

BỘ GIÁO DỤC VÀ ĐÀO TẠO
TRƯỜNG ĐẠI HỌC CÔNG NGHỆ ĐÔNG Á



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TÊN ĐỀ TÀI: MANAGEMENT APPLICATION FOR
STUDENT SCIENTIFIC RESEARCH AT EAST ASIA
UNIVERSITY OF TECHNOLOGY (ỨNG DỤNG QUẢN LÝ
SINH VIÊN NGHIÊN CỨU KHOA HỌC TẠI TRƯỜNG ĐẠI
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PHÙNG ĐẠI ĐỒNG

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DECLARATION

I hereby declare that the graduation project/thesis titled "**MANAGEMENT APPLICATION FOR STUDENT SCIENTIFIC RESEARCH AT EAST ASIA UNIVERSITY OF TECHNOLOGY**" is my own independent research. All data presented in this report are the result of my honest work and have not been copied from any other research project or source.

Bac Ninh, April 25th 2025

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ABSTRACT

Scientific research is a fundamental part of higher education, promoting critical thinking, creativity, and problem-solving skills among students. At East Asia University of Technology, student involvement in research is encouraged; however, the current management process remains inefficient due to fragmented systems, manual approvals, and a lack of transparency. These issues lead to delays and difficulty in tracking research progress.

To address these challenges, this study proposes the development of a centralized web-based scientific research management system tailored for EAUT. The system is designed to streamline and automate key research workflows, including topic registration, proposal approval, faculty-level evaluation assignment, university-level defense coordination, and automated notifications. The goal is to create a transparent, efficient, and user-friendly platform for students, faculty, and administrators.

The system is developed using the Agile methodology, ensuring flexibility and continuous feedback throughout the development process. It utilizes HTML, jQuery, and Bootstrap 5 for the frontend to ensure responsive and accessible interfaces. The backend is built with ASP.NET Core, while Microsoft SQL Server Express is used for data storage and management.

The research methodology includes stakeholder interviews, workflow analysis, and benchmarking against similar systems from other institutions to ensure relevance and usability. Special attention is given to the stages after students are matched with advisors, improving transparency and accountability during proposal evaluation and final approval processes.

Expected outcomes include reduced administrative workload, improved data accuracy, faster processing times, and higher satisfaction among users. By digitizing research workflows, this system supports EAUT's digital transformation initiatives and offers a scalable solution for managing academic research activities.

LIST OF ABBREVIATIONS

No.	Abbreviations	Explanation
1	OTP	One-time password
2	DFD	Data flow diagram
3	ERD	Entity-relationship diagram

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CHAPTER 1: INTRODUCTION

1.1. Background of study

Scientific research plays a crucial role in higher education, helping students develop critical thinking, creativity, and problem-solving skills. At East Asia University of Technology, students are encouraged to engage in scientific research to enhance their specialized knowledge and practical skills. However, research management at the university still faces many limitations due to the use of fragmented applications and manual approval processes, leading to delays, a lack of transparency, and difficulties in tracking the research process.

The advancement of digital transformation in education has driven many universities to adopt online scientific research management systems to optimize processes. However, East Asia University of Technology has yet to establish a centralized platform to store research data, approve topics, and manage student scientific research activities. This lack of a unified system creates various challenges for students, faculty, and the research management office.

1.2. Problem statement

The current research management model at East Asia University of Technology faces significant challenges in organizing and monitoring student scientific research. The lack of a centralized system creates inefficiencies, delays, and difficulties for students, faculty, and administrators. The key issues can be categorized into three main areas:

- Delayed approval process: Research topic approval involves multiple management levels, requiring extensive document handling and causing long waiting periods.
- Lack of real-time tracking: Students cannot monitor their proposal status, leading to uncertainty and communication gaps.
- Scattered document storage: Proposals and approvals are stored in different locations (emails, paper files, cloud drives), making retrieval difficult.
- No unified system for research management: The absence of an integrated digital platform results in inefficiencies in research tracking, approval, and evaluation.

- Limited automation and reporting: The lack of a structured system makes data retrieval, reporting, and progress monitoring difficult for faculty and administrators.

1.3. Objectives of the research

The objective of this research is to develop a centralized web-based scientific research management system for East Asia University of Technology to enhance efficiency, transparency, and accessibility in managing student research activities. The proposed system aims to address the challenges identified in the problem statement by digitizing and streamlining key research processes.

1.4. Scope

This system is specifically designed for East Asia University of Technology, applying to students, research advisors, Faculty-level Scientific Research Committee and the Scientific Research Department. The study focuses on five main processes in student scientific research management:

- Register for scientific research
- Topic management
- Committee management
- Proposal management
- Faculty-level topic approval management
- University-level topic approval management

1.5. Limitation

While the process of assigning research advisors to students is a crucial aspect of scientific research management, this study does not explore it in depth. To ensure a practical and efficient approach, the system will focus on the process after advisors and students have been matched and have finalized their research topics.

1.6. Research methodology

1.6.1. Data collection methods

- Interviews and discussions: Meetings with the Scientific Research Management Department and students who participated in scientific research to analyze the current research approval process, identify challenges, and gather insights on their experiences, difficulties, and expectations for the system.

- Document analysis: Reviewing official university policies and guidelines related to scientific research activities provides a foundation for understanding institutional regulations and requirements. Additionally, studying existing research management systems from other universities helps identify the best practices and potential enhancements to improve efficiency and user experience.

1.6.2. System development approach

The system will be developed using the Agile Software Development Model, which allows for incremental improvements and continuous feedback from stakeholders. The development process includes the following stages:

- Requirement Analysis: Define the system's functional and non-functional requirements based on collected data.
- System Design: Database schema, and system architecture to ensure a structured development process.
- Implementation: Develop the system using modern web technologies:
 - Frontend: HTML, jQuery, Bootstrap 5
 - Backend: ASP.NET Core (for handling research workflows and authentication).
 - Database: Microsoft SQL Server Express (for structured data storage and retrieval).

1.6.3. Evaluation criteria

The effectiveness of the system will be evaluated based on:

- System Usability: Measured through user testing and feedback.
- User Satisfaction: Collected through post-implementation surveys with students and research advisors.
- Processing Efficiency: Reduction in research proposal approval time.
- Data Management Accuracy: Ability to retrieve and manage research-related information effectively.

CHAPTER 2: SURVEY ON RESEARCH ACTIVITIES AT EAST ASIA UNIVERSITY OF TECHNOLOGY

2.1. Survey

2.1.1. Key research questions

- a) For the Scientific Research Office
 - Can you give an overview of the current state of scientific research at the university?
 - What are the steps involved in the research process?
 - Are there any official documents outlining the university's research regulations?
 - How do research advisors find students for scientific research?
 - How can students interested in scientific research find suitable advisors?
 - Where are research results and related documents stored?
 - How many scientific research groups are approved per year in each department?
- b) For Students Who Have Participated in Scientific Research
 - What is the process for research proposal approval?
 - How do the department-level and university-level evaluation process work?
 - How many faculty members typically evaluate a research project?
 - Is there a department-level project defense before the university-level defense?
 - What files and documents are required for department-level approval?

2.2. Business process analysis

2.2.1. Process of students register scientific research

Step 1: Scientific Research Department

- Develop a scientific research plan for students.
- Announce the plan to Faculties and Institutes.

Step 2: The faculty-level Scientific Research Committee announces the opening of the scientific research registration.

Step 3: Students

- Receive the announcement.
- Register for the first choice or second preference. Students can register for up to two preferences, with each preference corresponding to two specialized fields.

Step 4: Faculty-level Scientific Research Committee

- Add students to the list of registered scientific research participants.
- Send a successful registration notification to students.

Step 5: Students receive successful registration notification.

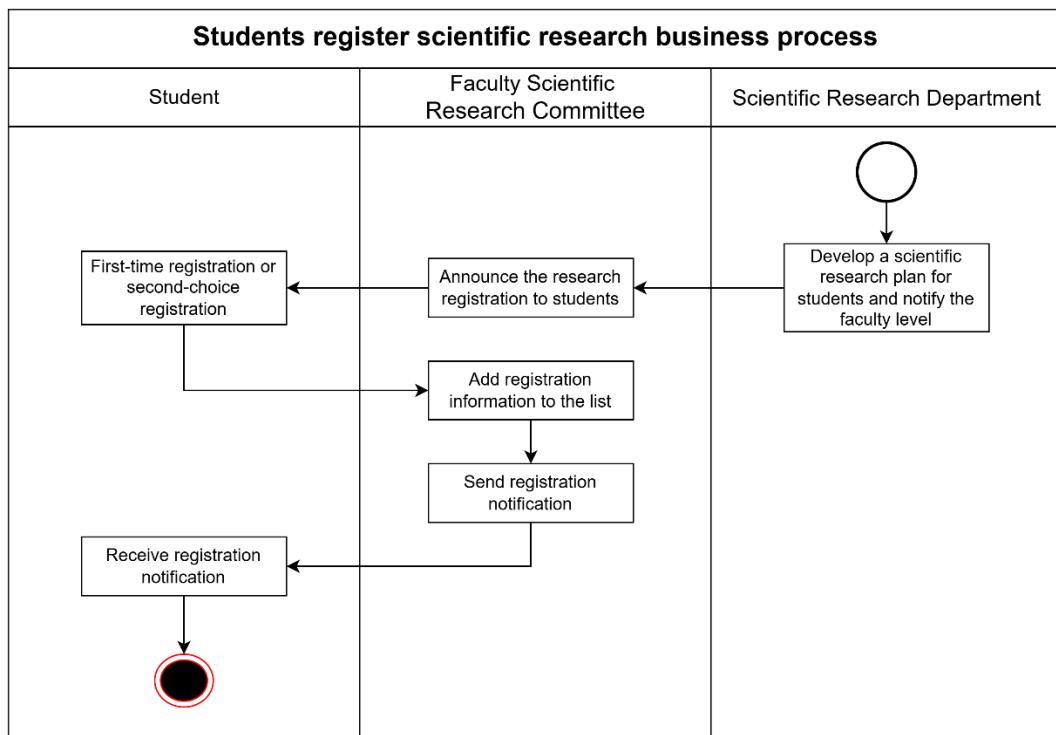


Figure 2.1 Process of students register scientific research

2.2.2. Process of assigning research instructors

Step 1: Faculty-level Scientific Research Committee

- Compile a list of students who have registered for scientific research.
- Filter out students who registered with their first preference.
- Send the list of students to faculty members.

