FACULTY OF COMPUTING
UTM Johor Bahru

Semester 2 2023/2024

Subject : System Analysis and Design (SECD2613)

Section : 02

Task : Project Phase 2

Lecturer: DR MUHAMMAD ALIIF AHMAD

Due : 21 May 2024 2.00pm (elearning and print 1 copy)

Group Member

	Name	Matric Number
1	FAM QAI ZEN	A23CS0223
2	MAH WILSON	A23CS0243
3	TAN JIAN MING	A23CS0275
4	TEE SOON KIET	A23CS5009

TABLE OF CONTENTS

1.0 Introduction

Postgraduate education is widely recognized for its pivotal role in enhancing research capabilities, bolstering academic reputations and generating financial gains for educational institutions. However, the effectiveness of postgraduate supervision remains a complex and evolving aspect of academia. As the demand for high-quality supervision increases, particularly amidst the diverse backgrounds of postgraduate students, the supervisory role becomes increasingly challenging.

Understanding the nuances of teaching and learning through postgraduate supervision is crucial for ensuring timely research completion, maintaining high-quality supervision, improving retention rates, enhancing student satisfaction, fostering a conducive research environment, and providing adequate administrative support services. A recent study conducted across three universities in Australia, utilizing question-based surveys among postgraduate students, shed light on avenues for improving timely completion, thesis quality, and scientific publications. Central to these improvements is the pivotal role of supervisors in fostering overall satisfaction, retention, and successful completion of postgraduate studies.

Dr Ahmad Najmi, is a knowledgeable researcher and educator who uses his knowledge of computational thinking and Design Science Research to create artificial intelligence-powered expert systems and other decision support systems. Furthermore, he holds a senior lectureship at UTM in the Applied Computing and Artificial Intelligence department.

We aim to enhance the current manual methodology of postgraduate supervision at UTM by creating a more user-friendly platform. In order to facilitate a smoother and easier supervision process for both the supervisor and the numerous postgraduate students under Dr. Najmi's supervision. We will outline our ideas and recommendations in our proposal for improving the manual postgraduate supervision system that is now in place, which we as users have determined is insufficient and inefficient. For instance, the time-consuming practice of the students contacting each supervisor individually and the lack of an appropriate platform for postgraduate students to locate a supervisor.

2.0 Problem statement

1. **Difficulty Verifying the Identity of Supervisors or Students**

   Currently, candidates have to go through the trouble of contacting and seeking out potential supervisors by directly messaging them through social media platforms such as Facebook, Instagram and Whatsapp. A problem arises when students have no way of verifying whether the person they found is the actual supervisor they are looking for, and this problem goes both ways as supervisors have the same issue. This could lead to issues of identity theft where there is third-party impersonating a supervisor, talking to a student and trying to swindle their information and money.

2. **Lack of Security and Encryption for Effective and Secure Communication**

   When a student does find a suitable supervisor, they have trouble sharing sensitive documentations and certifications with their supervisors as social media messaging does not grant an appropriate level of security nor encryption. The messaging platforms currently used are not equipped to handle the file types or file size.

3. **Difficulty Finding Reliable and Trusted Information**

   Reliable and valid information regarding supervisors, specifically, the data detailing their technical background, academic achievements, qualifications, certifications and the number of students they are currently supervising is not easy to attain. Without a centralised platform, students could be aimlessly finding supervisors who could not help the students as the supervisor may not be qualified or suitable to the research interest of the student, thus increasing the time and effort needed to find a suitable supervisor.

3.0 Proposed solutions

1. Secure and encrypted direct messaging to facilitate direct communication between student and supervisor.
2. Profile page for supervisors and students that shows the detailed and relevant information such as achievements, qualifications, research interest, publications and academic background.
3. Collaborative tools such as video meet and whiteboards.
4. Progress tracking and monitoring tools/metrics.
5. Search and filter feature to find supervisors with specific criterias such as research interest, proximity, academic background and availability.
6. An appointment scheduling functionality to allow students to schedule appointments with supervisors will be added, making it easier to manage meeting times.
7. Notification system to keep students informed about new supervisors matching their criteria, responses from supervisors, and upcoming appointments.
8. Feedback and reviews feature to allow students to provide feedback and review their interactions and experiences with supervisors to help future students make informed decisions.
9. Document sharing functionality to enable students to share documents such as research proposals and papers with supervisors securely through the platform.
10. Resource library feature to provide students with access to a library of resources related to postgraduate studies, such as guides, templates, and tips.
11. Community forums and chat rooms facilitate and nurture a culture of community where students can discuss their experiences, ask questions, and share advice with each other comfortably.

Technical Feasibility

1. **Technology**

   Suitable technologies will be used to form the basis of our system such as web technologies like HTML, CSS, JavaScript for the front end, and backend technologies like Node.js, Django, or Flask for the server side.

2. **Database Design**

   A native database will be developed in-house to store user profiles, supervisor profiles, messages, and other relevant information. Relational databases like MySQL or PostgreSQL will also be taken into consideration for further improvements to the system's database.

3. **Scalability**

   Our system can be scaled to handle a larger amount of users, traffic and data using cloud services such as AWS or Azure to scale our resources in a short amount of time.

