



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SYSTEM ANALYSIS AND DESIGN

SECD2613-03

Group: Tech Brothers

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Topic:

Campus Resource Management System

Project Proposal:

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1.0 Overview

Campus Resource Management Systems (CRMS) play a pivotal role in optimizing administrative and operational processes within universities by centralizing resource management, streamlining tasks, and enhancing overall efficiency. By integrating facility and event management, student and staff administration, and communication channels, CRMS simplifies resource allocation and decision-making processes, ensuring seamless campus operations.

Institutions of higher learning benefit significantly from the incorporation of CRMS, which improves efficiency and resource allocation. This integration fosters collaboration among stakeholders, creating a cohesive campus community. Moreover, CRMS aids in cost savings, boosts productivity, and modernizes operational frameworks, thus supporting academic excellence and enhancing student success.

Dr. Sean, a senior lecturer at UTM, leverages computational thinking and Design Science Research to develop AI-powered expert systems. His primary goal is to enhance the postgraduate supervision system at UTM by proposing a user-friendly platform, making the supervision process more efficient and streamlined for both students and supervisors.

In conclusion, the proposed platform aims to tackle inefficiencies in the current manual supervision system. Existing practices are time-consuming, requiring students to contact supervisors individually, and there is a lack of a suitable platform to efficiently locate supervisors. This innovative solution promises to significantly improve the ease and effectiveness of postgraduate supervision at UTM.

2.0 Problem Statement

1. Fragmented Systems:

Disparate manual systems for various administrative tasks create inefficiencies such as data silos and duplicated efforts, leading to resource underutilization and increased expenses.

2. Communication and Administrative Issues:

Poor communication and reliance on manual processes result in conflicts and delays in scheduling and event planning, impairing operational efficiency.

3. Accessibility and Inclusivity:

There is a need for proactive efforts to ensure that all community members, particularly those with disabilities, have equal access to campus facilities and services.

4. Financial and Data Management:

Limited funding restricts necessary improvements while extensive data management tasks overwhelm existing systems, complicating the balance between immediate financial pressures and long-term sustainability.

5. External Relations and Sustainability:

Effective management of external partnerships and commitment to sustainable practices are essential for community engagement and minimizing the environmental impact of campus operations.

3.0 Proposed Solutions

1. Integrated Campus Resource Management System (CRMS):

Implement a central CRMS to manage all aspects of resource scheduling, event organization, and administration for students, faculty, and staff, eliminating the need for manual processes and disparate systems.

2. Resource Utilization Dashboard:

Create a real-time dashboard within the CRMS to provide key metrics on facility occupancy, peak usage, and demand forecasts, enabling administrators to optimize resource allocation and identify underutilized areas.

3. Automated Scheduling and Allocation:

Use automated scheduling algorithms in the CRMS to allocate campus resources based on demand, availability, and priority, ensuring efficient utilization and avoiding conflicts.

4. Streamlined Administrative Procedures:

Digitize and automate workflows for staff management, course registration, and student enrollment within the CRMS, allowing administrative staff to focus on strategic tasks and reduce errors.

5. Collaboration and Communication Tools:

Integrate tools for seamless interaction among departments, faculty, students, and administrators, including feedback mechanisms, event notifications, and messaging systems.

6. User Training and Support:

Provide comprehensive training and ongoing support for CRMS users through training courses, user guides, online tutorials, and dedicated support channels.

7. Data Security and Privacy:

Implement robust security and privacy protocols within the CRMS to protect sensitive data and comply with legal requirements like GDPR and HIPAA, including data protection policies, access controls, encryption, and regular security audits.

8. Proactive Outreach and Partnerships:

Identify and engage with local businesses, government entities, and community groups to support campus initiatives through personalized outreach and relationship building.

9. Energy Conservation Programs:

- **Energy Audits:** Assess energy usage in campus buildings to identify inefficiencies.
- **Efficiency Measures:** Install energy-efficient systems and smart technologies.
- **Conservation Practices:** Educate students on energy-saving practices.
- **LEED Certification:** Aim for LEED certification for new and renovated buildings.
- **Retrofit Existing Structures:** Upgrade existing buildings to meet green standards.
- **Highlight Green Features:** Promote sustainability efforts through signage, tours, and promotional materials.