Step 2: Faculty Members

- Receive the list of students' first preferences.
- Identify suitable students and contact them.

Step 3: Students

- After discussing with faculty members, students will finalize a research topic.

Three scenarios may occur:

- The student successfully agrees on a research topic.
- The student does not agree on a research topic with any faculty member and has no second preference.
- The student does not agree on a research topic with any faculty member but still has a second preference.

Step 4: Processing Each Scenario

- If a research topic is agreed upon:
 - The faculty member registers the student group and research topic with the faculty-level Scientific Research Committee.
 - The committee sends a confirmation notice to the student and research advisor.
- If no agreement is reached and there is no second choice, the student is removed from the scientific research program.
- If no agreement is reached but the student has a second choice:
 - After three weeks of reviewing first-preference selections, the faculty-level Scientific Research Committee filters students with second preferences and research advisors with available research topics.
 - This list is sent to faculty members who still need students or research groups.

Step 5: Repeat Step 2, the process continues for students with a second choice.

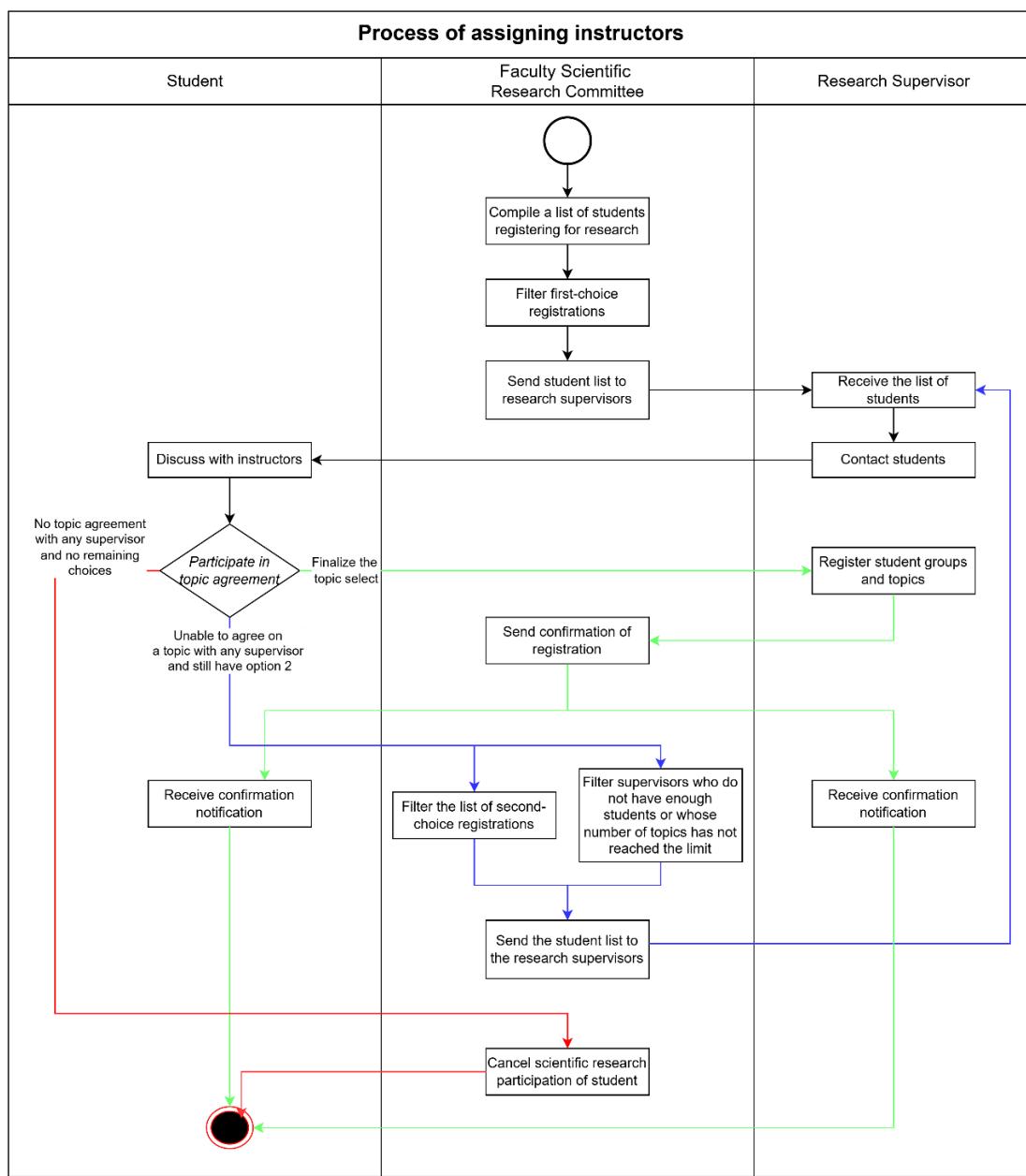


Figure 2.2 Process of assigning research instructors

2.2.3. Process of submitting and reviewing research topics

Step 1: Faculty-level Scientific Research Committee Announces Submission Deadline

- The committee informs students about the submission schedule for the research proposal.

Step 2: Students develop and complete their research proposals.

Step 4: Students submit their research proposals to the faculty-level Scientific Research Committee.

Step 5: Faculty-level Scientific Research Committee

- Collects all submitted proposals.
- Each faculty/institute establishes a specialized evaluation committee to assess the proposals.

Step 6: Committee evaluates proposals

- Reviews the content of the research proposals.
- If revisions are needed, the committee provides feedback to the student and faculty advisor.

Step 7: Students Revise the Proposal

- Students receive feedback and make necessary revisions.
- Once the revisions are complete, the proposal undergoes re-evaluation.

Step 8: Proposal Evaluation Committee Final Decision

- If the proposal meets the requirements, the committee approves it and adds it to the list of approved proposals.
- If the proposal is not approved, it is placed in a list of rejected proposals.

Step 9: Faculty-level Scientific Research Committee

- Sends approval notifications to students and faculty advisors.
- Submits the list of approved proposals to the Scientific Research Department.

Step 10: Scientific Research Department

- Reviews the approved proposal list and provides final confirmation.
- Sends official approval notifications to faculty research committees, research advisors, and students.