4. **Security**

   Specific security measures will be implemented to protect user data, such as encryption for sensitive information and secure authentication mechanisms.

5. **User Experience (UX)**

   An user friendly and intuitive interface to interact and contact with supervisors will be developed for ease of use for our users.

6. **PC and Mobile Compatibility**

   Our system will be developed with both PC and Mobile users in mind for the convenience of our users.

7. **Testing**

   Our system will be thoroughly and consistently tested to ensure proper functionality of our system and that it is free of bugs or vulnerabilities.

8. **Maintenance and Support**

   System maintenance and support will be prepared to ensure that our system is in its peak condition, up to date and operating at its optimal performance.

Conclusively, the technical feasibility of such a system depends on factors like the complexity of the technical requirements, the availability of resources, and the expertise of the development team.

Operational Feasibility

1. **User Acceptance**

   Surveys and interviews will be conducted to gather feedback, measure the willingness of students and supervisors to adopt this system, and ensure that the system meets their needs.

2. **Resource Availability**

   Our team will ensure that the resources required to operate the system, such as hardware, software, and personnel will be sufficiently easy to attain and access at all times.

3. **Compatibility**

   Our team will ensure that the system is compatible with existing systems and processes at universities or academic institutions. This also includes compatibility with different browsers, operating systems, and devices.

4. **Training and Support**

   Training and support will be provided to help users to adapt and use this system efficiently. Training materials such as tutorials, documentation, and help desk support will also be prepared.

5. **Legal and Regulatory Compliance**

   The system will undergo compliance testing and changes to make sure that it complies with relevant laws and regulations, such as data protection and privacy laws. This includes implementing measures to protect user data and ensure confidentiality.

6. **Risk Management**

   Our team will identify and mitigate potential risks associated with the system, such as security breaches, data loss, or system downtime and develop a risk management plan to address these risks.

7. **Feedback and Continuous Improvement**

   Our system will include mechanisms for gathering feedback from users and stakeholders to identify areas for improvement by using this feedback to continuously improve the system and ensure its long-term viability.

8. **Sustainability**

   The system will be developed with sustainability as one of the key focuses as well to ensure that it is sustainable in the long term, both in terms of its technical capabilities and its ability to meet the requirements of users and stakeholders.

Overall, the operational feasibility of such a system depends on factors such as user acceptance, resource availability, compatibility, and legal compliance.

Economic feasibility

A cost-benefit analysis will be conducted to determine the economic feasibility of the system. Certain factors such as development costs, maintenance costs, and potential benefits to students and supervisors will be taken into consideration.

CBA Analysis Table

Estimated Costs	
Hardware	RM 45000
Software	RM 10000
Training	RM 15000
Consulting	RM 25000
Data Conversion	RM 15000
Supplies	RM 10000 per year
IS Salaries	RM 45000 per year
Upgrades	RM 15000 per year
Estimated Benefits	
Customer Service	RM 120000 per year
Productivity	RM 115000 per year

Assumptions	
Discount rate	10%
Sensitivity factor (costs)	1.1
Sensitivity factor (benefits)	0.95
Annual change in production costs	8%
Annual change in benefits	10%

CRITERIA	**YEAR**			
	0	**1**	**2**	**3**
1. COST				
A. DEVELOPMENT				
Hardware	49500			
Software	11000			
Training	16500			
Consulting	27500			
Data Conversion	16500			
Total Development Cost	121000			
B. PRODUCTION				
Supplies		11000	11880	12830.4

IS Salaries		49500	53460	57736.8
Upgrades		16500	17820	19245.6
Total Production Cost		77000	83160	89812.8
Present Value (PV)		70000	75600	81648
Accumulated Cost		191000	266600	348248
2. BENEFITS				
Customer Service		114000	125400	137940
Productivity		109250	120175	132192.5
Total Benefits		223250	245575	270132.5
Present Value (PV)		212087.5	233296.25	256625.875
Accumulated Benefits		212087.5	445383.75	489922.125
Gain/Loss		21087.5	178783.75	141674.125
Profitability Index (PI)	1.170860537			

Conclusion for Economic Feasibility

Based on the CBA analysis conducted, the forecasted cost versus benefit has resulted in a profitability index of 1.17 which means that this system is a profitable investment venture in the long term.