4.0 Information Gathering Process

4.1 Method Used

In our project, we employed two interactive methods for information gathering: questionnaires and interviews. The questionnaire method was chosen for its ability to offer comprehensive insights into the perspectives of the general consumer base and to guide the direction of the system. Our questionnaire comprised a blend of open-ended and closed questions, facilitated through Google Forms. After disseminating the questionnaire across UTM Groups, we received approximately 30 responses. These responses provided valuable insights into the opinions of UTM residents regarding the current system and their envisioned improvements for the future.

Through this approach, we gained a holistic understanding of the sentiments and preferences of the UTM community. By analyzing the responses, we identified common themes and areas for improvement, informing our strategy for developing an Integrated Campus Resource Management System (CRMS) that aligns closely with user needs and expectations. This robust information gathering process laid a solid foundation for the subsequent stages of system design and implementation, ensuring that the CRMS meets the diverse requirements of its users and effectively addresses the challenges faced by the university community.

4.2 Summary From Method Used

In this project, we developed a questionnaire to gather insights, opinions, and suggestions regarding the current system. Below are the responses collected.

Question	Answer
What category do you fit into? -Postgraduate -Staff -Faculty Administrator -Undergraduate	Among the total respondents, 19 were postgraduates, while the remainder were undergraduates, indicating a predominant representation of postgraduate respondents in the survey.
How often do you use campus facilities such as sports fields, labs, classrooms, or auditoriums? -Very Often -Often -Occasionally -Rarely -Almost Never	Respondents frequently utilize campus facilities such as sports fields, labs, classrooms, or auditoriums, with the majority indicating that they use these amenities often or very often. This suggests a high level of engagement with campus resources among the surveyed individuals.
What challenges do you currently face the most when booking campus facilities for your activities or events? -Limited availability -Unclear or Inconsistent booking policies -Difficulty in tracking resource utilization -Other	Respondents often encounter challenges with limited availability and tracking when booking campus facilities, stemming from high demand and allocation inefficiencies. Improving these aspects could enhance user experience and resource utilization.

<p>On a scale from 1 to 10, how satisfied are you with the process of creating and managing campus events or activities? (1 - not satisfied , 10 - very satisfied)</p>	<p>Respondents rated their satisfaction with the process of creating and managing campus events at 7 or 8 out of 10. This indicates a generally high level of satisfaction, though there is still room for improvement.</p>
<p>On a scale from 1 - 5, how easy is it for you to access your academic profile, register for courses, view your schedule, and track your progress? (1 - easy , 5 - difficult)</p>	<p>Respondents rated the ease of accessing their academic profile, registering for courses, viewing their schedule, and tracking progress at 2 out of 5, indicating the system is generally user-friendly and effective.</p>
<p>For faculty and staff, how satisfied are you with the current system for managing your teaching schedules, submitting grades, and communicating with students? (Scale form 1 - 5) (1- dissatisfied , 5 - satisfied)</p>	<p>Faculty and staff rated their satisfaction with managing teaching schedules, submitting grades, and communicating with students at 4 out of 5, indicating the system is largely effective with some room for improvement.</p>
<p>Do you think the current system is in need of some improvements? If so, what would you like to see?</p>	<p>The most common improvements given by respondents are to provide more information for students and Implement new functions on the systems.</p>