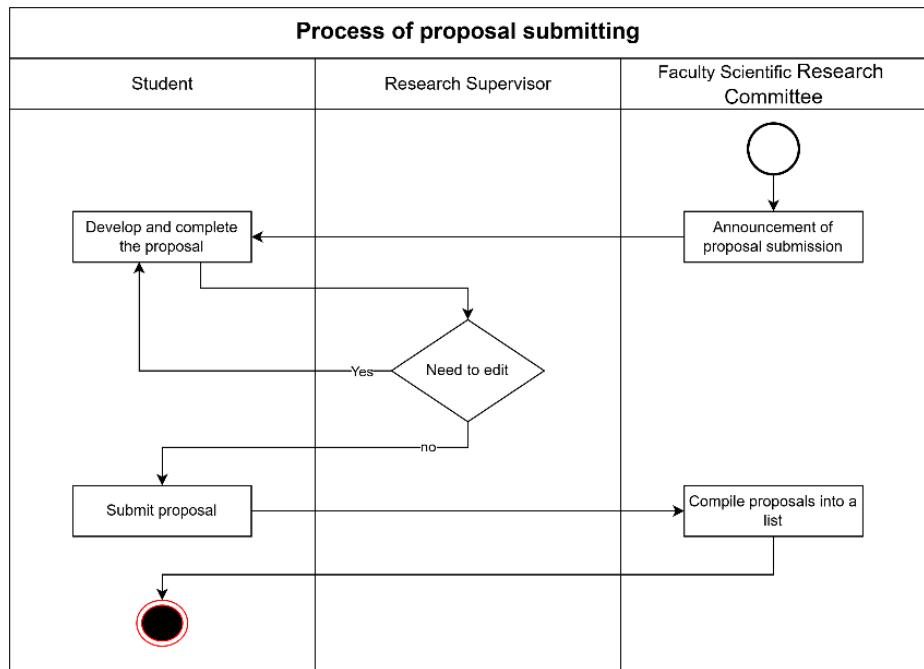


Figure 2.3 Process of proposal submitting

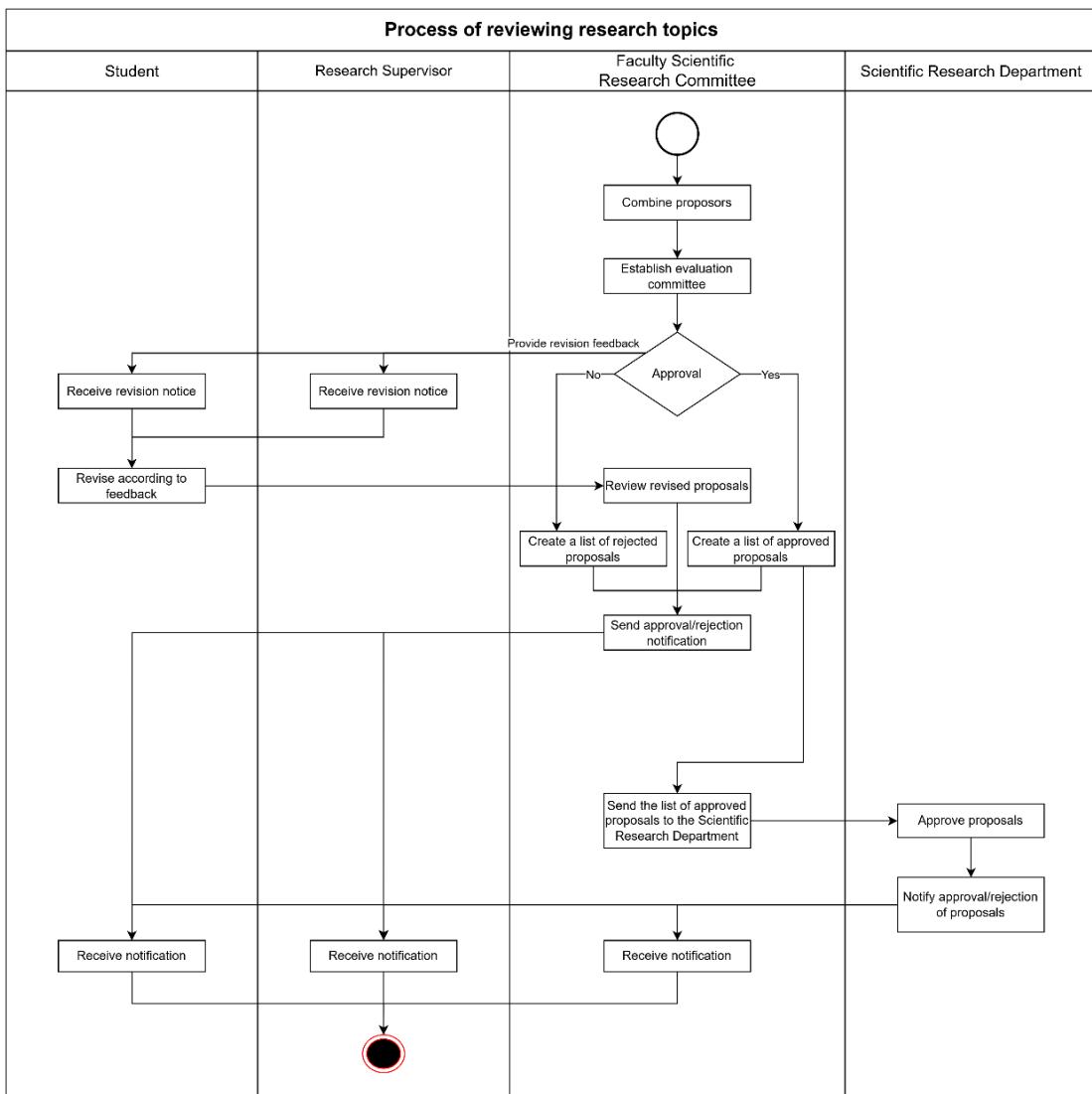


Figure 2.4 Process of reviewing topics

2.2.4. Process of Reporting Research

Step 1: The faculty advisor assigns specific research tasks to the student.

Step 2: The student carries out research according to the assigned tasks.

Step 3: The student submits a progress report to the faculty advisor.

Step 4: Faculty Advisor Evaluates Report and Provides Feedback.

- If the report meets requirements: Proceed to Step 6.
- If the report does not meet requirements: The faculty advisor extends the deadline for revisions.

Step 5: Revision and Resubmission

- The student makes necessary revisions based on the faculty advisor's feedback.
- The student resubmits the revised report for re-evaluation.

Step 6: Research Progress Review

- If the research is incomplete: The faculty advisor assigns new tasks for continued research.
- If the research is complete: The student concludes the research.

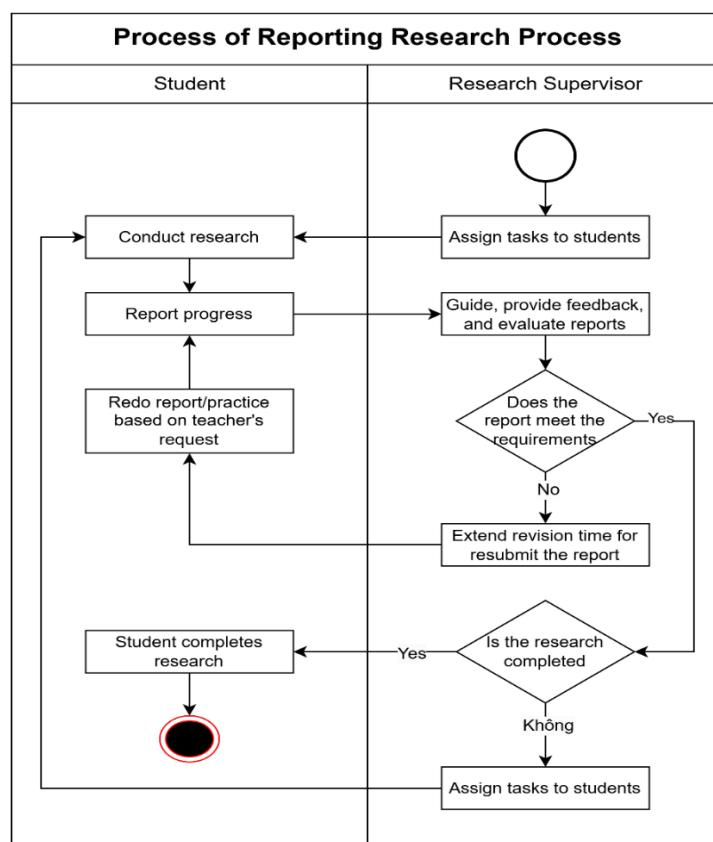


Figure 2.5 Process of Reporting Research

2.2.5. Process of topic approval at faculty-level

Step 1: The Faculty Scientific Research Committee informs students about the deadline for submitting their reports.

Step 2: Students submit their research reports.

Step 3: Faculty Research Committee

- Compiles a list of completed research projects.
- Establish a grading committee.
- Schedules presentation sessions.
- Send the presentation schedule to students, faculty advisors, and the grading committee.

Step 4: Grading Committee

- Reviews and evaluates the research projects.
- Provides scores and feedback for revisions if necessary.

Step 5: Students and their faculty advisors receive evaluation results.

Step 6: The Faculty Scientific Research Committee archives the final results of the research projects.

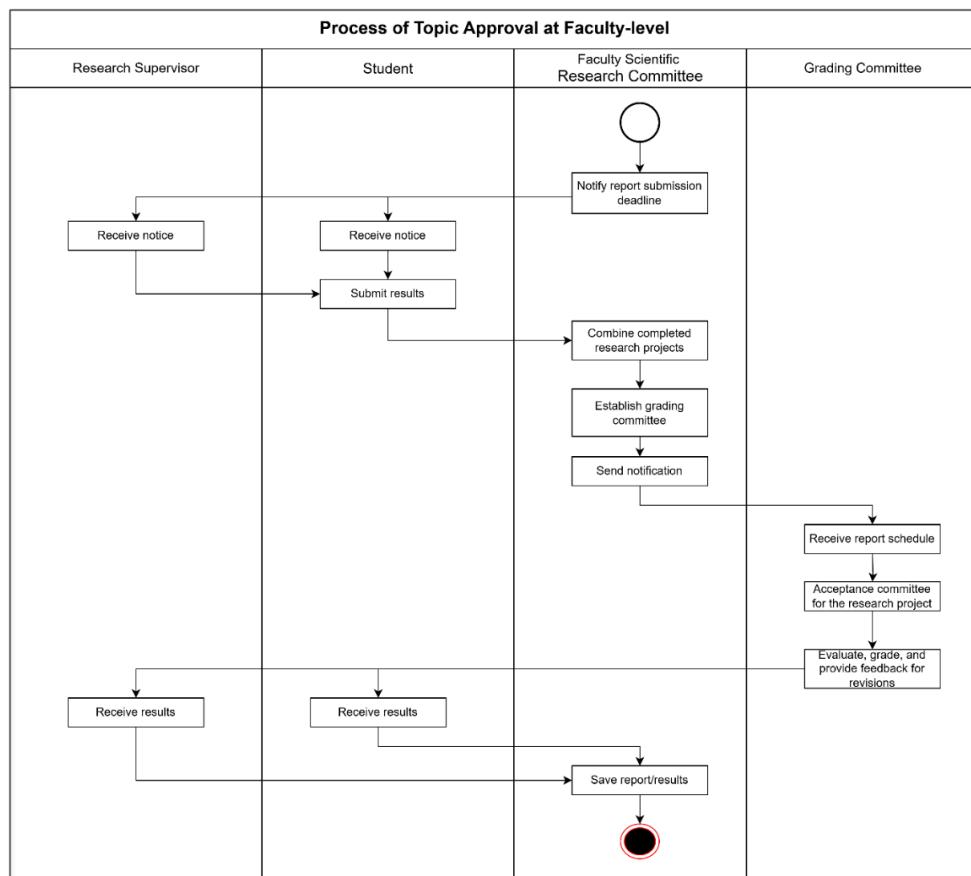


Figure 2.6 Process of topic approval at faculty-level

2.2.6. Process of reporting at university-level

Step 1: Each Faculty/Institute Scientific Research Committee selects projects with scores of 80 or higher and submits the list to the University Research Office.

Step 2: Scientific Research Department

- Compiles the list of projects eligible for the university-level presentation.
- Establish a grading committee.
- Schedules presentation sessions.
- Send the presentation schedule to students, faculty advisors, and the grading committee.

Step 3: Students, the Scientific Research Department, and the grading committee participate in the evaluation process.

Step 4: The committee evaluates the projects, provides feedback for revisions, and awards top-performing students.

Step 5: Students, Faculty Research Committees, and the Scientific Research Department receive the final evaluation results.

Step 6: The Scientific Research Department archives project records and officially announces the results.