4.0 Information gathering process

4.1 Method used

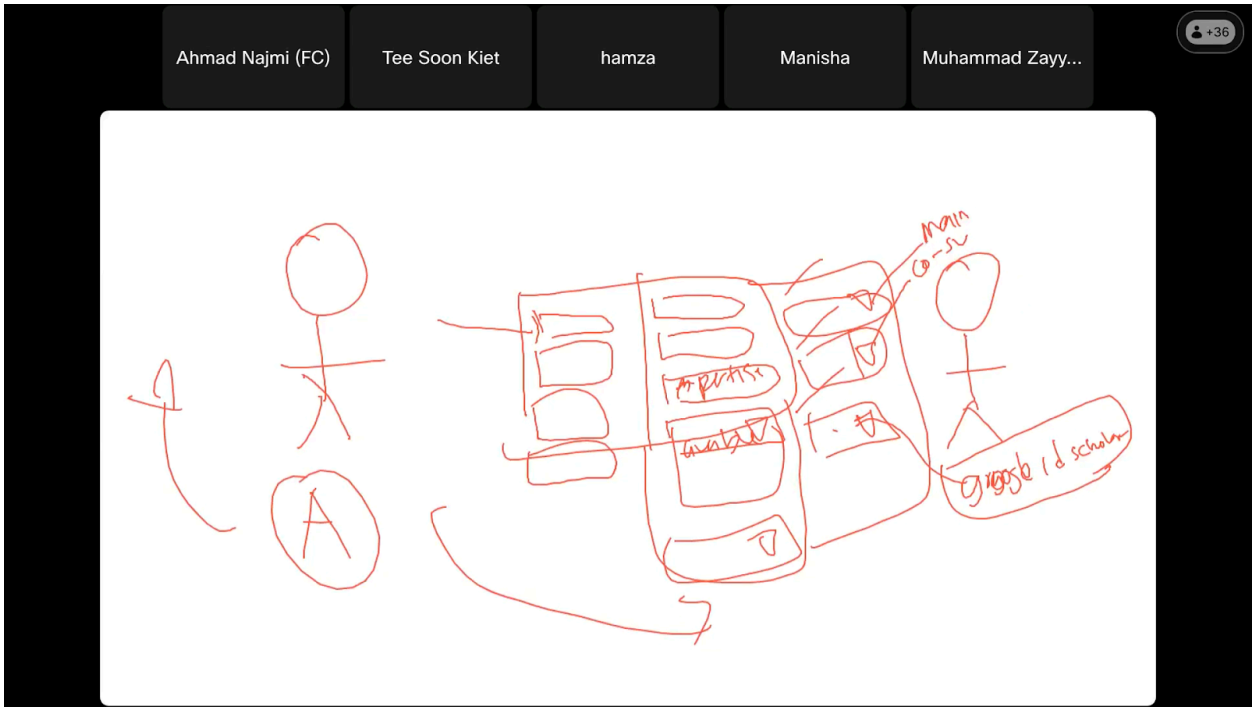


Figure 1: Screenshot of interview meeting

We decided to conduct interviews as a method of gathering information for our research. This method was chosen because it allows us to gather critical information about what users and the system require. To create the interview questions, our group collaborated with another group to avoid repeating the same questions or responses throughout the interviews. We also made sure to include both closed-ended and open-ended questions. While closed questions provide us with precise and reliable information, open-ended questions help us understand the clients' primary objectives for the system.

Following the preparation, our group and others questioned Dr. Ahmad Najmi, a senior lecturer in UTM's Department of Applied Computing and Artificial Intelligence. The interview was conducted on April 17, 2024, using the Webex platform. We were able to better understand the client's system requirements during the session. The client addressed both what is required for the proposed system and how the current system operates, providing detailed descriptions of these requirements.

4.2 Summary from method used

Questions	Answers
How can lecturers register and promote themselves as a supervisor for the course?	Students need to provide the following information for registration: -name, gender, background, education background, and work experience. Supervisors need to provide the following information for registration: -name, gender, background, university affiliation, field of expertise, availability for supervision, availability of grant money, number of students supervised, and Google Scholar ID for publication verification.
May I know for the postgraduate, what are the documents usually involved?	-Currently, supervisors usually ask students to use Google Docs or PDF files . -I suggest allowing students to upload Word documents or PDF files in the system.
Are there any financial or technical or operational constraints that need to be drafted for the FD?	The system will be developed using free software such as Laravel for example Laravel is a free formula to develop the system. So, the suggestion to develop the system cannot be used as some parts need to be paid.
May I know the maximum number of past postgraduate students that a supervisor can	There is no limit for the supervisor. So, set a little meaning that the supervisor already

supervise for?	reached around 10. Then, have that action where the supervisor can set it not available for supervisor supervising, so need to have that function.