5.0 Requirement Analysis

5.1 Current Business Process

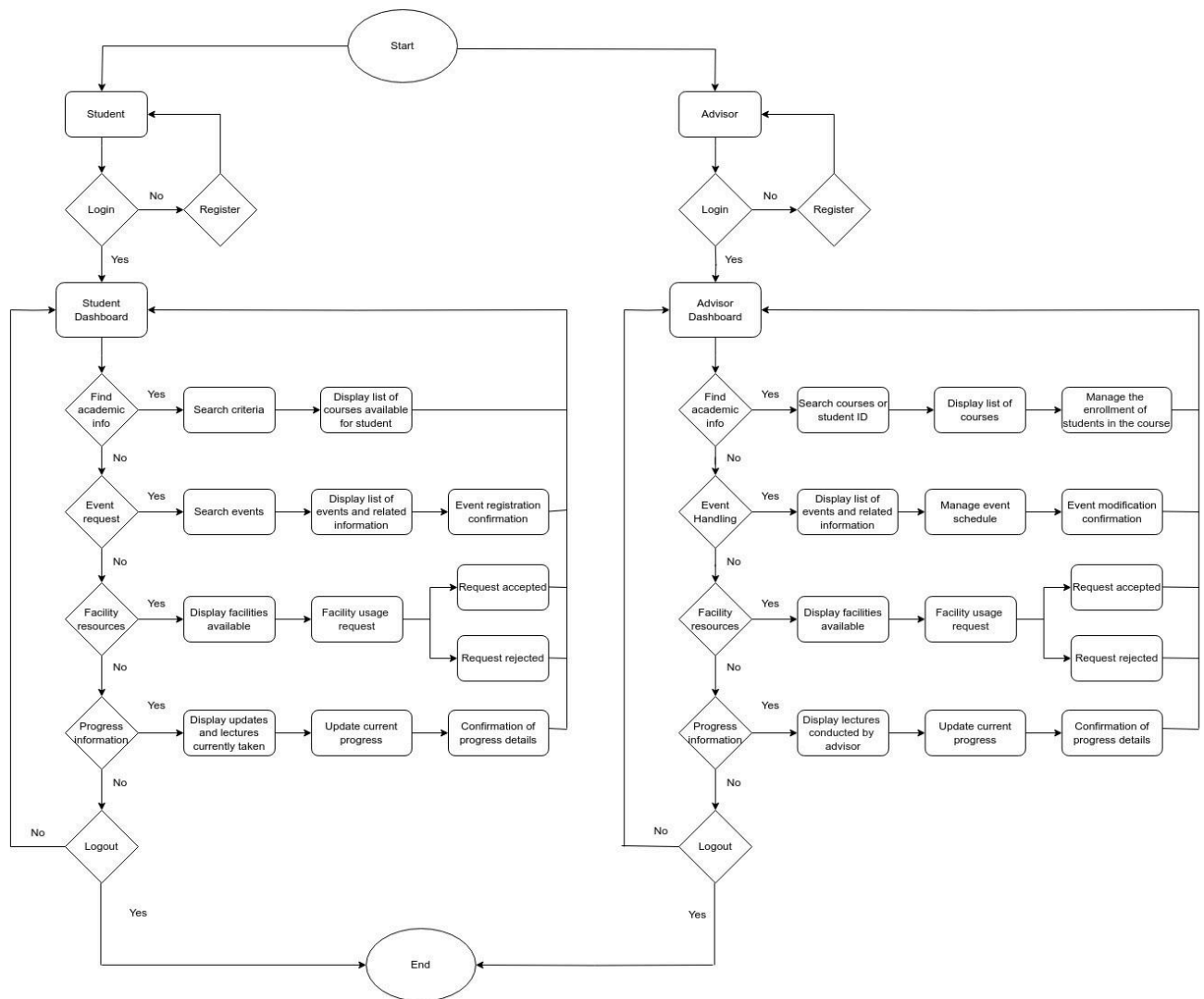


Figure 1: Workflow of current system

5.2 Functional Requirement

5.2.1 Input

1. User Login/Registration Information:

User inputs data related to user accounts, including usernames, passwords, and personal details required for registration or login.

2. Academic Info:

- Students can customize searches by department, name, student ID, or project title for academic information.
- Advisors can search for student IDs to manage enrollment, course registration, academic records, and activities.

3. Event Requests:

- Students can access event details like names, dates, times, locations, and requirements.
- Advisors can coordinate campus event schedules, including registration, promotion, attendee management, and feedback collection.

4. Availability of Resources:

Users can search for the availability and status of campus resources, including classrooms, labs, equipment, and facilities.

