ALBUKHARY INTERNATIONAL UNIVERSITY

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SCHOOL OF COMPUTING AND INFORMATICS

COURSE DETAILS	
SCHOOL	SCHOOL OF COMPUTING AND INFORMATICS
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COURSE NAME	PROJECT 1 PROJECT REPORT
COURSE CODE	CCC3013
CLO	CLO 3: Formulate computer science ideas for people in diverse working communities (C6, PLO6).
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PROJECT TITLE	AIU PG Progress: *A Dynamic Postgraduate Research Monitoring, Thesis Submission, and Supervisor Evaluation*
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LIST OF ABBREVIATIONS

AIU	Albukhary International University
API	Application Programming Interface
CGS	Center for Graduate Studies
CI/CD	Continuous Integration / Continuous Delivery (or Deployment)
CSS	Cascading Style Sheets
ERD	Entity-Relationship Diagram
ES6+	ECMAScript 6 and above
HTML	Hypertext Markup Language
IDE	Integrated Development Environment
JWT	JSON Web Token
LMS	Learning Management System
ORM	Object Relational Mapping
PG	Postgraduate
REST	Representational State Transfer
SDG	Sustainable Development Goals
SDLC	Software Development Life Cycle
SISKA-NG	Sistem Informasi Akademik Next Generation (from cited paper)
SMTP	Simple Mail Transfer Protocol
STLC	Software Testing Life Cycle
UI/UX	User Interface / User Experience
UiTM	Universiti Teknologi MARA
UPTracks	UiTM Postgraduate Tracking System
VS Code	Visual Studio Code

CHAPTER 1

INTRODUCTION

1. INTRODUCTION

Nowadays, effective management of postgraduate research is a critical component in ensuring the quality and timely completion of academic programs. Around the world, many universities are adopting digital products to replace manual processes, as these systems allow faster updates, better communication, and more reliable data management. Even though the adoption of digital products is becoming normalized, institutions worldwide still face challenges in building systems that are efficient and user-friendly to track student progress, facilitate supervision, and maintain transparent communication between students, supervisors, and academic administrators. For this reason, the implementation of a system becomes an important factor to ensure that students complete their studies on time, supervisors can provide proper guidance, and institutions can maintain the quality of academic programs. And the lack of digital systems often results in poor tracking of milestones, late completions, and difficulties in evaluating supervision quality (Wong et al., 2024).

At Albukhary International University (AIU), postgraduate research progress is still being monitored on printed forms and spreadsheets for monitoring. While this method may work for a small number of students, it becomes difficult to manage as the number of postgraduate students grows. This often leads to delays, inconsistencies, and difficulties in supervision, which create unnecessary barriers in the research journey. To overcome these challenges, this project introduces AIU PG Progress, a centralized and dynamic online platform designed to support postgraduate students, supervisors, and the Center for Graduate Studies (CGS). By integrating features such as thesis submission tracking, supervisor evaluation, and real-time analytics dashboards, the system aims to improve efficiency, ensure transparency, and strengthen communication throughout the postgraduate research journey. Therefore, it is important to clearly define the challenges faced in the current system, which are explained in the following problem statement.

2. PROBLEM STATEMENT

At AIU, currently, the postgraduate students' research progress is manually tracked using printed forms and spreadsheets, resulting in delays, data inconsistencies, poor communication, and difficulties in real-time monitoring. Supervisors and administrators face challenges in consolidating data, evaluating supervision effectiveness, and tracking key milestones such as proposal defense, progress reviews, and thesis submission. Without a centralized and automated tracking system, managing postgraduate research progress becomes inefficient, lacks transparency, and fails to provide timely decision-making processes and interventions.

3. PROJECT OBJECTIVES

The objectives of our project include:

1. To design and develop a centralized postgraduate monitoring system that tracks postgraduate student progress, which will help improve timely updates, access to records, and communication between students, supervisors, and the Center for Graduate Studies (CGS).
2. To create an interactive dashboard with data analytics for real-time visualization, providing alerts, progress reports, and support for data-driven decision-making.

4. SCOPE OF PROJECT

The project scope includes three major areas of functionality:

- Progress Monitoring**:** Continuous tracking of postgraduate student progress across milestones (proposal defense, progress reviews, thesis submission).
- Document Submission**:** Management of thesis submission processes through document uploads, deadline reminders, and approval workflows.
- Supervisor Evaluation: Provision of evaluation and feedback tools for supervisors, linked to real-time dashboards accessible by CGS.

The system will not replace existing academic regulations but will act as a digital support tool to strengthen monitoring and communication.

5. SIGNIFICANCE OF THE PROJECT

This project is significant because it improves the management of postgraduate studies by providing a centralized digital system that makes progress monitoring, thesis submission, and supervisor evaluation more efficient. Students benefit from clear guidance, structured progress tracking, and timely reminders that reduce the risk of late completion. Supervisors are supported with tools to streamline evaluation and feedback, while CGS executives gain access to transparent, real-time information for oversight and decision-making.

CHAPTER 2

LITERATURE REVIEW

In today's education, keeping track of postgraduate students' research progress is very important. Traditional methods, such as manual supervision or paper-based records, are often slow and less effective. Digital systems have become essential to help universities manage research, monitor student progress, and support timely thesis completion. This review examines studies on digital tracking systems, learning management tools, online supervision, and other technologies that assist postgraduate research.

1. ONLINE PLATFORMS FOR POSTGRADUATE RESEARCH TRACKING AND MONITORING.

Studies have shown that centralized systems have the advantage of delivering transparency, accountability, and real-time monitoring of postgraduate progress (Young et al., 2024). An example is PostConnect, which was designed to track and manage postgraduate research growth through organized milestones and data analytics dashboards (Wong et al., 2024). This system demonstrates how automated alerts and real-time analytics can enhance supervision effectiveness. Similarly, the Blockchain Framework of UiTM Postgraduate Tracking System (UPTracks) provides a governance-driven model, using blockchain to ensure data security and trust in postgraduate monitoring processes (Mamat et al., 2023).

Other systems also focus on continuous tracking. The Electronic Logbook System enables supervisors to monitor research progress systematically and provides a platform for feedback and guidance (Samed et al., 2022). In addition, the REST API and Real-Time Notification system of SISKA-NG Mobile emphasize real-time alerts for academic progress, helping institutions to avoid delays in milestone completion (Indrawan et al., 2021). Decision-support systems such as the Postgraduate Students Progress Monitoring and Interactive Decision Support System integrate monitoring with analytical features, ensuring that both students and supervisors can act on data-driven insights (Igwe et al., 2024).

In conclusion, these studies demonstrate that digital platforms provide clear advantages for universities by automating repetitive tasks, ensuring consistency in data collection, and making monitoring more effective. They directly support the objective of AIU PG Progress,

which aims to deliver a centralized and dynamic online platform for postgraduate tracking and supervision. (Sim et al., 2023)

2. ONLINE THESIS SUPERVISION AND COMMUNICATION CHALLENGES

Supervision is one of the most important aspects of postgraduate research, yet it often faces challenges related to communication, feedback, and writing support. The shift to online supervision during COVID-19 highlighted these challenges more strongly. For example, the Implementation of Online Thesis Supervision in Indonesia showed that although online systems allowed continuity during the pandemic, many supervisors and students faced difficulties in maintaining effective communication and timely feedback (Suparman, 2021). Similarly, Pre-Service EFL Teachers and Faculty Members' Views revealed that online supervision often brought complexities such as delays in communication and misunderstandings about expectations (Pardede & Purnamasari, 2021).

Several studies focus specifically on writing-related problems. For example, Students' Problems of Academic Writing Competencies and Challenges in Online Supervision discussed how students often struggle with thesis writing, while supervisors had to balance between providing feedback and maintaining progress (Nurkamto et al., 2022). Another study, Exploring the Complexities of Thesis Writing in Distance Mode (Yunus & Bachtiar, 2025), emphasized that online students face higher challenges in writing due to a lack of face-to-face interaction. These findings are also repeated by the Toolkit for Postgraduate and PhD Supervisors (DigiGrad Africa), which suggests using digitalization to support supervisors in giving structured guidance and managing communication more effectively (Giofre et al., 2025).