5.0 Requirement analysis

5.1 Current business process

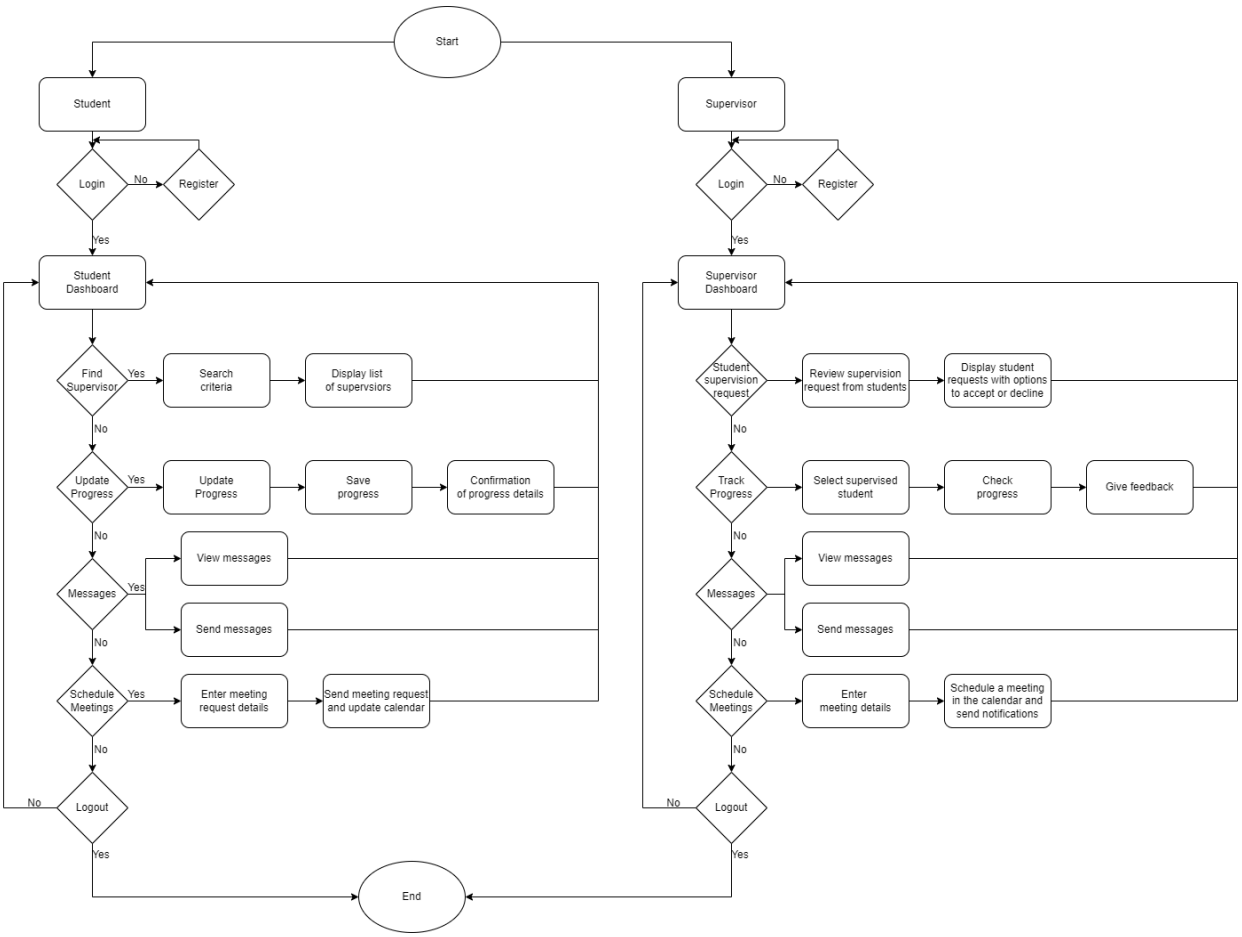


Figure 2: Workflow of current system

5.2 Functional requirement

5.2.1 Input

1. User login/registration

- Students and supervisors may provide a username and password for login or personal information for registration.

2. Matching

- Students enter search criteria such as department, name, or specialization.
- Supervisors enter search criteria, such as student name, ID, or project title.

3. Update progress

- Students enter progress information, such as project updates or milestones reached.
- Supervisors select a supervised student.

4. Messages

- Students and supervisors can view messages through the system.
- Students and supervisors provide message content and select a recipient.

5. Schedule meetings

- Students and supervisors provide meeting request information, such as date, time, and purpose.

6. Logout

- Students and supervisors can log out by clicking the logout button.

5.2.2 Process

1. User login/registration

- The system verifies the user's credentials or creates a new user account.

2. Matching

- The system searches the database for students and supervisors who meet the criteria.

3. Update progress

- The system saves the students' progress details to the database.
- The system retrieves the students' progress details from the database.

4. Messages

- The system retrieves messages from the database.
- The system sends the message and saves it to the database.

5. Schedule meetings

- The system sends the meeting notification to the students.
- The system sends the meeting request to the supervisors.

6. Logout

- The system terminates the current part.

5.2.3 Output

1. User login/registration

- Students and supervisors can access the student dashboard after successfully authenticating or registering.

2. Matching

- A list of matching supervisors is displayed to the students.
- A list of matching students is displayed to the supervisors.

3. Update progress

- Students receive confirmation that their progress information was saved.
- Supervisors can view the students' progress details.

4. Messages

- Students and supervisors can view the retrieved messages on their dashboard.
- Students and supervisors receive confirmation that the message has been sent.

5. Schedule meetings

- Students and supervisors receive confirmation of the meeting request.

6. Logout

- Students and supervisors are returned to the login page.

5.3 Non-functional requirement

5.3.1 Performance

1. The system should have a response time of less than 2 seconds for most user interactions.
2. The system should handle increasing numbers of students and supervisors without degradation in performance.
3. The system should support simultaneous usage by up to 1000 users without performance issues.

5.3.2 Reliability

1. The system should have an uptime of 99.9% to ensure that it is available for use at all times.
2. The system should continue to function correctly even if some components fail.

5.3.3 Security

1. The system must ensure that all user data, including progress reports and messages, are kept confidential.
2. The system should implement robust access controls to ensure that only authorized users can access certain features and data.

5.3.4 Backup and Recovery

1. The system should perform regular backups of all critical data.
2. The system should have a disaster recovery plan in place to restore functionality quickly in case of a catastrophic failure.