5. Progress Information:

- Students can receive updates on lectures, assignments, projects, exam preparation, upload their work online, and give feedback to lecturers for improvement.
- Advisors can update lecture progress, including achievements and submitted work, offer feedback on student improvements, and manage faculty and staff information.

6. Logout:

Users can log out by clicking the logout button.

5.2.2 Process

1. User Login/Registration Information:

The system verifies the input data for registration or login.

2. Academic Info:

The system retrieves tailored information based on the input criteria.

3. Event Requests:

The system enables event detail search, provides relevant information, and grants management authority exclusively to advisors.

4. Availability of Resources:

The system indicates whether the requested resources are available or if there are any scheduling conflicts.

5. Progress Information:

- The system stores and retrieves progress details from the database for students, encompassing updates on lectures, assignments, projects, exam preparation, online work uploads, and application of feedback for improvement.
- For advisors, it manages progress details related to their lectures in the database, covering updates on lecture progress, achievements, submitted work, feedback provided to students, and faculty and staff information management.

6. Logout:

The system terminates the current session.

5.2.3 Output

1. User Login/Registration Information:

Students and advisors will be able to access the dashboard.

2. Academic Info:

The system will display matching results based on the input criteria, displaying relevant results to the student or advisor.

3. Event Requests:

The system exclusively displays modified event information and results for advisors, while providing event information and results for students.

4. Availability of Resources:

The system will display information on the availability and status of requested resources. Users can view pending event requests and their statuses (approved, pending, rejected) in their dashboard.

5. Progress Information:

- For students, updates on lectures, assignments, projects, exam preparation, work uploads, and feedback applications are displayed in the student's dashboard.
- Advisors can access progress details for their lectures, covering current progress, achievements, and student feedback on their dashboard.

6. Logout:

User returns to the login page.

5.3 Non-functional Requirement

5.3.1 Performance

- The system must efficiently manage multiple concurrent users without performance degradation.
- Critical operations like logins, data retrieval, and transactions should respond within milliseconds to meet user expectations.
- The system should process a high volume of transactions per second (TPS).

5.3.2 Reliability

- The system should ensure high availability, typically aiming for 99.9% uptime, minimizing both planned and unplanned downtime.
- Ensure that data remains consistent and accurate even during concurrent updates or failures

5.3.3 Security

- All sensitive data, including personal information and login credentials, must be encrypted during storage and transmission using strong encryption methods.
- Implement robust authentication mechanisms (e.g., multi-factor authentication) and strict authorization controls to ensure users have appropriate access levels.
- Regularly perform security audits, penetration tests, and vulnerability assessments, and promptly address any discovered security issues.
- Develop and maintain an incident response plan to quickly detect, respond to, and mitigate security breaches or incidents.

5.3.4 Backup and Recovery

- Conduct regular backups (e.g., daily or weekly) to minimize data loss, with the frequency determined by the criticality of the data.
- Securely store backups in multiple locations, including off-site storage, to protect against physical disasters. Ensure that backup data is encrypted.