The Systematic Literature Review on Online Supervision Effectiveness further confirms that online supervision can be effective if supported by structured platforms, clear guidelines, and communication tools (Mohamad Kasim et al., 2023). Furthermore, Remote supervision is also seen as beneficial, as shown in the study Remote Supervision: A Boost for Graduate Students, which highlighted how digital supervision expands access to expertise and provides flexible communication channels (Premawardhena, 2022).

As a conclusion, these studies support the idea that AIU PG Progress must go beyond progress tracking and also strengthen communication between supervisors and students. By

integrating evaluation tools and communication alerts, the system can address supervision challenges effectively.

3. LEARNING MANAGEMENT SYSTEM (LMS) AND EDUCATIONAL TECHNOLOGY INTEGRATION

Another important area of study focuses on the use of learning management systems (LMS) and other educational technologies to support postgraduate studies. For instance, the Development of an LMS for Thesis Processes at Shahid Beheshti University shows how an LMS can simplify thesis submission, feedback, as well as evaluation provision (Shakerian et al., 2020). Similarly, other studies also demonstrate how integrating analytics into digital platforms can help institutions understand student performance and identify risks early (Sáiz-Manzanares et al., 2021).

The adoption of LMS has also been studied in various contexts. In South Africa, postgraduate nursing students reported mixed experiences when using LMS platforms, pointing out both benefits and usability challenges (Mashaba & Pretorius, 2023). Similarly, the Postgraduate Students' Online Learning Challenges within the CoI Framework revealed interaction issues, teaching presence, and social presence in online systems (Chimbo & Mutezo, 2023). In Ethiopia, postgraduate instructors emphasized that the sudden adoption of online learning during COVID-19 exposed limitations in digital infrastructure and readiness (Luele et al., 2023).

On the positive side, studies such as Experience of Online Learning from COVID-19 highlight that the pandemic accelerated digital transformation in education, pushing institutions to invest in more reliable LMS and digital tools (Jiang et al., 2022). By linking LMS to real-time data analytics, supervisors and administrators can take timely action to support students.

For AIU PG Progress, these findings emphasize the importance of integrating LMS-like features, such as document uploads, thesis tracking, and learning analytics, to ensure that supervision and monitoring are well-connected to the wider digital education ecosystem.

4. STUDENT AND SUPERVISOR PERSPECTIVES ON POSTGRADUATE RESEARCH

Understanding the perspectives of both students and supervisors is critical for designing truly user-centered systems. One study, Understanding the Motives for Pursuing

Postgraduate Studies and Causes of Late Completion, highlights how personal motivation, lack of support, and supervision quality all influence research completion times. Supervisors also report difficulties in balancing workloads while providing consistent feedback (Amani et al., 2022).

Other studies also emphasize students' struggles with academic writing, as seen in Students' Problems of Academic Writing Competencies, which found that postgraduate students often lack strong writing skills and need structured guidance (Nurkamto et al., 2022). Similarly, a study: Exploring Thesis Writing in Distance Mode, points out that without regular in-person interaction, many students feel isolated and struggle to maintain writing quality (Yunus & Bachtiar, 2025).

From the supervisor's perspective, studies like DigiGrad Africa Toolkit and Remote Supervision show that digital systems can support supervisors by providing structured ways to monitor progress and give timely feedback (Giofre et al., 2025; Premawardhena, 2022). These tools also reduce communication gaps and make supervision more transparent.

By identifying both student and supervisor needs, AIU PG Progress can design features such as evaluation tools, milestone checklists, and writing support resources that directly address these challenges.

5. SYSTEM DESIGN, IMPLEMENTATION, AND TESTING OF THESIS MANAGEMENT TOOLS

Many studies focus on how digital thesis management systems are designed, implemented, and tested. For example, the Design of Web-Based Thesis Management System and the ThesisIT Portal with Defense Scheduling both demonstrate how universities are adopting web-based portals to manage thesis submissions and defense scheduling (Chio et al., 2022; Nugraha, 2022). Similarly, the Database for Thesis Data Management Using Flask shows how lightweight frameworks can be used to build effective backend systems for research tracking (Suraya & Sholeh, 2022).

Other studies highlight the importance of user-centered design and testing. For example, the Testing of Thesis Management Application Using STLC and Automation Tools provides insights into how systematic testing ensures system reliability (Arjuna et al., 2025). Similarly, the Web-Based Thesis Title Submission System Using CodeIgniter emphasizes flexibility and user-friendliness in design (Wulandari et al., 2025).

These examples align strongly with AIU PG Progress, which also aims to combine monitoring, submission management, and supervisor evaluation into one integrated platform. By learning from these case studies, this project can adopt best practices in system design and ensure strong testing for usability and reliability.

6. SOCIAL INNOVATION AND BROADER EDUCATION IMAPCT

Beyond technical improvements, online postgraduate management systems also contribute to social innovation. These systems enhance inclusivity by making supervision accessible to remote students and ensuring that progress tracking is fair and transparent. For example, studies such as UPTrackS Blockchain Framework emphasize accountability and good governance, which are key to building trust in academic processes (Mamat et al., 2023). Similarly, the Toolkit for Supervisors (DigiGrad Africa) positions digital platforms as a way to empower supervisors and improve the overall supervision culture (Giofre et al., 2025).

Digital systems also ensure transparency and accountability, as seen in PostConnect and Decision Support Systems, which allow CGS executives to make data-driven decisions and intervene early when students face challenges (Igwe et al., 2024; Wong et al., 2024). In addition, utilizing online platforms contributes to sustainability by reducing paper use and making processes more efficient.

For AIU PG Progress, this broader impact means that the project is not only a technical innovation but also a social innovation that supports educational equity, efficiency, and quality.

CHAPTER 3

METHODODLOGY

1. SYSTEM DEVELOPMENT METHODOLOGY

Nugraha (2023): The development method used in this study is to use the Software Development Life Cycle (SDLC). This method is a structured method from the initial planning stage to the final stage of system testing. This SDLC method has several approaches that are often used in the development stage; one of the well-known approaches is the Waterfall approach. In this method, the steps that will be carried out will be outlined in several instruments according to the stages that are passed. Common stages that are often carried out, such as the results of data collection and analysis, are usually outlined and designed in a form such as diagrams, symbols, and pictures. Several stages of the development method in the SDLC with the Waterfall approach include on below:

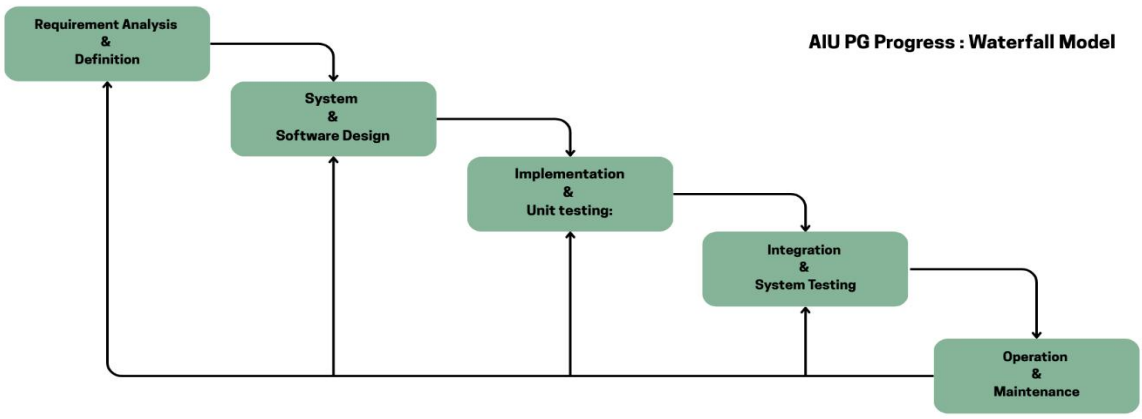

Figure 1 Waterfall Model

1.1. REQUIREMENT ANALYSIS AND DEFINITION

At this phase, data collection is carried out for system requirements, and defines what requirements must be achieved by the system.

- Gather functional and non-functional requirements from students, supervisors, and CGS executives.
- Requirements include: thesis submission tracking, supervisor evaluation, automated alerts, dashboard analytics, and role-based access control.

1.2. SYSTEM AND SOFTWARE DESIGN

At this phase, the results of the analysis from data collection are presented and presented in the form of pictures and diagrams. System design can be made with use cases, class diagrams, activity diagrams, and sequence diagrams.

