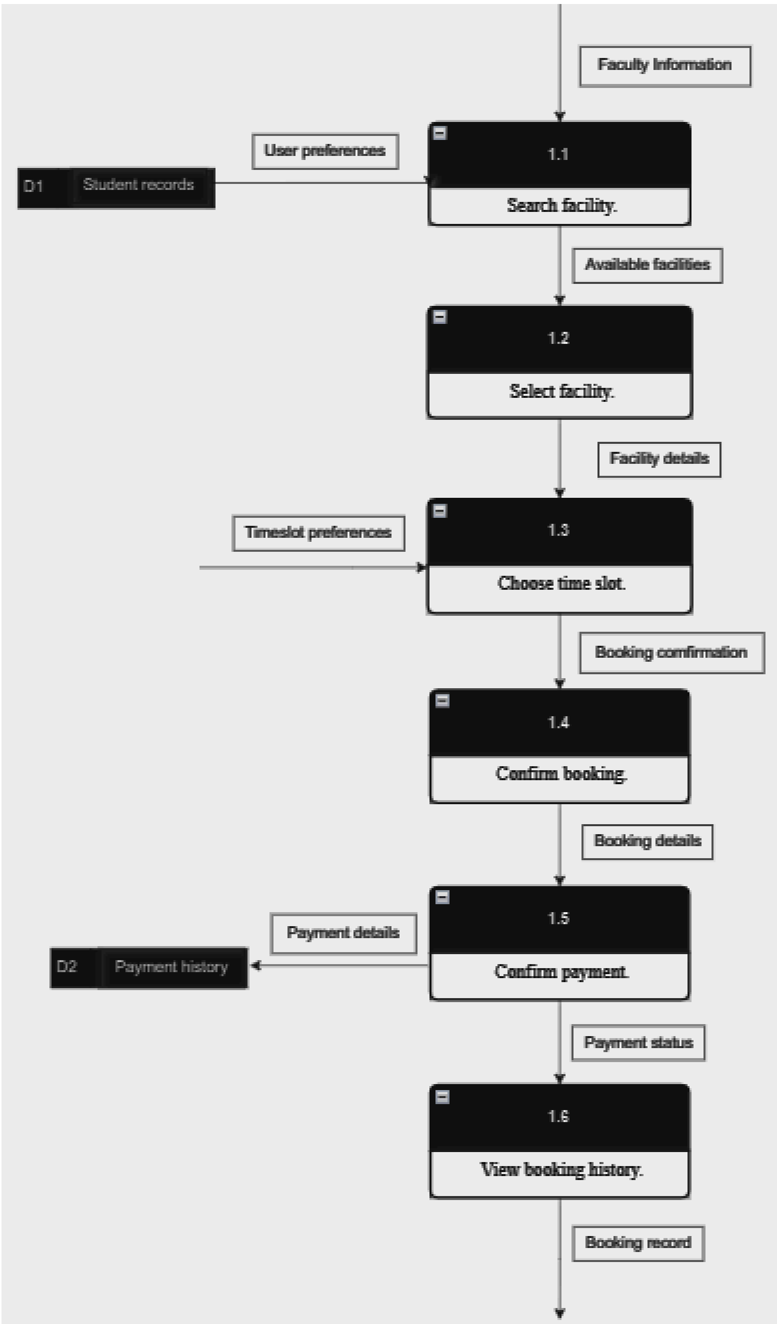


5.4.2 Level 0 Diagram

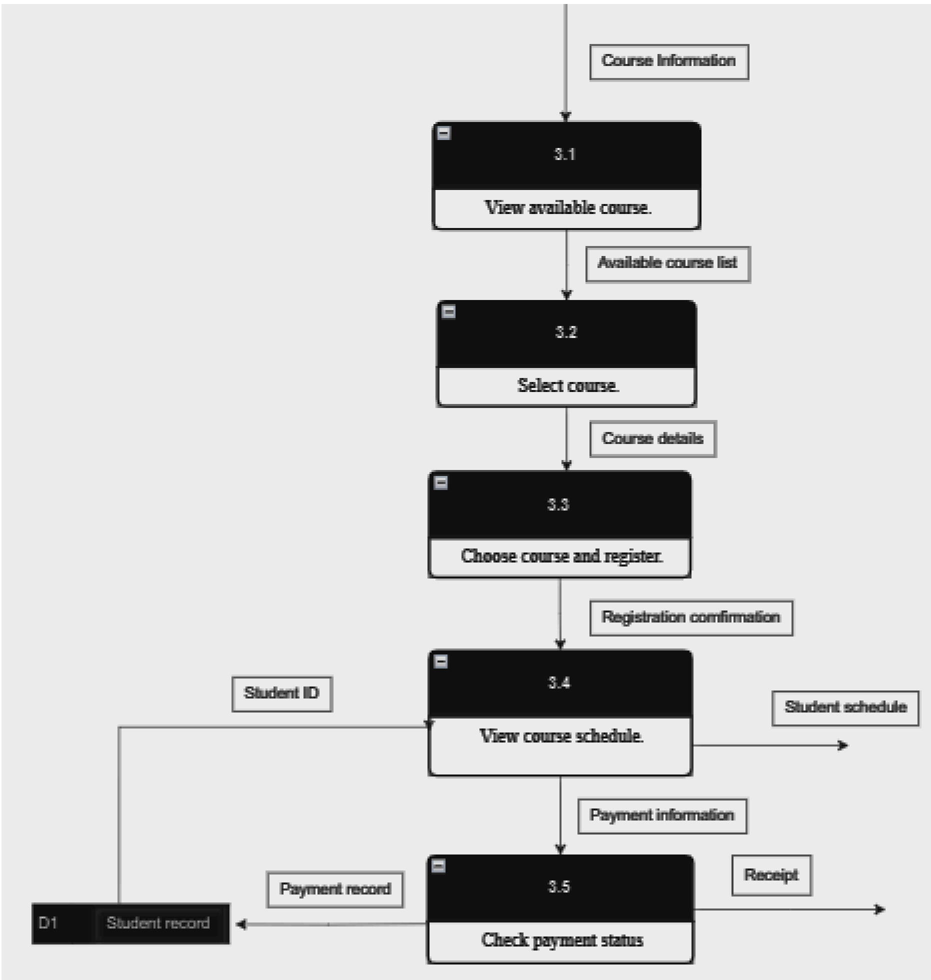


5.4.3 Child Diagram

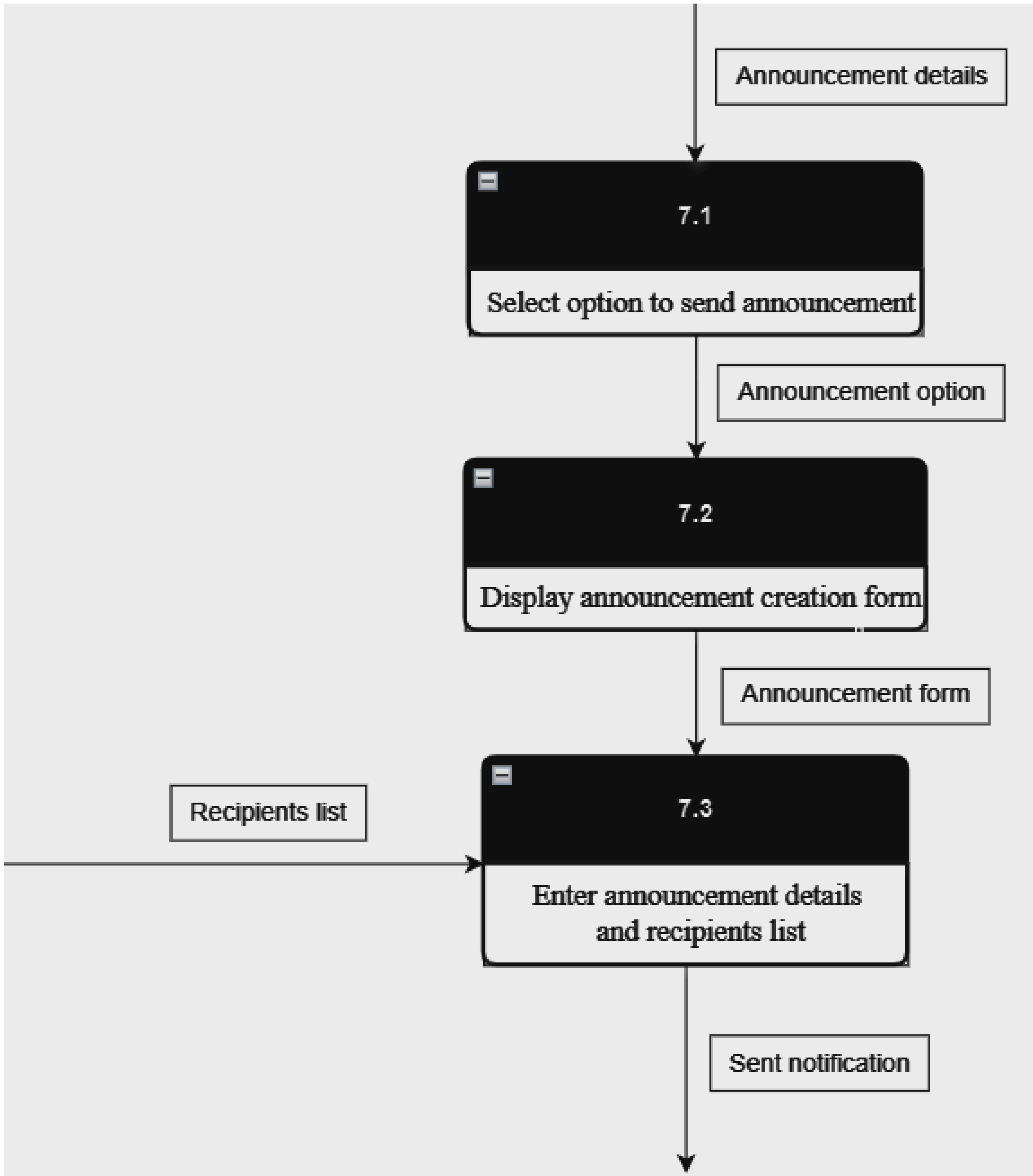
- **Process 1 - Book Facilities**



- **Process 3 - Register Course**



- **Process 7 - Send Announcement**



6.0 SUMMARY OF REQUIREMENT ANALYSIS PROCESS

There are a few functions that we can implement to improve the AS-IS system of the Campus Resource Management System in order to minimize the paperwork and digitalize the reservation and registration process.

The functions implemented in the TO-BE system are :

- Create a database to store information about students and facility management
- Track the availability of the facilities in the campus
- Automated scheduling booking
- Provide real time notifications
- Automated student registration