5.4 Logical DFD AS-IS system

Context diagram

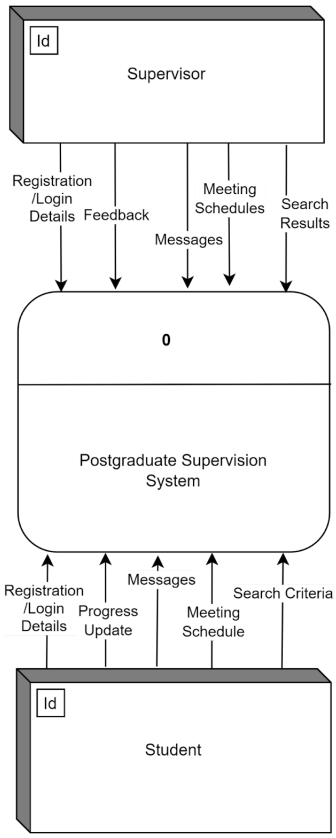


Figure 3: Context diagram of current system

Level 0 diagram

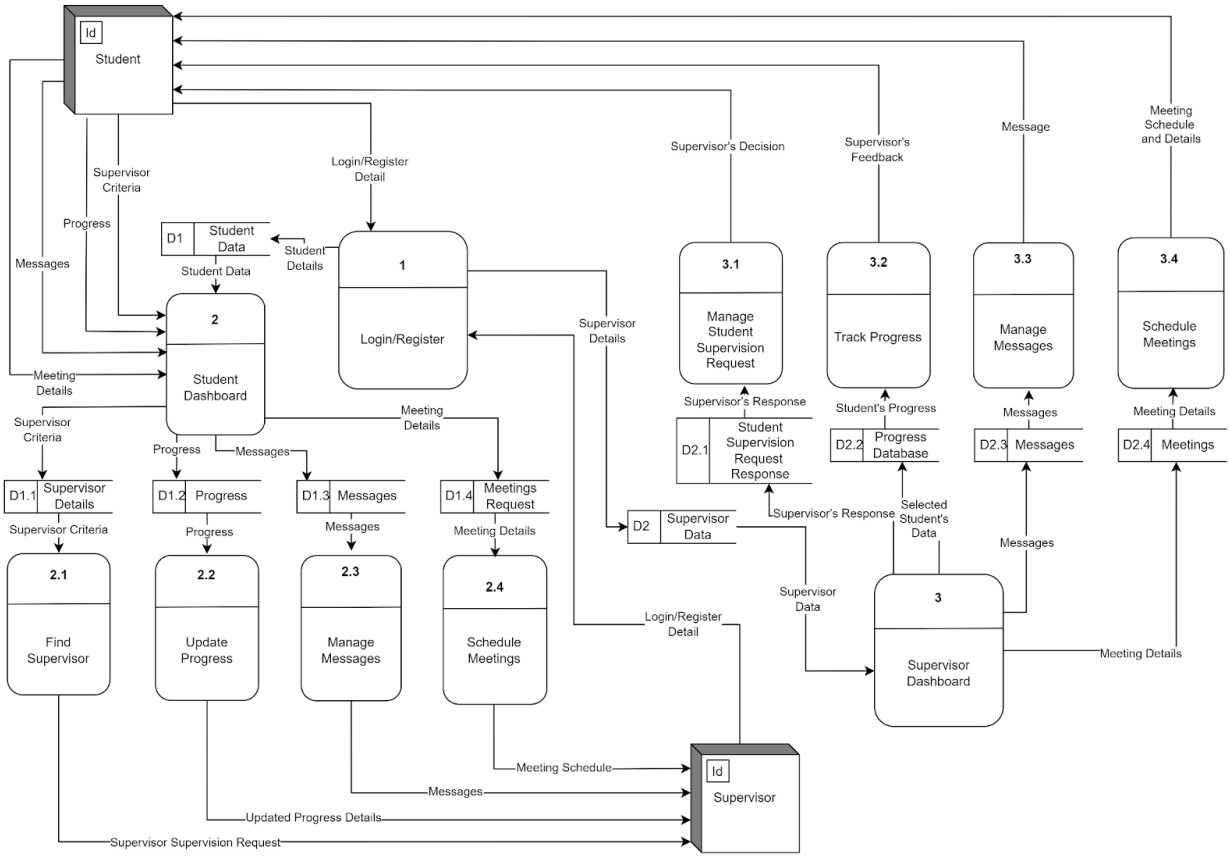


Figure 4: Level 0 diagram of current system

Child diagram

2.1 Find supervisor

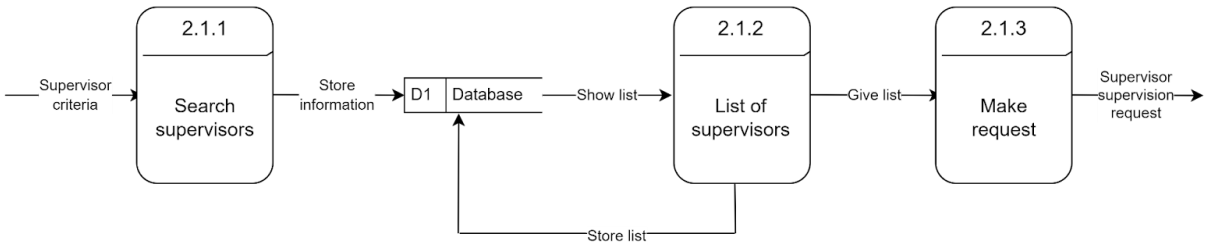


Figure 5: Child diagram of finding supervisor

2.2 Update progress

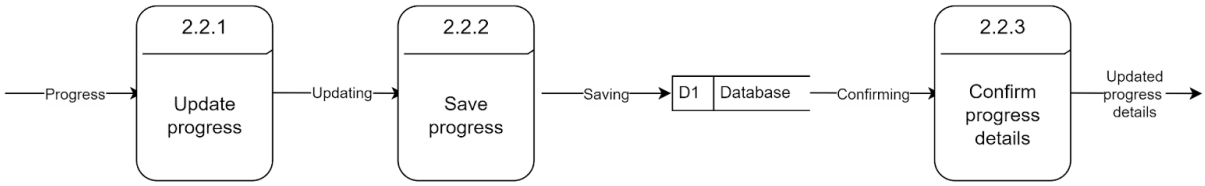


Figure 6: Child diagram of updating progress

2.3 Manage messages

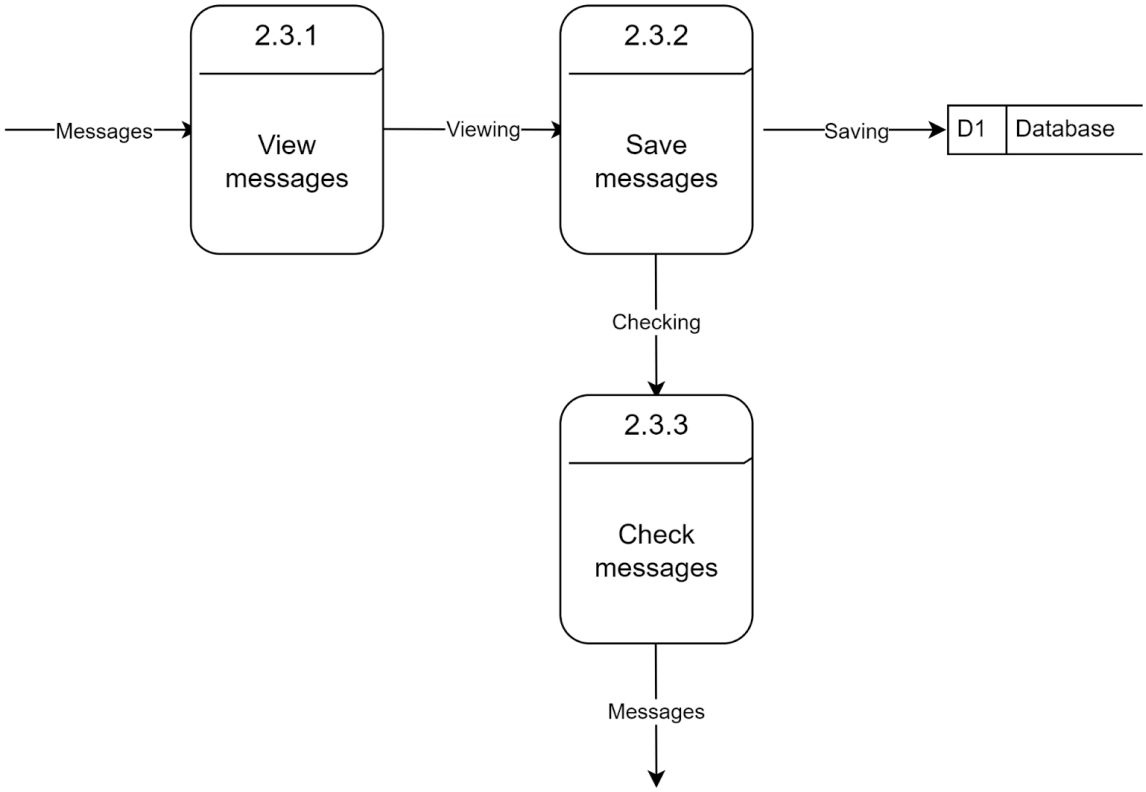


Figure 7: Child diagram of managing messages

2.4 Schedule meetings

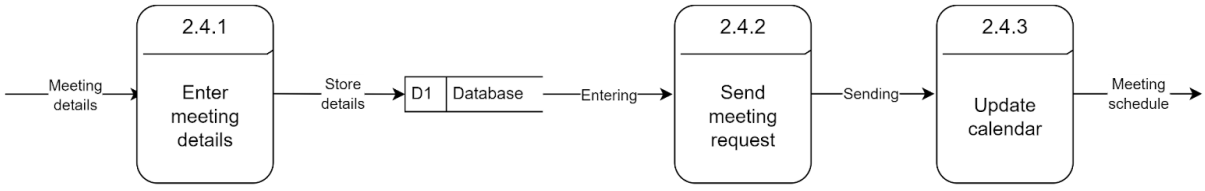


Figure 8: Child diagram of scheduling meetings

3.1 Manage student supervision request

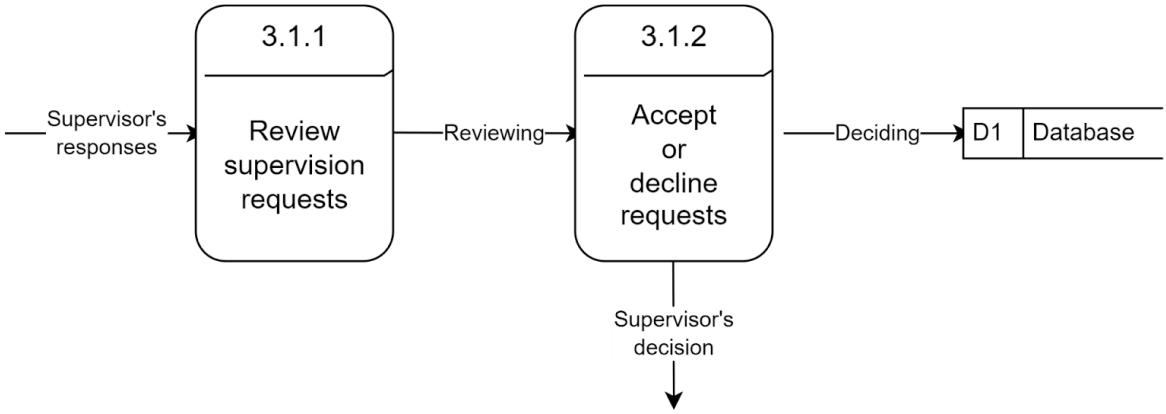


Figure 9: Child diagram of managing student supervision requests