- Develop system architecture including frontend, backend, database, and APIs.
- Create Entity-Relationship Diagrams (ERD) for database structure.

1.3. IMPLEMENTATION AND UNIT TESTING

At this phase, the design has been made and then poured into the form of programs and code (Programming). At this phase, the system has begun to be built according to the needs and design.

- Develop the system using selected frameworks and tools.
- Implement an interactive dashboard with data analytics.
- Conduct unit testing for individual modules (e.g., thesis submission form, progress tracker).

1.4. INTEGRATION AND SYSTEM TESTING

At this phase, this phase can carry out overall integration testing and then the system from start to finish.

- Integration testing ensures smooth communication between frontend, backend, and database.
- Usability Testing: Conducted to evaluate system effectiveness and ease of use among students and supervisors, ensuring the UI/UX meets their requirements.

1.5. OPERATION AND MAINTENANCE

This phase is the final phase in the development method; the finished system can be maintained and repaired if problems or errors occur.

- Deploy the system using Docker containers for consistency across environments.
- Use Nginx as a reverse proxy and static file server.
- GitHub Actions for Continuous Integration and Continuous Delivery/Deployment (CI/CD) automation and version control.
- Monitor and fix bugs as they are identified.

2. SYSTEM ARCHITECTURE

The architecture of AIU PG Progress follows a four-layered model with 3rd Party Services:

1. Presentation Layer: Frontend UI for students, supervisors, and CGS staff.
2. Business Layer: Backend handles logic, workflows, authentication, and notifications.
3. Data Access Layer: Object Relation Mapping (ORM) interacts with MySQL, and Redis caching ensures high-speed data retrieval.
4. Database Layer: Stores persistent data, including user profiles, thesis documents, milestone records, and notifications.
5. 3rd Party Services: Email notifications via SMTP, optional integration for SMS alerts.

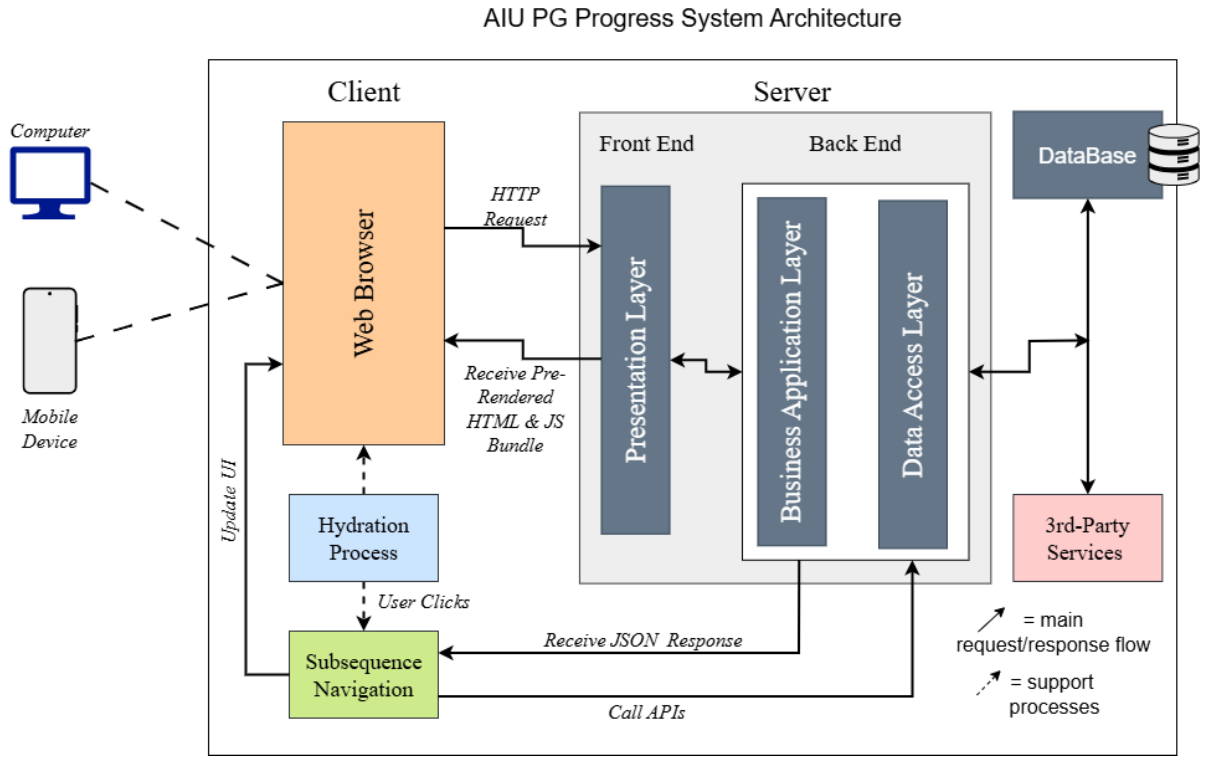

Figure 2 System Architecture

3. USE CASES DIAGRAM

3.1. ACTORS AND ROLES

1. **Student**
    - Log in to the system securely.
    - Upload thesis documents, proposals, and progress reports.
    - Submit thesis and related milestones.
    - View real-time progress and supervisor feedback.
    - Update research progress and milestones.
2. **Supervisor**
    - Review submitted documents and proposals.
    - Approve or reject thesis and report submissions.
    - Submit evaluation and feedback forms.
    - Track student progress via dashboard.
3. **CGS Staff**
    - Register students and assign supervisors or examiners.
    - Monitor overall thesis submission and student progress.

- Check and verify documents for compliance.

4. **Examiner**
   - Submit viva voce results.
   - Complete evaluation forms for thesis assessment.
5. **System**
   - Authenticate users and manage access rights.
   - Send automated notifications and reminders for deadlines.
   - Process final decision on thesis outcome.