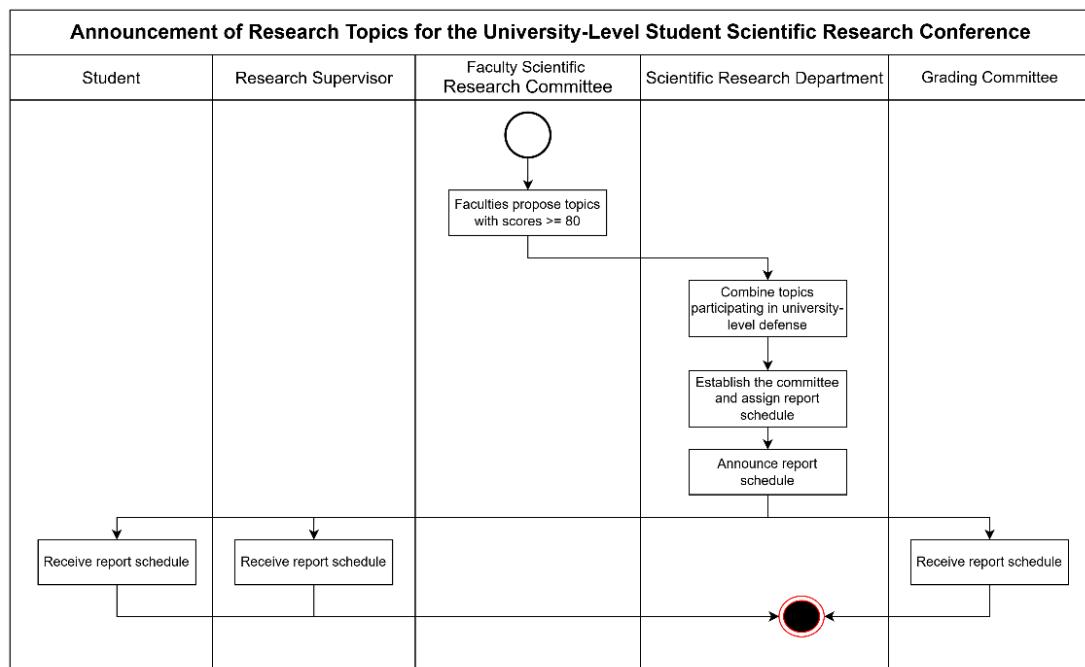


Figure 2.7 University-Level Student Research Topics Announced

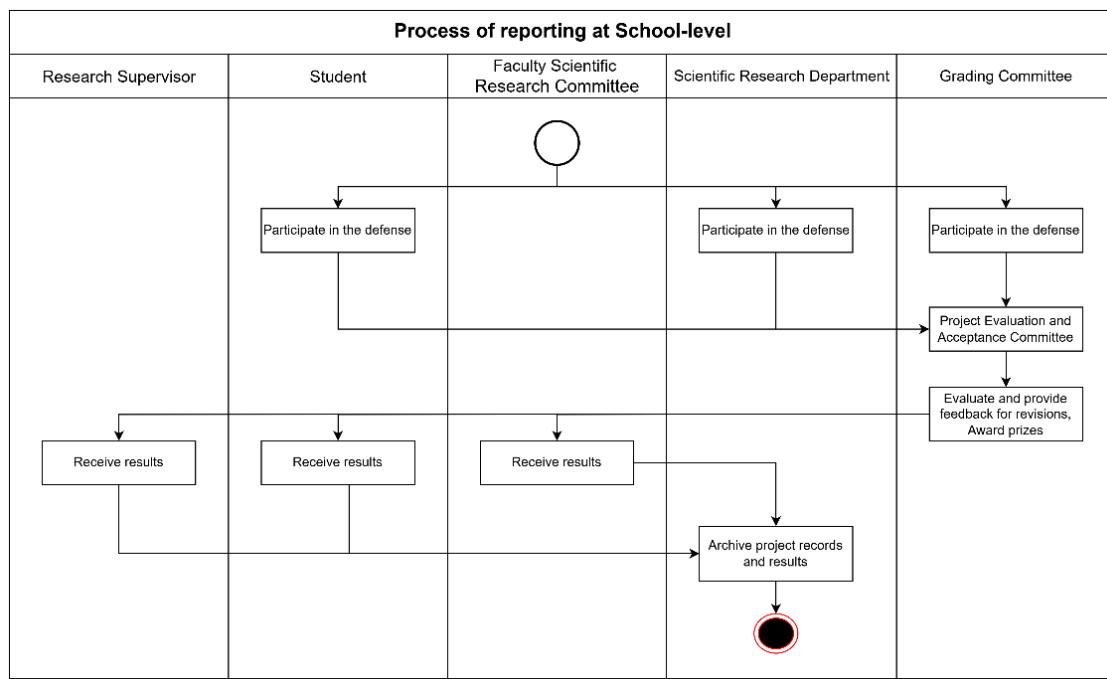


Figure 2.8 Process of reporting at university-level

2.2.7. Process of changing the research topic

Step 1: Student Submits a Request

- The student submits a request to change the project title along with a revised research proposal.
- The request must be submitted within four months from the initial approval of the project.

Step 2: The project supervisor reviews the request and decides:

- If not approved, the student is notified of the rejection.
- If approved, the supervisor forwards the request to the Faculty Scientific Research Committee and notifies the student.

Step 3: Scientific Research Committee Evaluation

- If not approved, the student and faculty advisor are informed of the rejection.
- If approved, the request is forwarded to the Scientific Research Department for final approval.

Step 4: Scientific Research Department Final Review

- If not approved, the student and faculty advisor are informed.
- If approved, the new project title is officially updated in the system, and confirmation is sent to the student, faculty advisor, and faculty scientific research team.

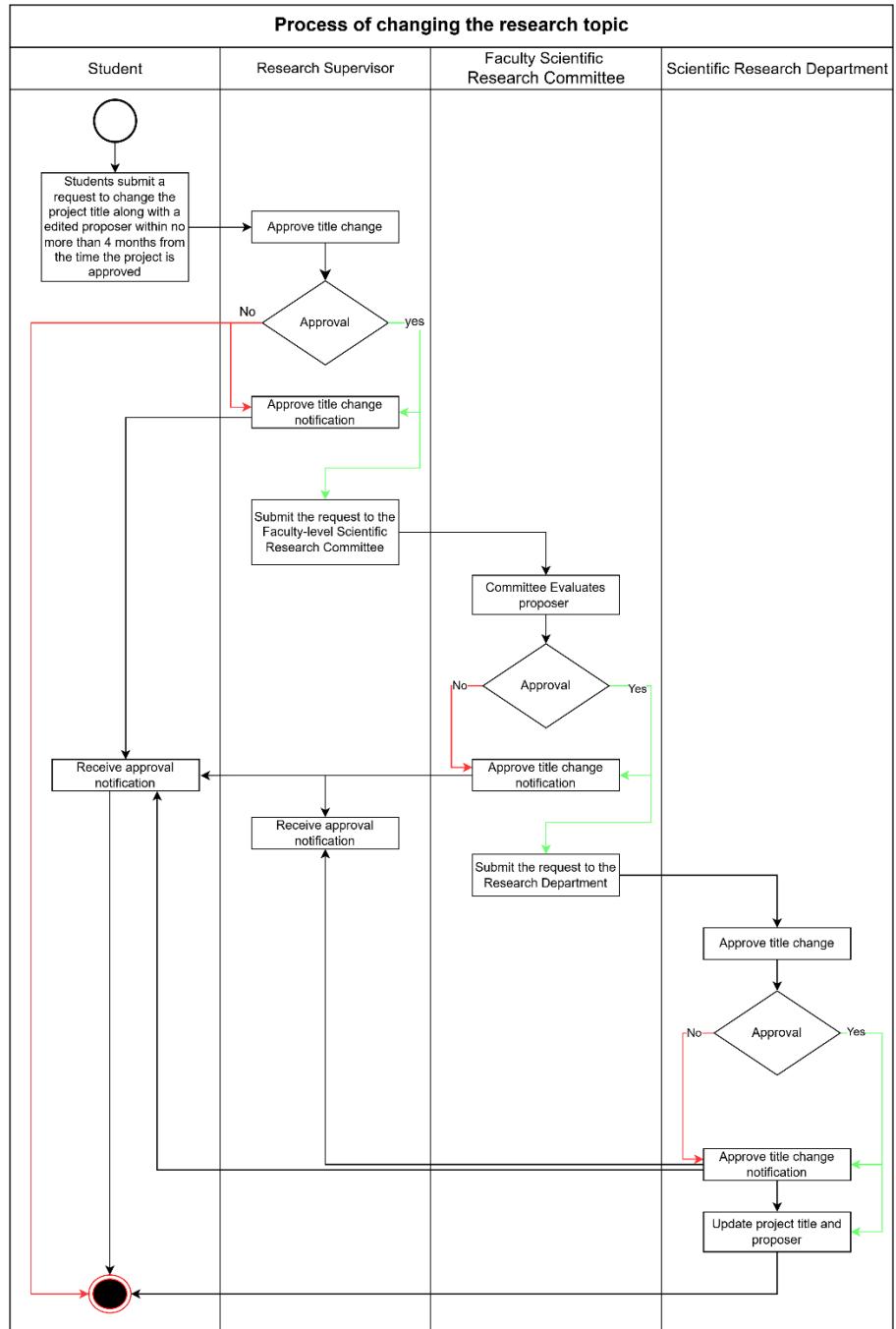


Figure 2.9 Process of changing the research topic

2.2.8. Process of changing the research advisor

Step 1: The student submits a formal request to change their research supervisor.

Step 2: The current supervisor reviews the request:

- If rejected, the student is notified of the rejection.
- If approved, the request is forwarded to the new supervisor for review.

Step 3: The new supervisor reviews the request:

- If rejected, the student is notified of the rejection.

- If approved, the request is forwarded to the Faculty Scientific Research Committee for further evaluation.

Step 4: The Faculty Scientific Research Committee Review

- If rejected, the student and supervisors are notified.
- If approved, the request is forwarded to the Scientific Research Department for final approval.

Step 5: The Scientific Research Department makes the final decision:

- If rejected, the student and supervisors are notified.
- If approved, the student and supervisors are notified, the new supervisor is officially assigned, and the change is updated in the system.