3.2 Track progress

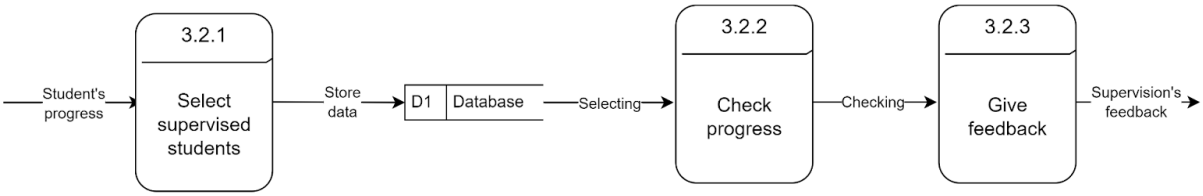


Figure 10: Child diagram of tracking progress

3.3 Manage messages

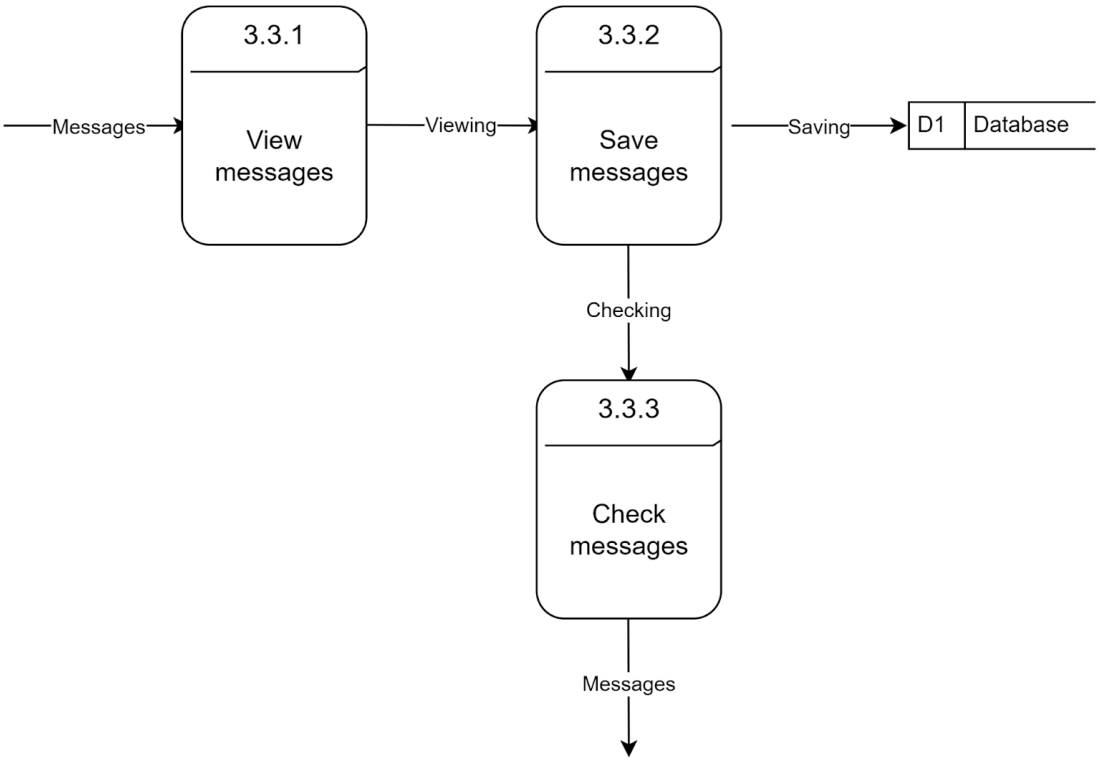


Figure 11: Child diagram of managing messages

3.4 Schedule meetings

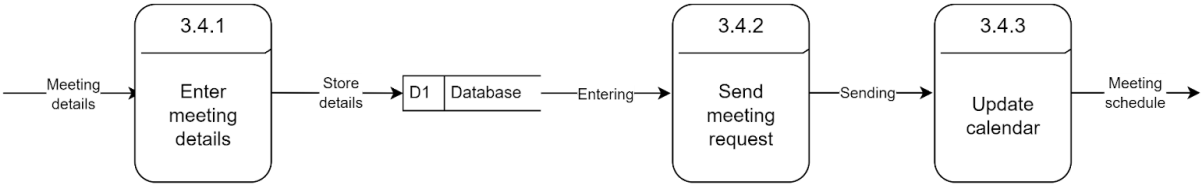


Figure 12: Child diagram of scheduling meetings

6.0 Summary of requirement analysis process

The requirements analysis process for the postgraduate supervision system included extensive data collection and evaluation to identify inefficiencies and user needs in the existing manual system. This process was critical in shaping the design of the proposed new system, ensuring that it addresses current flaws and meets user expectations.