Context Diagram

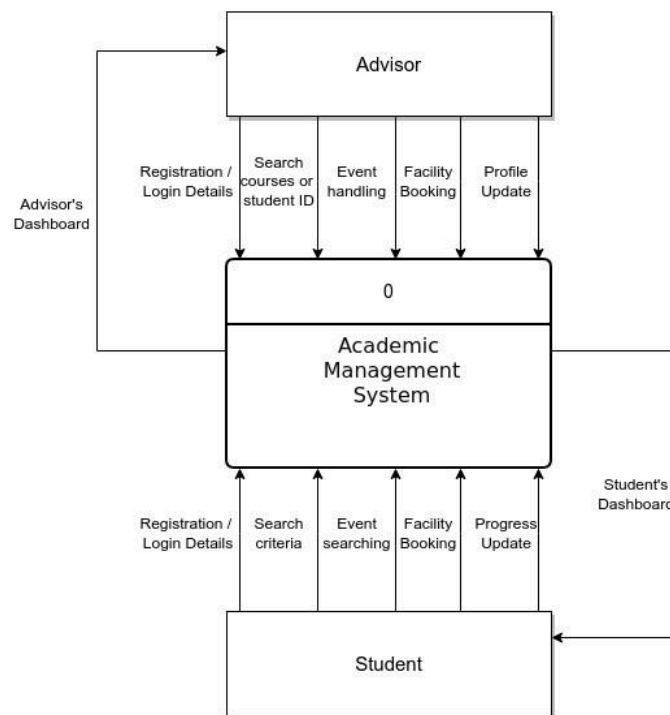


Figure 2: Context diagram of current system

Level 0 Diagram

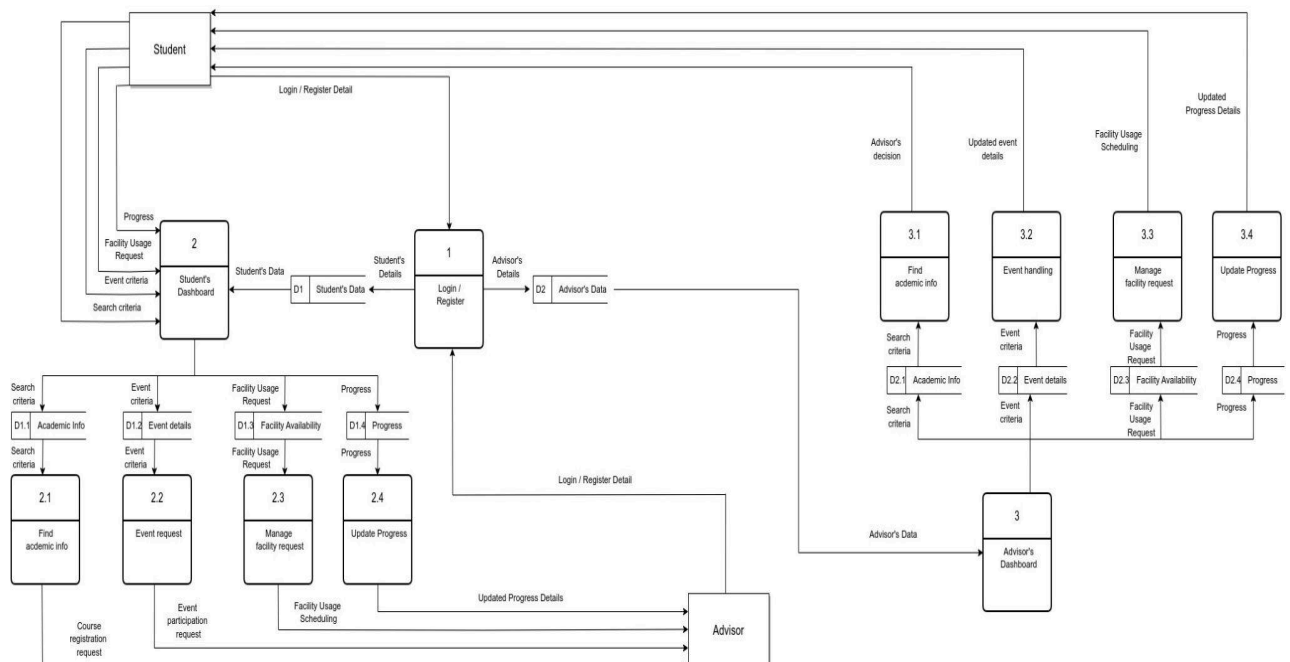


Figure 3: Level 0 diagram of current system

Child Diagram

2.1 Find Academic Info

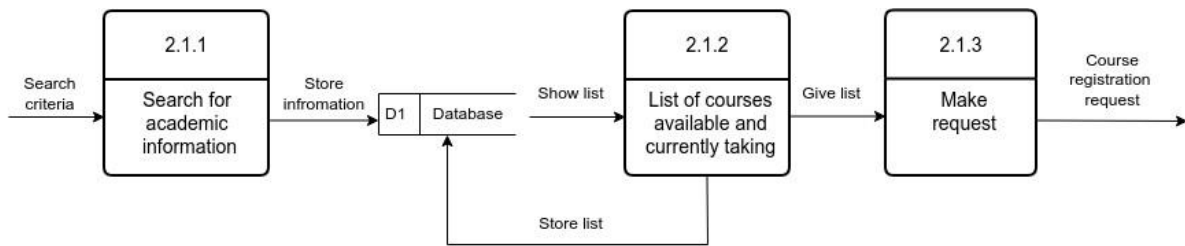


Figure 4: Child Diagram for Find Academic Info

2.2 Event Request

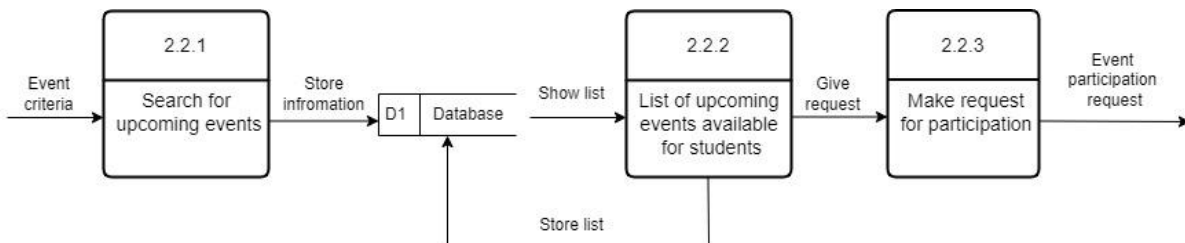


Figure 5: Child Diagram for Event Request

2.3 Facility Request

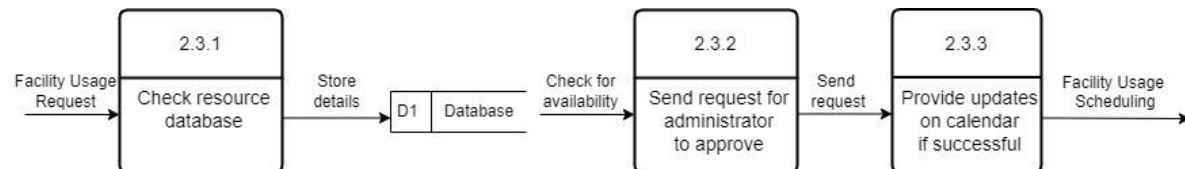


Figure 6: Child Diagram for Facility Request

2.4 Update progress

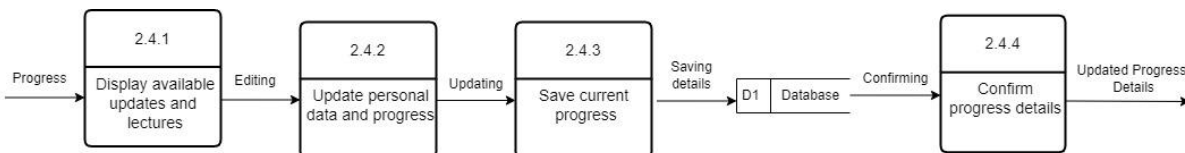


Figure 7: Child Diagram for Update progress

3.1 Find Academic Info

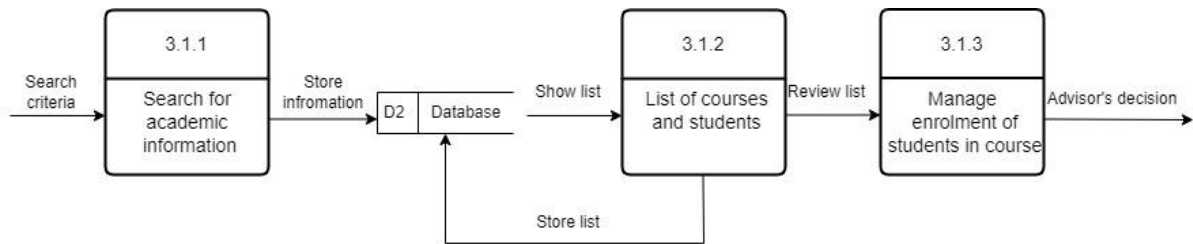


Figure 8: Child Diagram for Find Academic Info

3.2 Event Handling

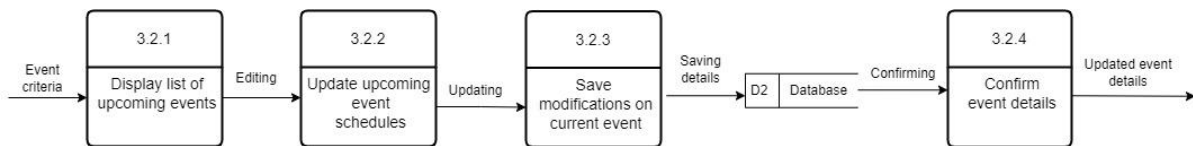


Figure 9: Child Diagram for Event Handling

3.3 Facility Request

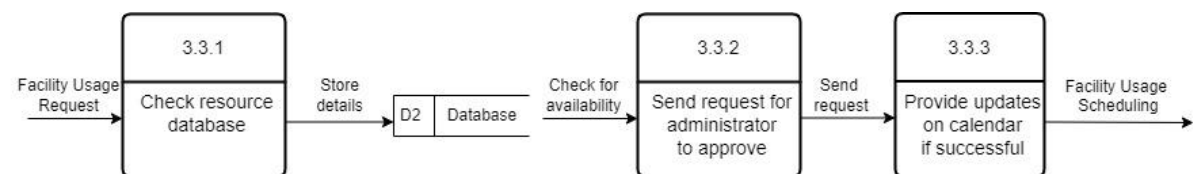


Figure 10: Child Diagram for Facility Request

3.4 Update progress