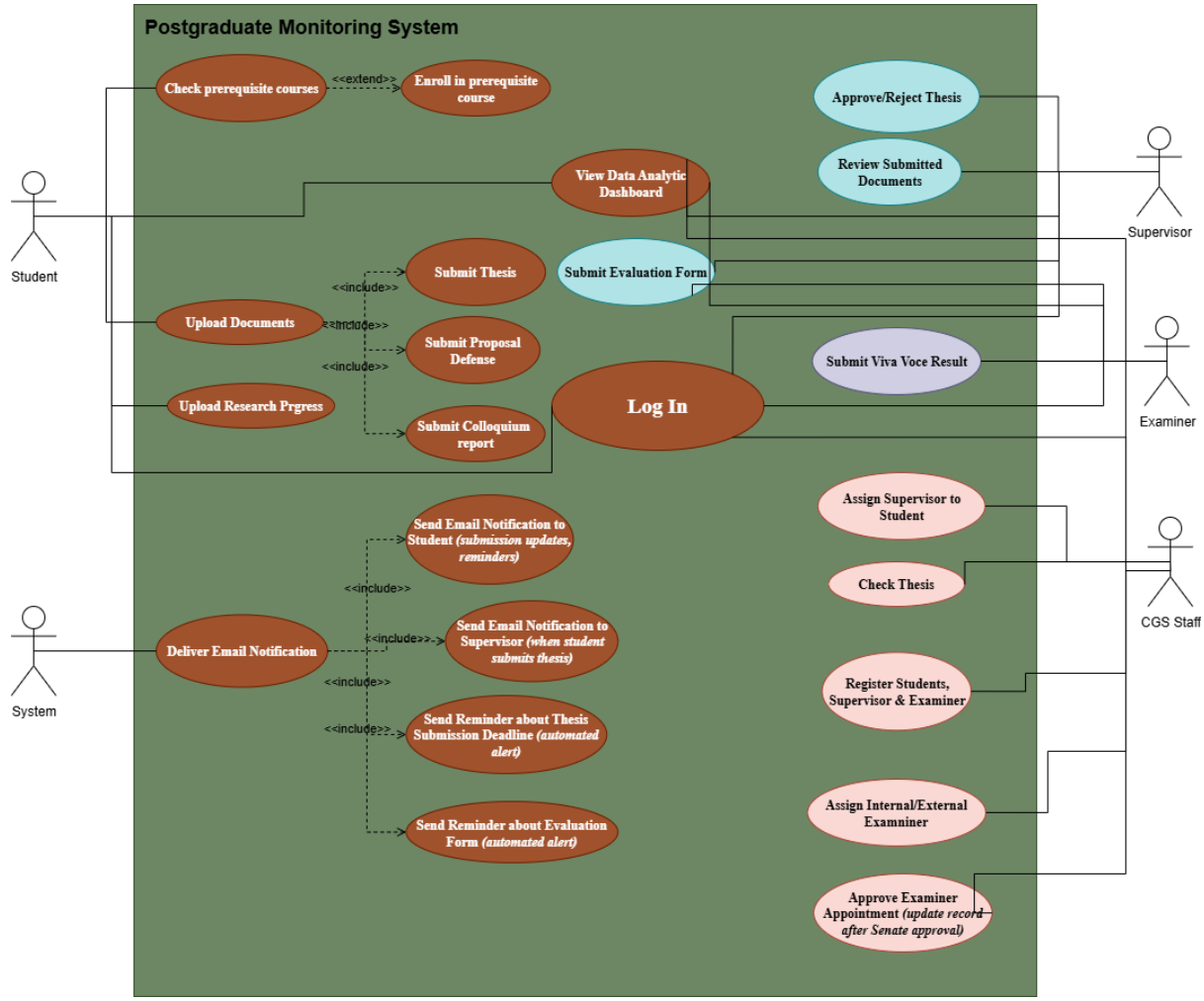

Figure 3 Use Case Diagram

3.2. KEY USE CASES

Use Case	Actor(s)	Description	Relationships
Document Submission	Student	Submit thesis, proposal, or colloquium documents.	<> Upload documents → Submit thesis
Review & Evaluation	Supervisor, Examiner	Evaluate and provide feedback or grade submissions.	<> Optional review of previous drafts
Progress Dashboard	Student, Supervisor, CGS Staff	Track milestones, deadlines, and evaluations in real-time.	<> Updates automatically on submission
Automated Notifications	System	Notify students, supervisors, and CGS staff of deadlines and evaluation updates.	<> Optional SMS notification (if implemented)
Authentication & Access	All	Ensure secure login, role-based access, and system security.	<> JWT validation → access granted
Thesis Outcome Decision	Supervisor, CGS Staff	Record the final thesis result after evaluations and viva.	<> Decision recorded → Notification sent

Table 1 Key Use Cases

3.3. USE CASE DIAGRAM DESCRIPTION

The use case diagram illustrates the interaction between actors and the AIU PG Progress system.

- Students interact primarily with document submission, progress tracking, and notifications.
- Supervisors interact with evaluation and dashboard modules, receiving automated alerts for pending submissions.

- CGS Staff oversees registration, supervisor assignment, and tracking of overall student progress.
- Examiners provide final evaluations and viva voce results.
- The system manages authentication, data storage, and notification delivery, ensuring smooth integration and workflow.

4. ACTIVITY DIAGRAM

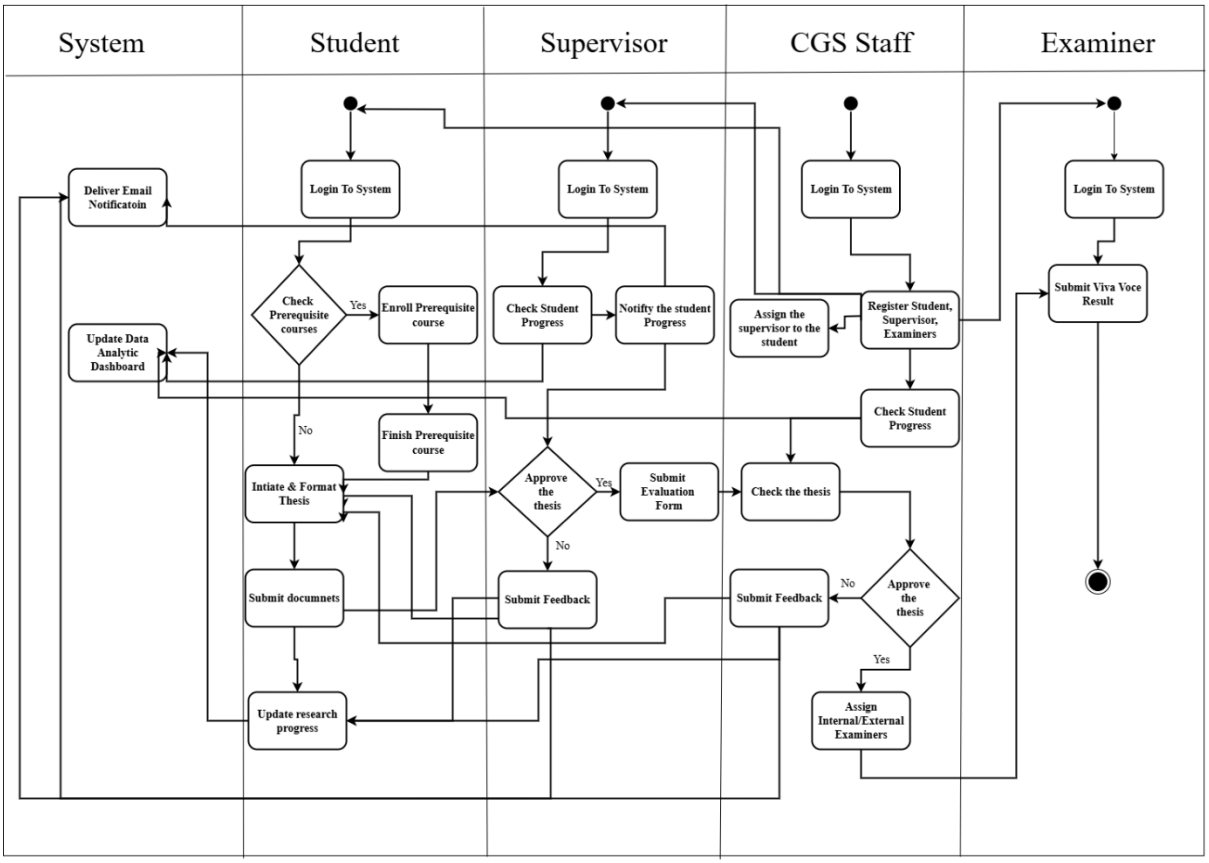

Figure 4 Activity Diagram

5. SYSTEM REQUIREMENTS

The AIU PG Progress system is designed to ensure efficient management, tracking, and evaluation of postgraduate research progress. In order to achieve this, the system is defined with clear functional and non-functional requirements to guide development, testing, and deployment.

5.1. FUNCTIONAL REQUIREMENTS

Functional requirements are the needs that explain the tasks the system must perform to support the research management process. These requirements are made to guide the system design and the development steps. Each requirement is also given a priority based on how much it will affect the system's work and the user experience when they use the system. The list of these requirements with their priority can be seen in Table 2. It is made to clearly show each requirement and its level of importance for the system.

Req ID	Description	Priority
FR-01	The system shall allow users (students, supervisors, CGS) to register and log in with role-based access.	High
FR-02	The system shall allow students to update their research progress and milestones.	High
FR-03	The system shall allow students to submit thesis drafts and final documents.	High
FR-04	The system shall allow supervisors to review and approve/reject thesis submissions.	High
FR-05	The system shall allow supervisors to provide feedback and evaluations for students.	Medium
FR-06	The system shall allow CGS to manage student and supervisor records.	High
FR-07	The system shall provide dashboards with real-time visual reports of student progress.	High
FR-08	The system shall send automated alerts and notifications (e.g., deadlines, feedback).	Medium
FR-09	The system shall allow CGS to generate reports and analytics on postgraduate progress.	High
FR-10	The system shall allow CGS to set deadlines and policies for submissions and milestones.	High

Table 2 Functional Requirements

These functional requirements ensure that students can submit their work and track progress, supervisors can provide evaluations, and CGS staff can manage and oversee the postgraduate research process. Real-time dashboards and automated notifications are included to support dynamic management and timely interventions.

5.2. NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements talk about the quality, performance, and rules of how the system will work. These things are very important because they make sure the system is safe, can be trusted, and can handle more users when needed. They are also needed so that the system is strong enough for all people who will use it. Refer to Table 3 for the full list of non-functional requirements and how they are described based on their priority in the development process.