The interviews with Dr. Ahmad Najmi, a stakeholder, revealed several critical issues with the current system. First and foremost, there is a lack of a platform where students can find and connect with supervisors. Students must manually search for supervisors on social media. Furthermore, students have no guarantee that their supervisor will be available. During the interview, we also requested user requirements for the proposed new system. Several user requirements for the new system were identified through interviews, including supervisor availability status, an online interview interface, progress monitoring tools, and deadline notifications or reminders.

To better understand the current workflow, a flow diagram was created that highlighted its inefficiencies. Functional and non-functional requirements were documented to validate the system's capabilities and evaluate its performance. A logical data flow diagram depicted the relationships between various entities and processes, while data requirements detailed the processes for data entry, updates, deletions, and queries.

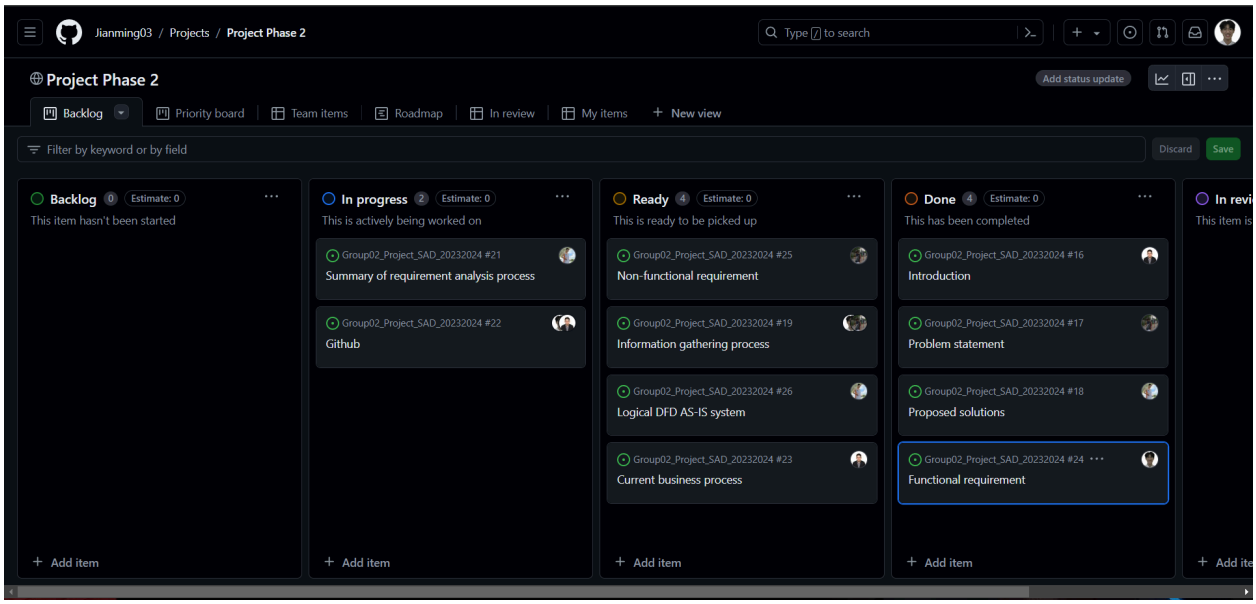
In a nutshell, the requirement analysis process is critical to the success of the proposed system. The proposed system is intended to improve efficiency, reduce workload, and minimize errors by thoroughly collecting, analyzing, summarizing, and documenting user needs and system inefficiencies. This ensures that the new system meets user expectations and effectively facilitates the postgraduate supervision process.

7.0 Github

7.1 Github repository link

Link: https://github.com/Jianming03/Group02_Project_SAD_20232024

7.2 Repository snapshot



7.3 Kanban board integration

Link: https://github.com/users/Jianming03/projects/6