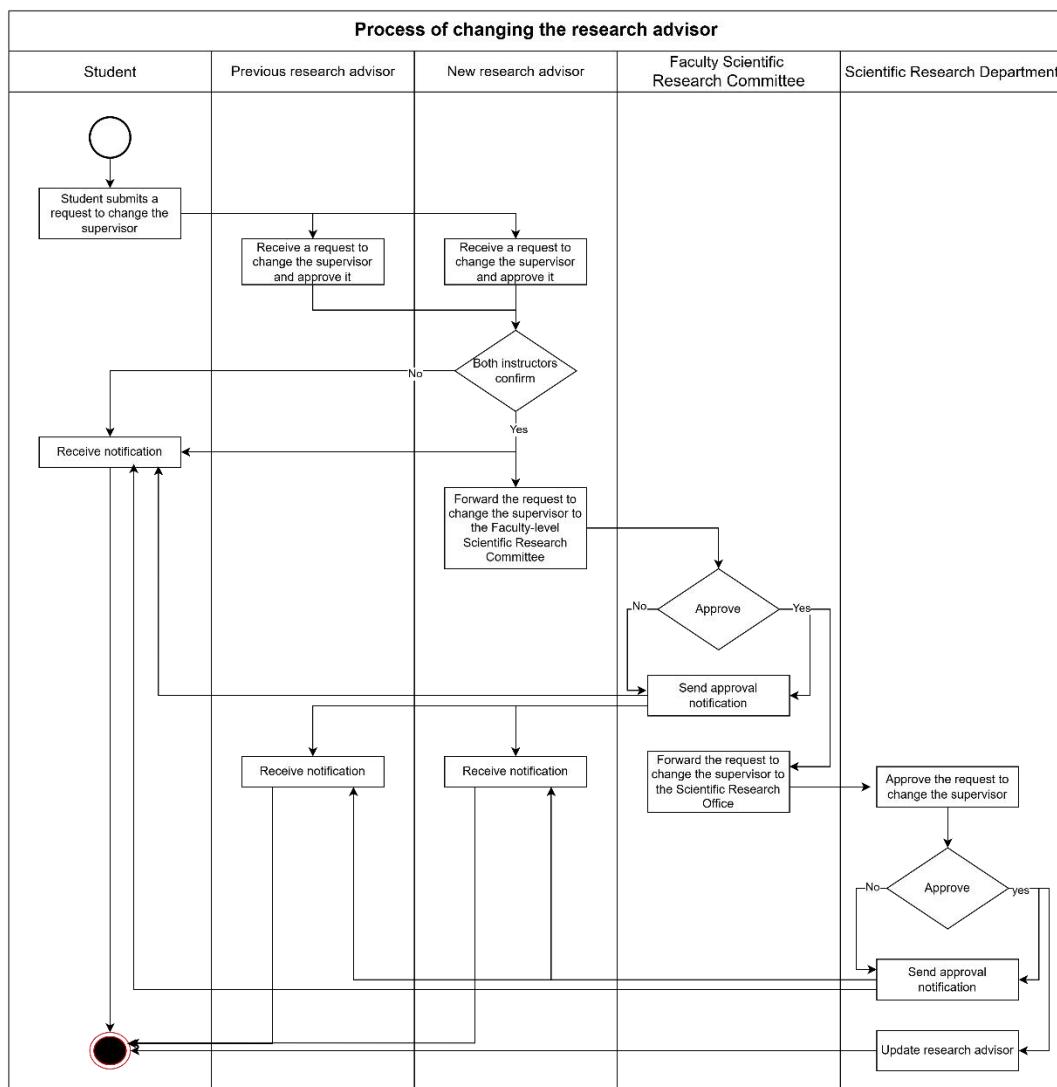


Figure 2.10 Process of changing the research advisor

2.2.9. Process of student requesting to stop implementing the research topic

Step 1: The student submits a formal request to stop their research project.

Step 2: The project supervisor reviews the request:

- If rejected, the student is notified of the rejection.
- If approved, the request is forwarded to the Faculty Scientific Research Committee for evaluation.

Step 3: The Faculty Scientific Research Committee reviews the request:

- If rejected, the student is notified of the rejection.
- If approved, the request is forwarded to the Scientific Research Department for final approval.

Step 4: The Scientific Research Department makes the final decision:

- If rejected, the student is notified of the rejection.
- If approved, the Scientific Research Department updates the research database and officially records the project's termination for current students.

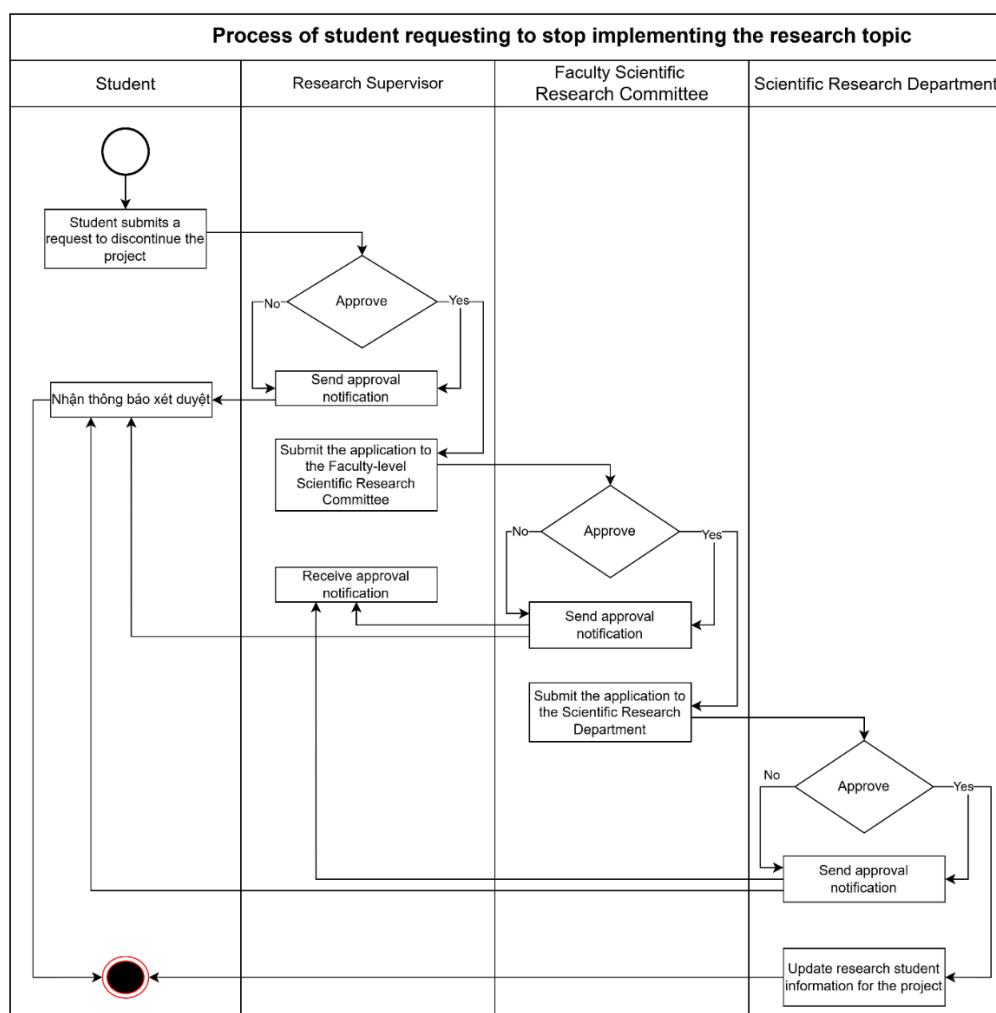


Figure 2.11 Process of student requesting to stop implementing the research topic

2.3. System requirements identification

2.3.1. Functional requirements

- a) Account management
 - Allows users to view and update their account information.
 - The department scientific research team can create accounts for their respective faculty.
 - The scientific research office can create accounts for all departments.
- b) Topic management
 - Enables faculty advisors to register, edit or remove scientific research groups.
 - Students and faculty advisors can view information on topics they are associated with.
 - The department scientific research team can view topic groups within their department.
 - The scientific research Office can view topic groups across the entire university.
 - Allows the department scientific research team and the scientific research office to export research group lists.
- c) Committee management
 - Enables the department scientific research team to view proposal approval committee, and the scientific research office to view assign topic evaluation committees.
- d) Proposal management
 - The scientific research office can send notifications requesting students to submit their research proposals.
 - Students and their research advisors receive notifications regarding proposal submission requests.
 - Students can submit their proposals, and research advisors are notified when a student submits or updates a proposal.
 - The department scientific research team can assign committees to review proposals, and committee members receive notifications upon assignment.
 - The scientific research office, and the assigned review committees can view the list of assigned proposals.

- Committees and the scientific research office can review and approve research proposals. The scientific research office can only approve a proposal after it has been approved by the proposal review committee.
- Students and research advisors receive notifications of the proposal review results and can track the review progress.

e) Faculty-level topic approval management

- The department scientific research team can send notifications requesting students to submit their final research outcomes, and students, research advisors receive these notifications.
- Students can submit their final research outcomes.
- The department scientific research team can assign review committees for topic evaluation, and committee members receive notifications of their assignments.
- The scientific research office, review committees, and the department scientific research team can view committee assignments.
- The review committee evaluates and approves research topics.
- Students, research advisors, the department scientific research team, and the scientific research office can view the approval results.

f) University-level defense management

- The department scientific research team can nominate research topics for university-level defense.
- Students and research advisors receive notifications of their nomination.
- The scientific research office assigns a scoring committee for evaluation.
- The scientific research office and the scoring committee can view assigned topics.
- The scientific research office records the evaluation results.
- Relevant stakeholders can view the final scores and evaluation outcomes.

2.3.2. *Non-functional requirements*

- Security:
 - User authentication via account and password.
 - OTP via email for password reset or email changes.

- Clear role-based access control for Admin, Research advisor, Students, Scientific Research Team, Scientific Research Office.
- Performance:
 - The system runs smoothly with at least 500 concurrent users.
 - Optimized queries to prevent system slowdowns.
- Usability:
 - User-friendly interface with easy navigation.
 - Status notifications for request submissions, approvals, and data updates.
- Integration and Compatibility:
 - Fully functional on Chrome, Firefox, and Edge.