Req ID	**Description**	**Priority**
NFR-01	The system shall respond to user queries (dashboard load, progress view) within 2 seconds.	High
NFR-02	File uploads (thesis submissions) should complete within 5 seconds under normal network conditions.	High
NFR-03	The system shall support at least 500 concurrent users (students, supervisors, CGS).	Medium
NFR-04	The user interface must be accessible and usable across desktop and mobile browsers.	High
NFR-05	The system should be available 99% of the time, excluding maintenance periods.	Medium

NFR-06	The system shall provide secure role-based access control (Student, Supervisor, CGS).	High
NFR-07	The system shall encrypt sensitive data (passwords, thesis files, evaluations).	High
NFR-08	The system shall log all administrative and evaluation actions for accountability.	High
NFR-09	The system shall be scalable to support an increasing number of users and records over time.	Medium

Table 3 Non-Functional Requirements

These non-functional requirements make sure the system works well in real use. They help with fast speed and smooth file uploading, so users do not face delays. They also use role-based access control and data encryption to protect sensitive student and academic information. At the same time, scalability and cross-platform accessibility ensure that the system can grow with AIU's postgraduate population and support different user devices, such as computers or mobile devices.

The system requirements have been carefully written to follow the project's objectives and scope:

1. Student Progress Tracking: Functional requirements like FR-02, FR-03, and FR-07 directly support updating the research progress, submitting documents such as the thesis, proposal defense as well as colloquium report, and monitoring the progress of their research journey.

2. Supervisor Evaluation: FR-04 and FR-05 are for supervisors to enable effective assessment, feedback, and decision-making.

3. CGS Administration: FR-06, FR-09, and FR-10 are for CGS staffs. These functions will allow them to keep all records, check analytics reports, and manage the rules and policies of the research study.

4. System Quality: Non-functional requirements (NFR-01 to NFR-09) ensure high performance, security, and usability for all users on different devices. This is important so the system can really work in daily use at the university.

By implementing all these requirements together, the AIU PG Progress system will be more useful and solve many problems that happen when using only paper and spreadsheets.

6. HARDWARE AND SOFTWARE REQUIREMENTS

6.1. HARDWARE REQUIREMENTS:

Developer Side	Server Side	Client Side
Processor: Intel i5 or higher (to run IDEs and local servers smoothly)	Processor: Intel i5 or equivalent	Devices: Desktop, laptop, tablet, or smartphone
RAM: Minimum 8 GB (16 GB recommended)	RAM: Minimum 8 GB	Browser: Modern Web Browser (Chrome, Edge, Firefox, Safari)
Storage: At least 250 GB free space	Storage: Minimum 500 GB	No specialized hardware required, as the system mainly handles document uploads, dashboards, and analytics
Operating System: Windows, Linux, or macOS (whichever the developer prefers to work with)	Internet: Stable connection to support multiple concurrent users	Internet: Stable connection
Processor: Intel i5 or higher (to run IDEs and local servers smoothly)	Processor: Intel i5 or equivalent	Devices: Desktop, laptop, tablet, or smartphone

Table 4 Hardware Requirements

6.2. SOFTWARE REQUIREMENTS:

- Frontend (Presentation Layer):
    - HTML5 / CSS3 / JavaScript (ES6+)
    - Bootstrap or Tailwind CSS for responsive design
    - React.js for interactive dashboards
    - Chart.js or Plotly.js for data visualization
- Backend (Business Layer):
    - Node.js as a runtime environment
    - Express.js for routing and API development
    - JWT for authentication and role-based access
    - Nodemailer for sending email notifications
    - BullMQ or Agenda with Redis for background tasks and job scheduling
- Database / Data Access Layer:
    - MySQL (Community Edition) as the primary database
    - Redis for caching, session management, and queues
    - Sequelize.js or Prisma ORM for database interactions
- APIs and Data Format:
    - RESTful APIs for communication between frontend and backend
    - JSON as standard data format for requests/responses
- Deployment and DevOps Tools:
    - Docker for containerization
    - Nginx as a reverse proxy and a static file server
    - GitHub for version control and CI/CD pipelines
    - VS Code as the development environment
    - Postman for API testing
- Security and Performance Considerations:
    - Secure role-based access control for Students, Supervisors, and CGS staff
    - Encryption of sensitive data (passwords, thesis files, evaluations)
    - Logging of all administrative and evaluation actions for accountability

The outlined hardware and software requirements ensure that the AIU PG Progress system is efficient, scalable, and accessible to all users, including students, supervisors, and CGS staff. By using open-source and free tools wherever possible, the system minimizes reliance

on costly proprietary solutions while maintaining high performance. The design will support at least 500 concurrent users, provide fast response times, and allow smooth interaction across desktop and mobile devices. Security and accountability are ensured through role-based access control, encryption of sensitive data, and detailed logging of administrative and evaluation actions. To support the development process, we have made a Gantt Chart, and it is put in the appendix to show the work plan as well as how the system will be developed step by step. Overall, these requirements provide a strong foundation for developing a reliable and user-friendly centralized postgraduate research monitoring system.

CONCLUSION

1. CONTRIBUTION TO THE SOCIAL BUSINESS

The AIU PG Progress system contributes to social business and sustainable development goals in several ways:

- SDG 4: Quality Education
  - Enhances inclusive and equitable quality education by providing students, supervisors, and administrators with a centralized platform to monitor progress.
  - Facilitates timely thesis submissions and supervisor feedback, improving the learning experience and supporting student success.
  - Promotes data-driven decision-making for supervisors and CGS staff, ensuring interventions are timely and effective.
- SDG 12: Responsible Consumption and Production
  - Reduces reliance on paper-based processes, such as printed forms and spreadsheets.
  - Minimizes paper waste and the environmental impact of physical documentation.
  - Contributes indirectly to Zero Net Carbon Emissions by reducing printing, storage, and transportation of physical documents, supporting sustainability initiatives.

2. ASSIGNED ROLES & RESPONSIBILITIES AMONG GROUP MEMBERS

Members	Roles	Responsibilities
Myat Min Khant	Database & Backend Developer	Design and manage the database, implement backend logic, and support features for thesis submission.
Ye Min Myat	Frontend & Dashboard Developer	Develop the user interface, build the dashboard with analytics and visualization, and integrate the frontend with backend services.

Ro Min Swe	System Analyst & Developer	Analyse requirements, design system functions, and develop modules for monitoring student progress.

Table 5 Assigned Roles & Responsibilities Among Group Members

In Table 5, each member has been assigned with respective task ranging from the Frontend to the Backend of the system to ensure smooth and successful development of the project.

3. CONCLUSION

The AIU PG Progress system addresses a critical need in postgraduate research management by providing a centralized, dynamic, and interactive platform for students, supervisors, and CGS staff. By moving away from manual tracking and paper-based submissions, the system ensures real-time progress monitoring, efficient thesis submission, and structured supervisor evaluations.

This project delivers the importance of integrating modern digital tools in higher education to enhance quality, efficiency, and accountability. The use of a reverse Waterfall methodology also ensures a structured and systematic approach to development, allowing thorough requirement analysis, smooth system design, and comprehensive testing.

The proposed architecture, combining frontend, backend, and database layers with responsive dashboards, automated notifications, and secure authentication, supports scalability, usability, and performance. By implementing the system, AIU can expect improved communication and timely decision-making, resulting in higher student satisfaction and better academic outcomes.

Furthermore, the project contributes significantly to social business goals by promoting quality education and responsible resource consumption to decrease the release of Carbon emissions. The shift to digital monitoring reduces environmental impact, ensures inclusivity, and supports sustainable practices in academic administration.

In summary, AIU PG Progress is not only a technological advancement for postgraduate research management but also a socially responsible innovation that aligns with global

sustainability goals and enhances the overall quality of education. Its implementation can provide postgraduate administration with a huge transformation, along with measurable benefits for students, supervisors, and the university community.