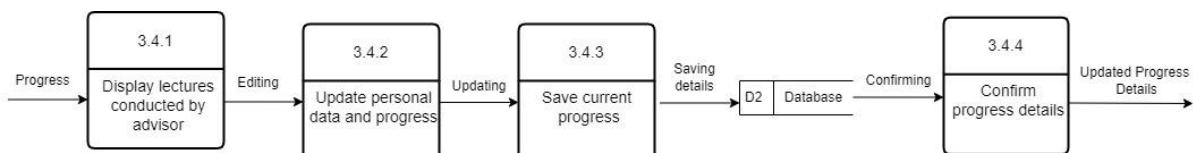


Figure 11: Child Diagram for Update Progress

6.0 Summary of Requirement Analysis Process

The requirement analysis process for the Integrated Campus Resource Management System (CRMS) thoroughly assessed existing business processes, functional, and non-functional requirements. This comprehensive examination was pivotal in shaping the design of the proposed system, aiming to rectify current flaws and align with user expectations.

The questionnaire analysis revealed widespread utilization of campus facilities among students, with 19 out of 60 respondents expressing interest. However, a notable portion reported difficulties in booking due to limited availability. Despite this, satisfaction with current campus events, activities, and the system was high, attributed to easy access to academic profiles, course registration, schedules, and progress tracking. Consequently, many students see potential benefits in system improvement.

To comprehend the existing workflow, a flow diagram was crafted, emphasizing inefficiencies. Functional and non-functional requirements were documented to validate system capabilities and assess performance. A logical data flow diagram illustrated entity and process relationships, while data requirements delineated processes for data entry, updates, deletions, and queries.

In conclusion, the analysis highlighted existing system shortcomings and outlined opportunities for enhancement. This sets the stage for developing an Integrated Campus Resource Management System (CRMS) that addresses key challenges and improves user experience. Future efforts will focus on integrating user-friendly interfaces, streamlining processes, and ensuring robust data management to create an efficient and adaptable system. Ultimately, the goal is to meet both current and future needs of the university community.

7.0 Github

7.1 Github repository Link

https://github.com/madlorddarkness/TechBrothers_Project1_SAD_20232024/tree/main

7.2 Repository Snapshot