CHAPTER 3: SYSTEM ANALYSIS

3.1. Functional decomposition

3.1.1. Identifying and grouping functions

Table 3.1 Grouping functions table

No.	Function name	Function group
1	View account information	Account management
2	Update profile	
3	Add account(s)	
4	View account list	
5	Login	
6	Logout	
7	Change password	
8	Forgot password	
9	Add research topic	Topic management
10	Modify research topic information	
11	Delete research topic	
12	View research topic list	
13	Export topic list	
14	View research topic's details	
15	View Committee	Committee management
16	Track topic approval	Proposal management
17	Send proposal submission request notification	
18	Submit proposal	
19	Assign proposal approval committee	
20	View the list of assigned proposal approvals	
21	Approve the proposal	
22	Track topic evaluation	Department-level research topic approval management
23	Request student(s) to submit final result	
24	Student submit final result	
25	Establish research topic approval committee	
26	Approve research topic	

27	View detailed topic approval information	
28	View the list of assigned topic approvals	
29	Track topic grading	
30	Nominate research topics for university defense	University-level research topic defense management
31	Establish grading committee	
32	Enter evaluation results	
33	View grading results	

3.1.2. Functional decomposition diagram

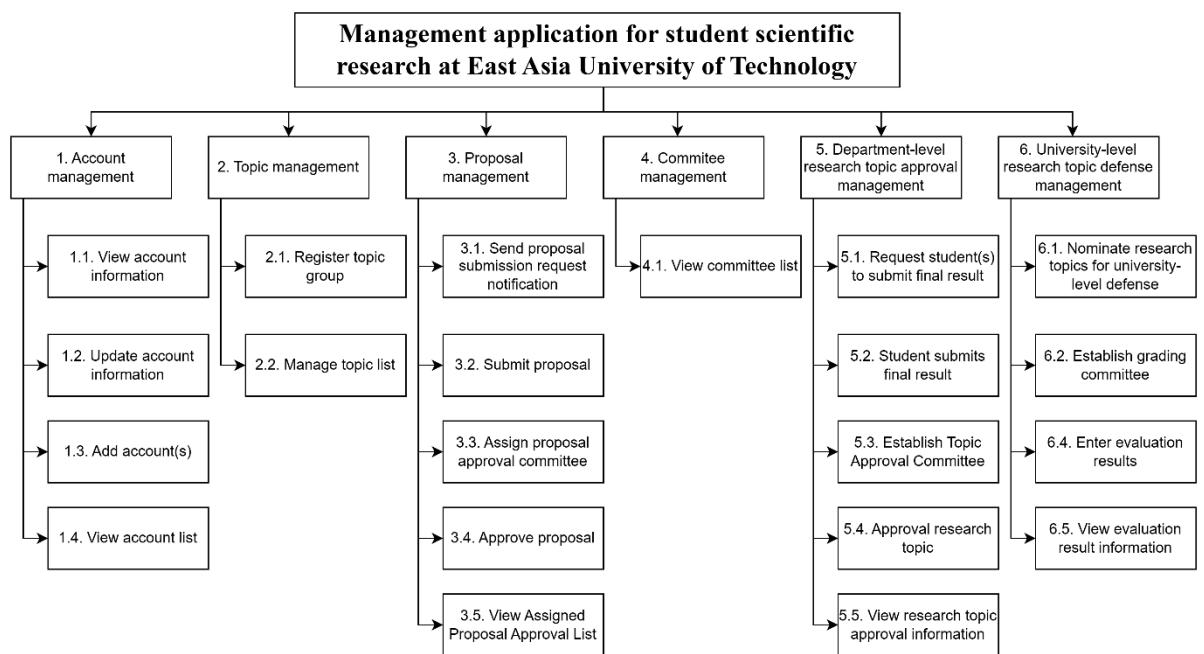


Figure 3.2 Functional decomposition diagram

3.2. Functional specification

3.2.1. Account management

- a) View account information

Table 3.3 View account information specification

Function name	View account information
Description	Allows users to view their account details based on his/her role
Role	All user
Preconditions	The user must be authenticated
Postconditions	
Input	Account ID
Output	<p>Account information:</p> <ul style="list-style-type: none"> • General: Full name, email, phone number, avatar • Student: Student code, class name, department • Teacher: Academic title, department • Department-level scientific research team: Department
Main flow	<ol style="list-style-type: none"> 1. User clicks the “Avatar” button. 2. The system retrieves account details using the Account ID provided. 3. System displays the account information to the user via a popup.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Update profile 2. Change Password

- b) Update account information

Table 3.4 Update account information specification

Function name	Update profile
Description	Allow users to update their account details based on his/her role
Role	All users
Preconditions	The user must be authenticated

Postconditions	<ol style="list-style-type: none"> 1. The updated account information is successfully saved in the system. 2. The user receives a confirmation message upon successful update.
Input	<p>Changed information:</p> <ul style="list-style-type: none"> • General: Email, phone number, avatar • Teacher: Academic title
Output	Confirmation message
Main flow	<ol style="list-style-type: none"> 1. Users click the “Avatar” button. 2. The user edits their account information in the form fields. 3. The user clicks the “Save” button. 4. The system validates the input data: <ul style="list-style-type: none"> • Ensures required fields are filled. • Checks for valid email format and phone number. 5. If the data is valid, the system updates the account information in the database. 6. The system displays a confirmation message indicating a successful update.
Alternative flows	<ol style="list-style-type: none"> 1. Invalid Input: If required fields are missing or contain incorrect data, the system displays an error message and prompts the user to correct the input. 2. System Error: If the update process fails due to a technical issue, the system notifies the user and suggests retrying later.
Related functions	<ol style="list-style-type: none"> 1. View Account Information 2. Change Password

c) Add account

Table 3.5 Add account specification

Function name	Add new account
Description	This function allows the scientific research office to create new accounts for all users and allows the department scientific research team to create teacher and student accounts only within their department scope.
Role	Scientific research office, department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated 2. User's role is scientific research office or department scientific research team
Postconditions	The new account is successfully created and stored in the system.
Input	<p>Account information:</p> <ul style="list-style-type: none"> • General: Full name, email, phone number, password, user role (Student, Teacher, Department Scientific Research Team) • Student: Student code, class name, Training program, department, major • Teacher: Academic title, major, department • Department-level scientific research team: Department
Output	Confirmation message
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the Account List page. 2. The user clicks the “Add New” button. 3. A popup appears with the Add new account form. 4. The user enters the required account details. 5. The user clicks the “Save” button. 6. The system validates the input: <ul style="list-style-type: none"> • Checks if required fields are filled. • Ensures the email format is valid and unique.

	<ul style="list-style-type: none"> • Enforces department-level restrictions for the Department Scientific Research Team. <p>7. If the input is valid:</p> <ul style="list-style-type: none"> • The system creates the account in the database. • Send a success notification. <p>8. If the input is invalid, the system displays an error message specifying the issue.</p>
Alternative flows	<ol style="list-style-type: none"> 1. Unauthorized action: If the department scientific research Team tries to create an account outside their department, the system prevents the action and shows an error message. 2. System error: If account creation fails due to a technical issue, the system notifies the user and suggests retrying later.
Related functions	<ol style="list-style-type: none"> 1. View Account Information 2. Update profile

d) View account list

Table 3.6 View account list specification

Function name	View account list
Description	This function allows authorized users to view and manage a list of accounts. The scientific research office can view all accounts, while the department scientific research team can only view accounts within their department.
Role	Scientific research office, department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the appropriate permissions to view the account list.
Postconditions	<ol style="list-style-type: none"> 1. If successful, the system displays a list of accounts based on the applied filters.

	<p>2. If an error occurs, the system displays an appropriate error message.</p>
Input	<p>Filter Options (optional):</p> <ul style="list-style-type: none"> • Search by full name, email, phone number, student • Filter by Role (Student, Teacher, Department Scientific Research Team, Scientific Research Office) • Filter by Department
Output	<p>A table displaying account details:</p> <ul style="list-style-type: none"> • Full Name • Email • Phone Number • Role • Department
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Account List” page. 2. The system retrieves the list of accounts based on the user's role and department. 3. The user can apply filters to refine the search. 4. The system updates the displayed list according to the selected filters. 5. The user can click on an account to view detailed information.
Alternative flows	<ol style="list-style-type: none"> 1. System error: If a technical issue occurs, an error message is displayed, prompting the user to retry later.
Related functions	Add new account

e) Update password

Table 3.7 Update password specification

Function name	Update password
Description	Allow users to update their account password
Role	All users
Preconditions	The user must be authenticated

Postconditions	<ol style="list-style-type: none"> If successful, the user's password is updated, and a confirmation message is displayed.
Input	<ol style="list-style-type: none"> Current password New password Confirm password
Output	Confirmation message
Main flow	<ol style="list-style-type: none"> The user clicks the “Avatar” button, a popup with account information appears. The user clicks “Change Password”, another popup with change password form appears. The user enters the form. The system verifies the current password. The system checks if the new password meets security requirements (e.g., length, special characters, etc.). If validation passes, the system updates the password and displays a success message.
Alternative flows	<ol style="list-style-type: none"> Incorrect current password: If the entered current password is incorrect, the system shows an error message: “The current password is incorrect. Please try again.” New password does not meet requirements: If the new password is too weak, the system shows an error message: “Your password must be at least 8 characters long and include uppercase, lowercase, number, and a special character.” New password and confirm password do not match: The system shows an error message: “New password and confirm password do not match.” System error: If a technical issue occurs, the system displays an error message and asks the user to try again later.

Related functions	1. Forgot Password 2. View Account Information
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f) Forgot the password

Table 3.8 Forgot the password specification

Function name	Forgot the password
Description	Allow users to reset their password if they forget it. The system will send a OTP code to the user's registered email.
Role	All user
Preconditions	The user must have a registered email in the system.
Postconditions	1. If successful, the user receives a password reset email. 2. If an error occurs, the system provides feedback on what went wrong.
Input	Email
Output	1. Confirmation message: “An OTP code has been sent to your email.” 2. Error message if email is not found: “No account is associated with this email.”
Main flow	1. The user is on the Login page and clicks Forgot password. 2. A popup appears with a form to enter the registered email. 3. The user enters their email and clicks “Submit”. 4. The system checks if email exists in the database. 5. If the email exists: <ul style="list-style-type: none">• The system generates a 6-digit OTP.• The system sends the OTP to the user's email.• A new popup appears asking the user to enter the OTP. 6. The user enters the OTP and clicks “Verify”. 7. The system checks if the OTP is correct and still valid. 8. If the OTP is correct:

	<ul style="list-style-type: none"> • The system generates a new password. • The system sends the new password to the user's email. • The system displays a message: "Your password has been reset. Please check your email for the new password."
Alternative flows	<ol style="list-style-type: none"> 1. Email Not Found: "No account is associated with this email." 2. If the user enters an incorrect OTP, the system displays an error message: "Invalid or expired OTP. Please try again." 3. The user can request a new OTP if needed.
Related functions	Login

g) Login

Table 3.9 Login specification

Function name	Login
Description	Allow users to log into the system using their email and password.
Role	All users
Preconditions	The user must have a registered account.
Postconditions	<ol style="list-style-type: none"> 1. If authentication is successful, the user is redirected to the home page. 2. If authentication fails, an error message is displayed.
Input	<ol style="list-style-type: none"> 1. Email / Phone number 2. Password
Output	Redirect to the user's home page
Main flow	<ol style="list-style-type: none"> 1. The user enters their email and password on the login page. 2. The system validates the input fields. 3. The system checks the email and password against the stored credentials.