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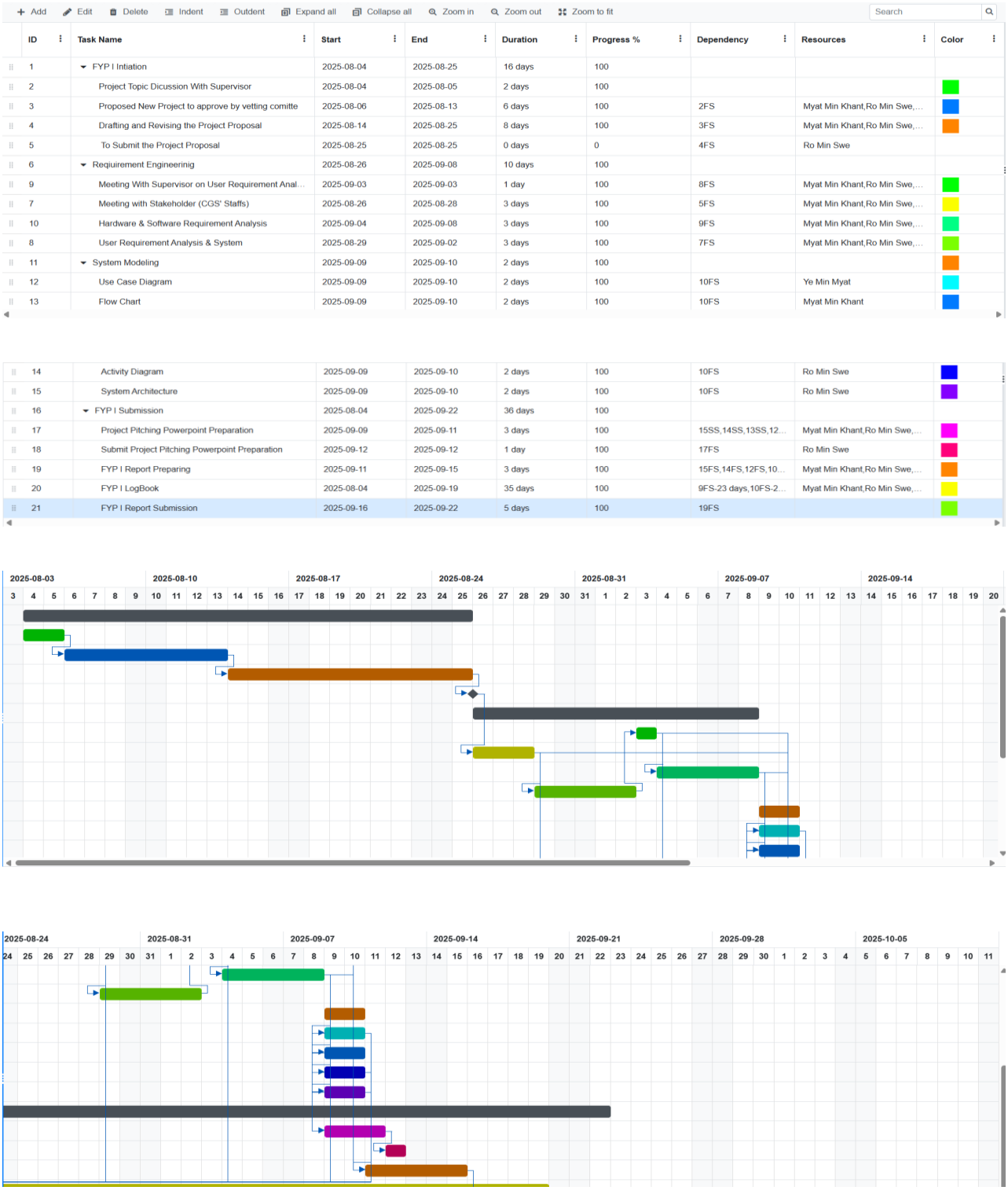
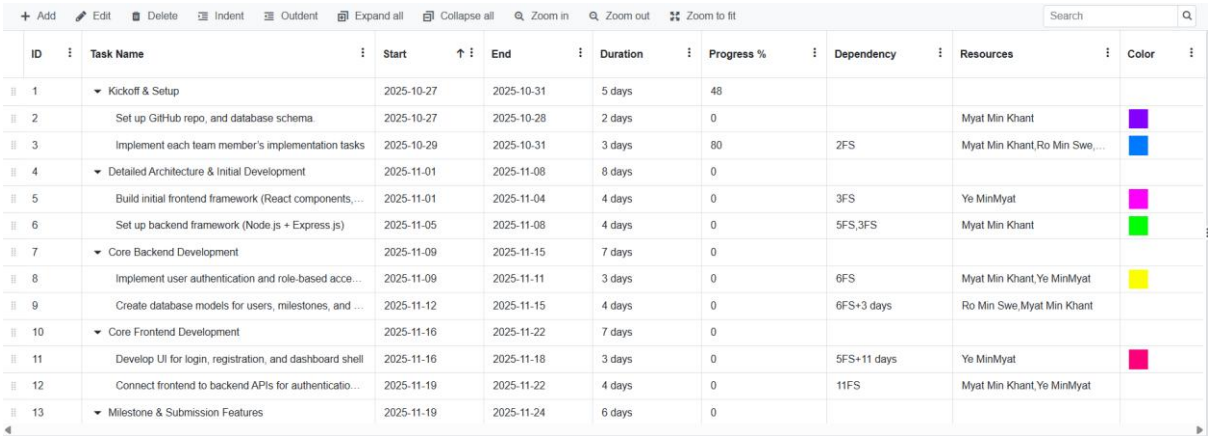
APPENDICES

1. APPENDIX A GANTT CHART



ID	Task Name	Start	End	Duration	Progress %	Dependency	Resources	Color
1	FYP I Intiation	2025-08-04	2025-08-25	16 days	100			
2	Project Topic Dicussion With Supervisor	2025-08-04	2025-08-05	2 days	100			
3	Proposed New Project to approve by vetting comitte	2025-08-06	2025-08-13	6 days	100	2FS	Myat Min Khant,Ro Min Swe,...	
4	Drafting and Revising the Project Proposal	2025-08-14	2025-08-25	8 days	100	3FS	Myat Min Khant,Ro Min Swe,...	
5	To Submit the Project Proposal	2025-08-25	2025-08-25	0 days	0	4FS	Ro Min Swe	
6	Requirement Engineerinig	2025-08-26	2025-09-08	10 days	100			
9	Meeting With Supervisor on User Requirement Anal...	2025-09-03	2025-09-03	1 day	100	8FS	Myat Min Khant,Ro Min Swe,...	
7	Meeting with Stakeholder (CGS' Staffs)	2025-08-26	2025-08-28	3 days	100	5FS	Myat Min Khant,Ro Min Swe,...	
10	Hardware & Software Requirement Analysis	2025-09-04	2025-09-08	3 days	100	9FS	Myat Min Khant,Ro Min Swe,...	
8	User Requirement Analysis & System	2025-08-29	2025-09-02	3 days	100	7FS	Myat Min Khant,Ro Min Swe,...	
11	System Modeling	2025-09-09	2025-09-10	2 days	100			
12	Use Case Diagram	2025-09-09	2025-09-10	2 days	100	10FS	Ye Min Myat	
13	Flow Chart	2025-09-09	2025-09-10	2 days	100	10FS	Myat Min Khant	
14	Activity Diagram	2025-09-09	2025-09-10	2 days	100	10FS	Ro Min Swe	
15	System Architecture	2025-09-09	2025-09-10	2 days	100	10FS	Ro Min Swe	
16	FYP I Submission	2025-08-04	2025-09-22	36 days	100			
17	Project Pitching Powerpoint Preparation	2025-09-09	2025-09-11	3 days	100	15SS,14SS,13SS,12...	Myat Min Khant,Ro Min Swe,...	
18	Submit Project Pitching Powerpoint Preparation	2025-09-12	2025-09-12	1 day	100	17FS	Ro Min Swe	
19	FYP I Report Preparing	2025-09-11	2025-09-15	3 days	100	15FS,14FS,12FS,10...	Myat Min Khant,Ro Min Swe,...	
20	FYP I LogBook	2025-08-04	2025-09-19	35 days	100	9FS-23 days,10FS-2...	Myat Min Khant,Ro Min Swe,...	
21	FYP I Report Submission	2025-09-16	2025-09-22	5 days	100	19FS		