	<p>4. If the credentials are correct:</p> <ul style="list-style-type: none"> • The system saves the account session and cookie for authentication. • The user is redirected to the home page. <p>5. If the credentials are incorrect, the system displays an error message.</p>
Alternative flows	If the user enters an incorrect email or password, an error message is displayed: “Invalid email or password. Please try again.”
Related functions	

h) Logout

Table 3.10 Logout specification

Function name	Logout
Description	Allow users to securely log out of the system, ending their session.
Role	All users
Preconditions	The user must be logged in.
Postconditions	<ol style="list-style-type: none"> 1. The user's session is terminated. 2. The user is redirected to the login page.
Input	
Output	
Main flow	<ol style="list-style-type: none"> 1. The user clicks the “Logout” button in the top bar. 2. The system clears the user's session and authentication cookies.
Alternative flows	
Related functions	Login

3.2.2. Topic management

a) Add research topic

Table 3.11 Add research topic specification

Function name	Add research topic
Description	The research advisor can add a research topic
Role	Research advisor
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated and authorized 2. The research advisor must have registered less than 2 research topics 3. Each student must not be involved in another research group per year
Postconditions	<ol style="list-style-type: none"> 1. Research advisor has registered less than 2 topic group 2. Each student hasn't been involved in any group topic
Input	<ol style="list-style-type: none"> 1. Topic title 2. Student list (Max is 5 students). Each student has: <ul style="list-style-type: none"> • full name • student code • class name • phone number • email • role 3. Teacher account ID (Max is 2 advisors) 4. Note
Output	Confirm message, Error
Main flow	<ol style="list-style-type: none"> 1. The advisor navigates to “Research topic management”. 2. Enters the Topic Title. 3. Adds students (max 5 members): <ul style="list-style-type: none"> • Enters “Student code”, system Auto-fills if the student exists. • If student is new, research advisor manually enters details.

	<ul style="list-style-type: none"> • Assigns “Role” for student (Leader/Member). <p>4. Enter teacher’s email or phone number, if it’s correct, their name will be displayed.</p> <p>5. Enters any notes.</p> <p>6. Clicks “Submit”, The system checks:</p> <ul style="list-style-type: none"> • If the research advisors have fewer than 2 topics registered in the current year. • If a student is new, adds them to the “Student” table. • If a student exists, updates their details. • Inserts the topic into the “Topic” table.
Alternative flows	<ol style="list-style-type: none"> 1. Advisor already registered 2 topics: System displays an error and prevents submission. 2. Student already in another research group: System blocks submission and alerts the advisor.
Related functions	<ol style="list-style-type: none"> 1. Modify research topic 2. View research topic list

b) Modify research topic information

Table 3.12 Modify research topic information specification

Function name	Modify research topic information
Description	The research advisor can modify student information, remove students from the topic group, or update student details and topic title when the topic is in the “Pending” status.
Role	Research advisor
Preconditions	<ol style="list-style-type: none"> 1. User must be authenticated. 2. User must have “Research advisor” role.
Postconditions	The system updates the research topic information successfully.
Input	<ol style="list-style-type: none"> 1. Account ID 2. Topic ID 3. Teacher IDs

	4. Updated Student Information (if applicable) 5. Updated Topic Title (if applicable)
Output	Confirmation message indicating successful modification.
Main flow	1. User goes to the “Research topic management” page 2. User selects a topic and click “Edit” button 3. System verifies the user’s role and permissions 4. System checks the topic’s status 5. User updates student information 6. User modifies the topic information 7. System validates the changes and updates the database. 8. System displays a success message
Alternative flows	If user lacks permission, the system denies access and shows a warning.
Related functions	View research topic list

c) Delete research topic

Table 3.13 Delete research topic specification

Function name	Delete research topic
Description	A research advisor can delete a research topic
Role	Research advisor
Preconditions	1. The research topic has not been notified for proposal submission. 2. The person attempting to delete the topic is the one who created it.
Postconditions	If successful, the research topic is deleted from the system
Input	Topic ID
Output	1. Success: Confirmation message that the topic was deleted. 2. Failure: Error message indicating why the topic could not be deleted.
Main flow	1. The research advisor navigates to the “Research topic management” page.

	<ol style="list-style-type: none"> 2. The research advisor selects a topic to delete. 3. The system checks if: <ul style="list-style-type: none"> • The topic status is “Pending” • The research advisor is the one who created the topic. 4. If both conditions are met, the system deletes the topic. 5. The system confirms successful deletion.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Notify research proposal submission 2. View research topic list

d) View research topic list

Table 3.14 View research topic list specification

Function name	View research topic list
Description	<ol style="list-style-type: none"> 1. Students and research advisors can view the topics they have participated in. 2. The department scientific research team can view all topics belonging to their department. 3. The scientific research office can view all research topics across departments.
Role	<ol style="list-style-type: none"> 1. Student research advisor 2. Department scientific research team 3. Scientific research office
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the appropriate permissions based on their role.
Postconditions	The system retrieves and displays the correct list of research topics based on the user’s role and applied filters.
Input	<ol style="list-style-type: none"> 1. Account ID (Identifies the user and their role) 2. Filters (Optional): <ul style="list-style-type: none"> • Status • Free-text search on topic title and note • Year

	<ul style="list-style-type: none"> • Department
Output	<p>A table containing a list of research topics with the following columns:</p> <ol style="list-style-type: none"> 1. The order number 2. Status 3. Topic Title 4. Note 5. Actions: <ul style="list-style-type: none"> • View Details • Delete
Main flow	<ol style="list-style-type: none"> 1. User accesses the “Research topic management” page. 2. The system retrieves topics based on the user’s role and permissions. 3. The system applies filters (if provided). 4. The system displays a list of topics on the table. 5. The user can interact with the available actions (view details, delete).
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. View Research topic details 2. Delete research topic 3. Export research topic list

e) Export to list

Table 3.15 Export to list specification

Function name	Export topic list
Description	This function allows authorized users to export a list of research topics into Excel file.
Role	Department scientific research team, Scientific research office
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must belong to one of the authorized roles.
Postconditions	The system generates and downloads the research topic list.

Input	List of topic IDs
Output	Word file
Main flow	<ol style="list-style-type: none"> 1. The user accesses the “Research topic management” page. 2. The user selects filters. 3. The system retrieves the research topics based on the user’s role and applied filters. 4. The system generates the export file. 5. The system returns the file for automatically downloading.
Alternative flows	<ol style="list-style-type: none"> 1. If no topics match the filters, the system displays a “No data available” message. 2. If export fails due to system error, the system shows an error message.
Related functions	View research topic list

f) View research topic’s details

Table 3.16 View research topic’s details specification

Function name	View research topic’s details
Description	Displays detailed information about a selected research topic.
Role	Student, research advisor, department scientific research team, scientific research office
Preconditions	<ol style="list-style-type: none"> 1. User must be authenticated. 2. Users must have the required permissions.
Postconditions	System retrieves and displays topic details.
Input	<ol style="list-style-type: none"> 1. Account ID 2. Topic ID
Output	<ol style="list-style-type: none"> 1. Basic Topic Information: <ul style="list-style-type: none"> • Created date • Topic Title • Note

	<ul style="list-style-type: none"> • Status <p>2. Student(s) information:</p> <ul style="list-style-type: none"> • Full name • Class name • Student code • Department • Email • Phone number <p>3. Research advisor information:</p> <ul style="list-style-type: none"> • Full name • Academic Title • Department • Email • Phone Number <p>4. Proposal approval:</p> <ul style="list-style-type: none"> • Proposal file • Proposal submission date • Status • Feedback <p>5. Department-level evaluation:</p> <ul style="list-style-type: none"> • Final results files • Average score • “View evaluation details” button to view details <p>6. University-level evaluation:</p> <ul style="list-style-type: none"> • Average score • All scores from committee members • Supporting images of evaluation documents • Awards (if any)
Main flow	<ol style="list-style-type: none"> 1. User goes into the “Research topic management” page 2. User selects a research topic and the click “View details” button from the list.

	<ol style="list-style-type: none"> 3. System verifies user role and permissions. 4. System retrieves topic details. 5. System displays topic details.
Alternative flows	If the user lacks permission, the system denies access and shows a warning.
Related functions	<ol style="list-style-type: none"> 1. View Research Topic List 2. Edit Research Topic 3. Evaluate research topic proposal 4. Evaluate research topic 5. Enter evaluation results

3.2.3. Committee management

a) View committee

Table 3.17 View committee specification

Function name	View committee list
Description	The department-level scientific research team can only view committees within their department and committee type is Proposal review committee and Topic evaluation committee, while the scientific research office can view all committees.
Role	Department-level scientific research team, scientific research office
Preconditions	The user must be authenticated and have the appropriate role to access committee information.
Postconditions	The system displays the list of committees based on the user's role and department access.
Input	<p>Filter (Optional):</p> <ul style="list-style-type: none"> • Search input, applied to (Committee's name, member's name, topic's name) • Type of committee • Department

Output	<ol style="list-style-type: none"> 1. Topic's name 2. Committee name 3. Committee type 4. "View members" button.
Main flow	<ol style="list-style-type: none"> 1. User navigates to the "Committee management" page. 2. The system retrieves committees based on the user's role. 3. If filters are applied, the system filters the committee list accordingly. 4. The system displays the list of committees with relevant details.
Alternative flows	User lacks permission: If the user does not have the required role, the system denies access and shows an error message
Related functions	<ol style="list-style-type: none"> 1. Assign committee for proposal review 2. Assign committee for department-level topic approval 3. Assign committee for university-level project defense

3.2.4. *Proposal management*

a) Track proposal management

Table 3.18 Track proposal management specification

Function name	Track proposal management
Description	Allows the department scientific research team to track and manage research proposals, including filtering, viewing, and selecting proposals for further actions.
Role	Department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the Department scientific research team role.
Postconditions	The user can select proposals for further actions such as sending submission request notifications or assigning approval committees.