Figure 5 FYP I Gantt Chart



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ID	Task Name	Start	End	Duration	Progress %	Dependency	Resources	Color
1	Kickoff & Setup	2025-10-27	2025-10-31	5 days	48			
2	Set up GitHub repo, and database schema.	2025-10-27	2025-10-28	2 days	0		Myat Min Khant	
3	Implement each team member's implementation tasks	2025-10-29	2025-10-31	3 days	80	2FS	Myat Min Khant,Ro Min Swe,...	
4	Detailed Architecture & Initial Development	2025-11-01	2025-11-08	8 days	0			
5	Build initial frontend framework (React components,...	2025-11-01	2025-11-04	4 days	0	3FS	Ye MinMyat	
6	Set up backend framework (Node.js + Express.js)	2025-11-05	2025-11-08	4 days	0	5FS,3FS	Myat Min Khant	
7	Core Backend Development	2025-11-09	2025-11-15	7 days	0			
8	Implement user authentication and role-based acce...	2025-11-09	2025-11-11	3 days	0	6FS	Myat Min Khant,Ye MinMyat	
9	Create database models for users, milestones, and ...	2025-11-12	2025-11-15	4 days	0	6FS+3 days	Ro Min Swe,Myat Min Khant	
10	Core Frontend Development	2025-11-16	2025-11-22	7 days	0			
11	Develop UI for login, registration, and dashboard shell	2025-11-16	2025-11-18	3 days	0	5FS+11 days	Ye MinMyat	
12	Connect frontend to backend APIs for authenticatio...	2025-11-19	2025-11-22	4 days	0	11FS	Myat Min Khant,Ye MinMyat	
13	Milestone & Submission Features	2025-11-19	2025-11-24	6 days	0			
15	Build supervisor evaluation features in backend and...	2025-11-19	2025-11-21	3 days	0	11FS		
14	Implement student progress update and thesis sub...	2025-11-22	2025-11-24	3 days	0	15FS	Myat Min Khant,Ro Min Swe,...	
16	Dashboard & Notifications alerts	2025-11-25	2025-11-29	5 days	0		Ro Min Swe	
17	Integrate real-time progress dashboard with data an...	2025-11-25	2025-11-25	1 day	0	14FS	Ro Min Swe,Ye MinMyat	
18	Set up automated notifications (email, optional SMS).	2025-11-25	2025-11-26	2 days	0	14FS	Ro Min Swe,Myat Min Khant	
19	Frontend polishing.	2025-11-27	2025-11-29	3 days	0	11FS+8 days,14FS+...	Ye MinMyat	
20	Integration & Early Testing	2025-11-30	2025-12-08	9 days	0			
21	Full-stack integration testing (frontend–backend–dat...	2025-11-30	2025-12-02	3 days	0	19FS,18FS	Myat Min Khant,Ro Min Swe,...	
22	Fix major bugs found during integration.	2025-12-03	2025-12-06	4 days	0	21FS	Myat Min Khant,Ro Min Swe,...	
23	Gather early user feedback from sample users.	2025-12-06	2025-12-08	3 days	0		Ro Min Swe	
24	Usability & Performance Testing	2025-12-09	2025-12-15	7 days	0			
25	Conduct usability testing with students/supervisors	2025-12-09	2025-12-11	3 days	0		Myat Min Khant,Ro Min Swe,...	
26	Performance tuning for dashboard and database qu...	2025-12-12	2025-12-15	4 days	0	23FS,25FS	Myat Min Khant,Ye MinMyat	
27	Security Hardening & Refinement	2025-12-16	2025-12-20	5 days	0			
29	Fix issues discovered in testing & finalize document...	2025-12-16	2025-12-18	3 days	0	26FS	Ro Min Swe,Myat Min Khant,...	
28	Implement data encryption, and secure role-based ...	2025-12-19	2025-12-20	2 days	0	22FS,29FS	Ro Min Swe,Myat Min Khant	
30	Final Polishing	2025-12-21	2025-12-22	2 days	0			
31	Finish UI/UX polish and accessibility fixes	2025-12-21	2025-12-22	2 days	0	29FS+2 days,22FS+...	Myat Min Khant,Ye MinMyat	
32	User Acceptance Testing (UAT)	2025-12-23	2025-12-27	5 days	0			
33	Host UAT with stakeholders (students, supervisors, ...	2025-12-23	2025-12-24	2 days	0	29FS,31FS	Myat Min Khant,Ye MinMyat	
34	Collect feedback and fix any high-priority issues.	2025-12-25	2025-12-27	3 days	0	33FS	Myat Min Khant,Ro Min Swe,...	
35	Final Deployment & Handover	2025-12-28	2026-01-04	8 days	0			
36	Deploy production version.	2025-12-28	2025-12-30	3 days	0	34FS	Ro Min Swe,Myat Min Khant,...	
37	Deliver user manuals and admin guides.	2025-12-31	2026-01-04	5 days	0	36FS	Ro Min Swe	

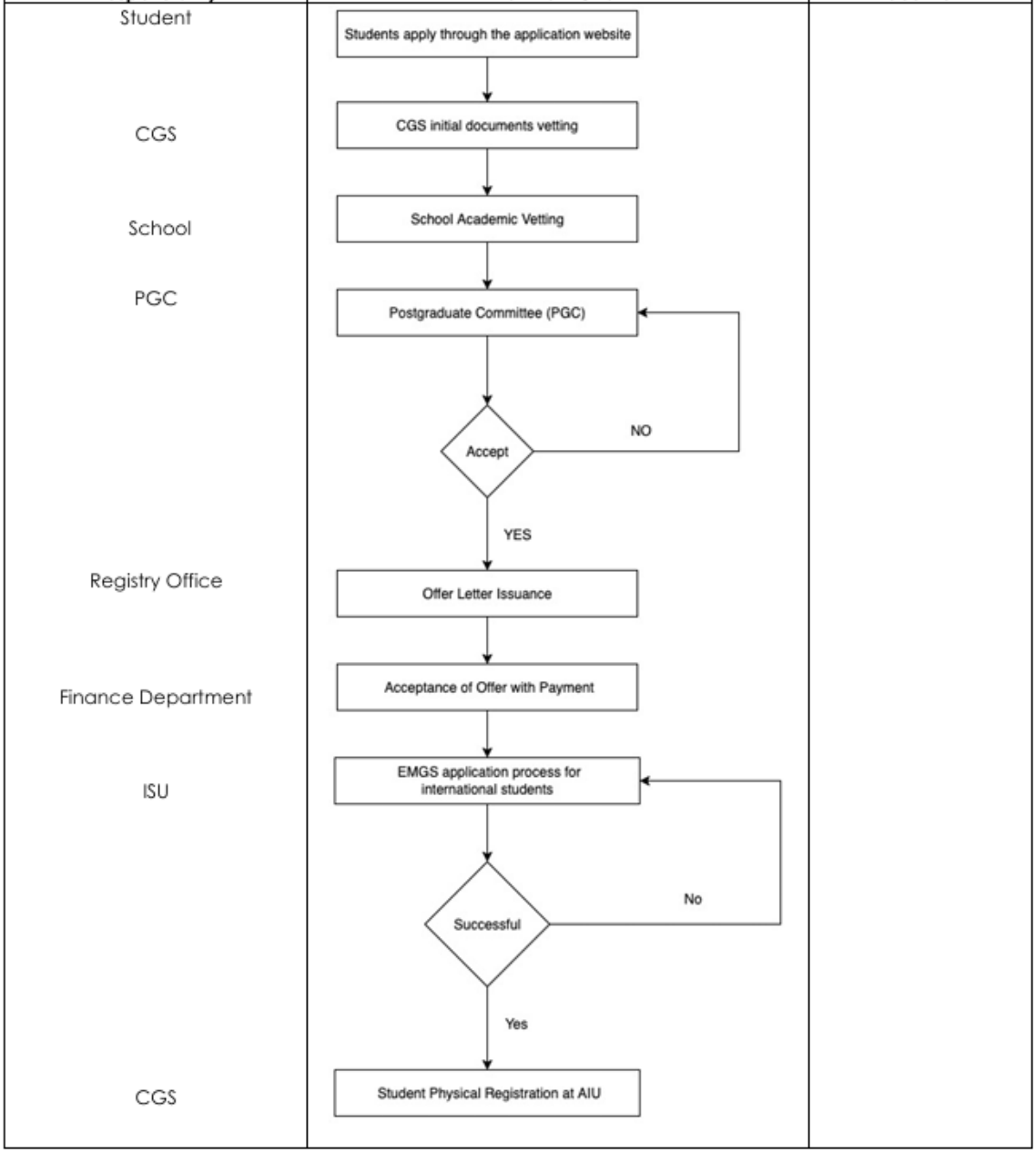
Figure 6 FYP II Gantt Chart

2. APPENDIX B POSTGRADUATE PROCESS FLOW

ALBUKHARY INTERNATIONAL UNIVERSITY	PPOSTGRADUATE PROCESS FLOW (RESEARCH MODE)	Ref. No.	
		Rev. No.	2025-00
		Effective date	
		Page	1 of 2

EXAMPLE OF PROCESS FLOW

Responsibility	Workflow Chart	Document



ALBUKHARY INTERNATIONAL UNIVERSITY	PPOSTGRADUATE PROCESS FLOW (RESEARCH MODE)	Ref. No.	
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		Effective date	
		Page	2 of 2

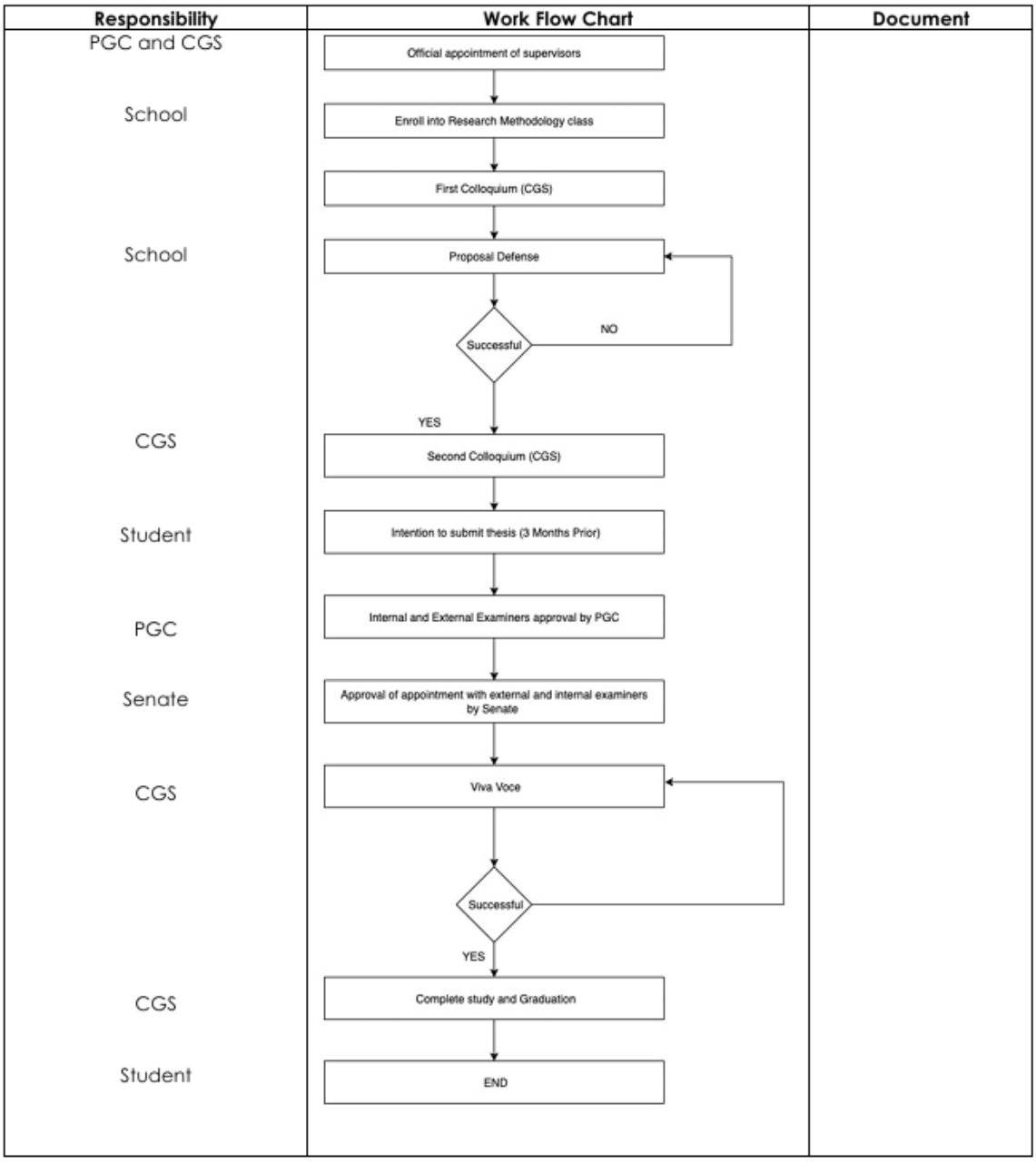
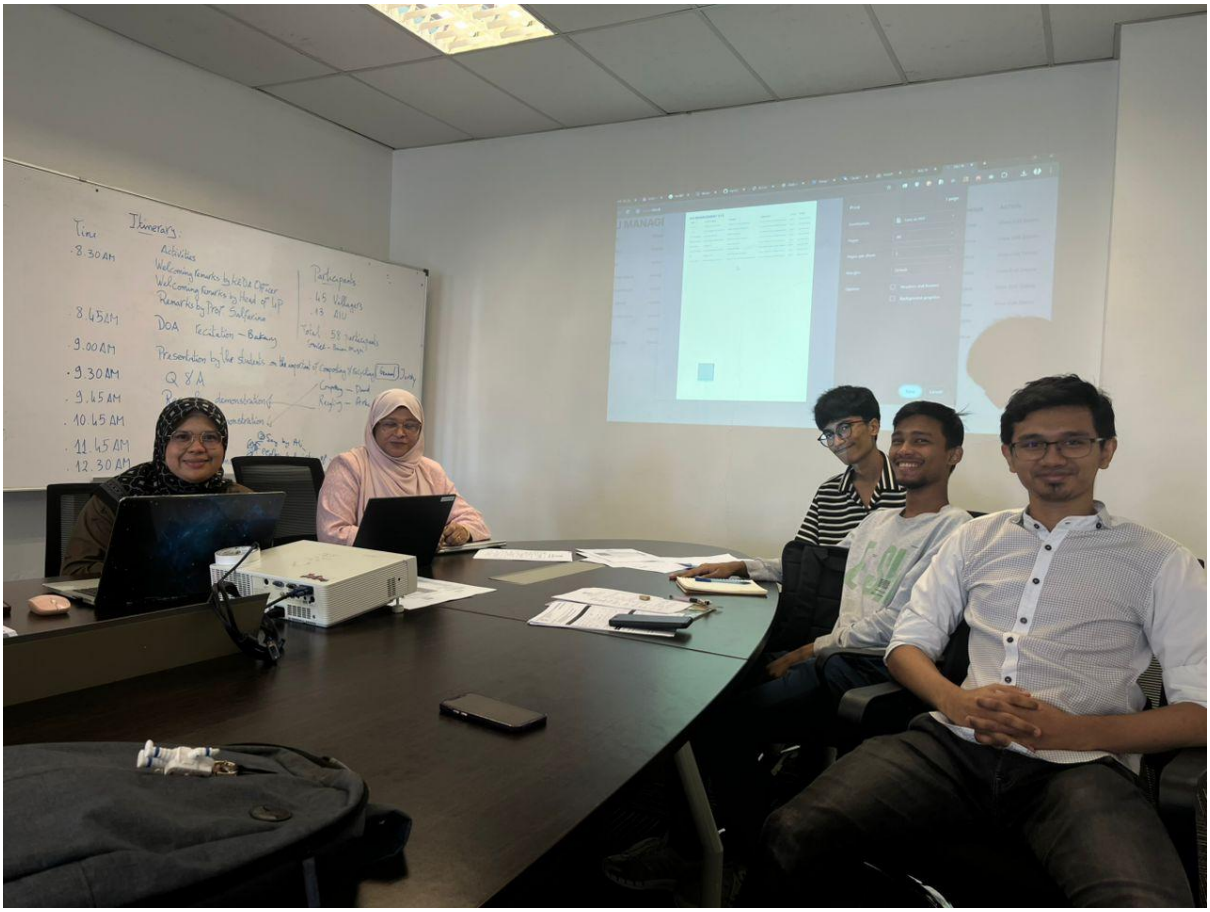


Figure 7 AIU Postgraduate Process Flow Chart by CGS

3. APPENDIX C PICTURE WITH CGS STAFF



FYP 1 Project Report.pdf

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