Input	Filters (Optional): Current stage, proposal status, topic title, year. Current stage is Department approval or University approval.
Output	List of research topics matching the applied filters. Proposal details included: <ol style="list-style-type: none">1. Topic Title2. Created date3. Proposal4. Proposal submission deadline5. Submission date6. Submit date7. Action (Checkbox selection)
Main flow	1. The user navigates to the “Track proposal management” page. 2. The system displays all research topics with relevant details. 3. The user applies filters to refine the list. 4. The system updates the displayed topics based on the filters.
Alternative flows	
Related functions	1. Send proposal submission request notification 2. Assign proposal approval committee

b) Send proposal submission request notification

Table 3.19 Send proposal submission request notification specification

Function name	Send proposal submission request notification
Description	Allow the department scientific research team to send a notification requesting the student to submit their proposals.
Role	Department scientific research team
Preconditions	1. User must be authenticated. 2. Users must have the department scientific research team role.

	<ol style="list-style-type: none"> 3. The system must have research topics with proposal's status "Pending" or "Just Sent Notification".
Postconditions	<ol style="list-style-type: none"> 1. The system sends a notification to the student and research advisor of the selected research topics. 2. The proposal status updated to "Just send notification".
Input	<ol style="list-style-type: none"> 1. Selected Topics. 2. Submission Deadline.
Output	<ol style="list-style-type: none"> 1. Confirmation message indicating successful notification. 2. Updated research topic proposal status to "Just Sent Notification". 3. An account is created for leader student in topic group
Main flow	<ol style="list-style-type: none"> 1. User navigates to the "Track proposal management" page. 2. User filters research topics with proposal status "Pending" or "Just sent notification". 3. Users select topics using checkboxes. 4. User clicks the "Send proposal submission request notification" button. 5. A form appears, prompting the user to enter the "Submission deadline". 6. User clicks "Send". 7. The system validates the deadline and other input fields. 8. If valid, the system sends the notification to the student and research advisor of each selected topic. 9. The proposal status is updated to "Just Sent Notification". 10. An account for leader the student is created 11. The system displays a confirmation message that the notification has been sent.
Alternative flows	<ol style="list-style-type: none"> 1. If there are no topics available for selection, the system disables the action button. 2. If users do not enter a valid deadline, the system prompts for correction.

	3. Notification sending fails (e.g., server error), the system notifies the users.
Related functions	Track proposal management

c) Submit proposal

Table 3.20 Submit final results specification

Function name	Submit proposal
Description	Allow students to submit their proposal document for approval.
Role	Student
Preconditions	The student received a notification requesting proposal submission or the proposal status is “Need to modify”.
Postconditions	<ol style="list-style-type: none"> 1. The system saves the uploaded proposal file. 2. The system notifies the research advisor and the department scientific research team about the submission. 3. Proposal status is changed to “Submitted”
Input	<ol style="list-style-type: none"> 1. Proposal document (Accepted formats: Word, PDF) 2. Note
Output	Confirmation message indicating successful submission.
Main flow	<ol style="list-style-type: none"> 1. The student navigates to the “Research topic management” page. 2. The system displays detailed topic information assigned to the student. 3. The student locates the “Proposal Details” section. 4. The student selects a file (Word/PDF) and clicks “Submit”. 5. The system validates the file and checks preconditions. 6. If valid, the system saves the proposal file. 7. The system sends a notification to the research advisor and the department scientific research team. 8. The system displays a confirmation message indicating successful submission.

Alternative flows	
Related functions	Send proposal submission request notification

d) Assign proposal approval committee

Table 3.21 Assign proposal approval committee specification

Function name	Assign proposal approval committee
Description	Allows the department scientific research team to assign a proposal approval committee.
Role	Department scientific research team
Preconditions	The proposal status must be “Submitted”
Postconditions	The system notifies the assigned committee members.
Input	<ol style="list-style-type: none"> 1. Selected topics 2. Establish committee 3. Location 4. Deadline
Output	Confirmation message
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Track Proposal Management” page. 2. The system displays topics with proposal status “Submitted” 3. The user selects one topic. 4. The user clicks “Assign proposal approval committee”. 5. The system displays an input form. 6. The user selects committee members and assigns the role for each committee member. 7. The user clicks “Submit”. 8. The system assigns the proposal to the selected committee and sends notifications to committee members. 9. The system displays a confirmation message indicating successful assignment.
Alternative flows	
Related functions	Track proposal management

- e) View the list of assigned proposal approvals

Table 3.22 View the list of assigned proposal approvals specification

Function name	View the list of assigned proposal approvals
Description	This function allows the proposal approval committee to view the list of assigned proposal approvals. Users can view proposals within their department's scope, while the scientific research office can view all proposals.
Role	Proposal approval committee, Scientific research office
Preconditions	A proposal approval committee has been assigned to evaluate a topic proposal.
Postconditions	
Input	<ol style="list-style-type: none"> 1. User account ID (to determine access scope) 2. Filters (Optional): <ul style="list-style-type: none"> • Department ID
Output	<p>A list of proposal approval assignments, including:</p> <ol style="list-style-type: none"> 1. Topic title 2. Deadline 3. Proposal file 4. Approval status (Not approved yet, Department approved, Approved, Department rejected, Rejected, Need more work) <p>Action (Evaluate)</p>
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Proposal Approvals Assignment” page. 2. The system displays a table of proposal approval assignments based on applied filters.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Assign proposal approval committee 2. Approving the proposal

f) Approving the proposal

Table 3.23 Approve the proposal specification

Function name	Approving the proposal
Description	This function allows the proposal approval committee to approve the list of assigned proposal approvals. while the scientific research office can approve all proposals.
Role	Proposal approval committee, Scientific research office
Preconditions	The proposal must be assigned to the approval committee
Postconditions	<ol style="list-style-type: none"> 1. The proposal's approval status is updated. 2. The system notifies the student and research advisor about the decision
Input	<ol style="list-style-type: none"> 1. Proposal approval status ID (Approved, Rejected, Need more work) 2. Feedback
Output	<ol style="list-style-type: none"> 1. Updated proposal approval status 2. A notification sent to the student and research advisor after the Scientific research office approve the proposal
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Proposal approvals assignment” page. 2. The system displays a table of assigned proposal approvals. 3. The user clicks the “Evaluate” button for a selected proposal. 4. The system displays a popup for entering evaluation information: <ul style="list-style-type: none"> • A selection field (Approve, Reject, Need more work) • A text input for additional comments. 5. The user clicks “Submit.” 6. The system saves the evaluation and updates the proposal approval status. 7. The system sends a notification to the student and research advisor.
Alternative flows	

Related functions	View the list of assigned proposal approvals
--------------------------	--

3.2.5. Faculty-level topic approval management

a) Track topic evaluation management

Table 3.24 Track topic evaluation management specification

Function name	Track topic evaluation management
Description	Allows the department scientific research team to track and manage topic evaluation, including filtering, viewing, and selecting topic for further actions.
Role	Department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the Department scientific research team role.
Postconditions	The user can select topics for further actions such as sending final result submission request notifications or assigning topic evaluation committees.
Input	Filters (Optional): Topic status, topic title, year
Output	<p>List of research topics matching the applied filters. Topic details include:</p> <ol style="list-style-type: none"> 1. Topic Title 2. Notes 3. Proposal approved date 4. Final result submission deadline 5. Topic status 6. “View final results” button <p>Action (Checkbox selection)</p>
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Track topic evaluation management” page. 2. The system displays all research topics with relevant details. 3. The user applies filters (Proposal status, topic title, year) to refine the list.

	4. The system updates the displayed topics based on the filters.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Send final result submission request notification 2. Assign topic evaluation committee

b) Request student(s) to submit final result

Table 3.25 Request students to submit final results specification

Function name	Send final result submission request notification
Description	Allow the department scientific research team to send a notification requesting the student to submit their final results.
Role	Department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. User must be authenticated. 2. Users must have the department scientific research team role. 3. The topic's status must be "Proposal approved by university"
Postconditions	<ol style="list-style-type: none"> 1. The system sends notification to the student and research advisor of the selected research topic. 2. The topic status updated to "Waiting for final result submission".
Input	<ol style="list-style-type: none"> 1. Selected Topics. 2. Submission Deadline.
Output	<ol style="list-style-type: none"> 1. Confirmation message indicating successful notification. 2. Updated research topic proposal status to "Waiting for final result submission".
Main flow	<ol style="list-style-type: none"> 1. User navigates to the "Track topic evaluation management" page. 2. System displays the topics have proposal status is "Proposal approved by university" by default

	<p>3. User filters (Optional) with topics status, free-text search</p> <p>4. Users select topics using checkboxes.</p> <p>5. User clicks the “Send final result submission request notification” button.</p> <p>6. A form appears, prompting the user to enter the “Submission deadline”.</p> <p>7. User clicks “Send”.</p> <p>8. The system validates the deadline and other input fields.</p> <p>9. If valid, the system sends the notification to the student and research advisor of the topic</p> <p>10. The topic status is updated to “Waiting for final result submission”.</p> <p>11. The system displays a confirmation message that the notification has been sent.</p>
Alternative flows	<p>1. If there are no topics available for selection, the system disables the action button.</p> <p>2. If users do not enter a valid deadline, the system prompts for correction.</p>
Related functions	Track topic evaluation management (To filter and select research topics)

c) Submit final result

Table 3.26 Submit final results specification

Function name	Submit final result
Description	Allow students to submit their final result document for department evaluation.
Role	Student
Preconditions	The topic status is “Waiting for final result submission”.
Postconditions	<p>1. The system saves the uploaded proposal file.</p> <p>2. The system notifies the research advisor and the department scientific research team about the submission.</p>

	3. Proposal status is changed to “Final results submitted”
Input	1. Topic ID 2. Word file 3. Power point file 4. Submit date 5. Note
Output	Confirmation message indicating successful submission.
Main flow	1. The student navigates to the “Topic management” page. 2. The system displays detailed topic information. 3. The student locates the “Department-level evaluation” section. 4. The student selects a files and clicks “Submit”. 5. The system validates the file and checks preconditions. 6. If valid, the system saves the final result files. 7. The system sends a notification to the research advisor and the department scientific research team. 8. The system displays a confirmation message indicating successful submission.
Alternative flows	
Related functions	Send final results submission request notification

d) Establish Department-level topic evaluation committee

Table 3.27 Establish research topic approval committee specification

Function name	Assign Department-level topic evaluation committee
Description	Allow the department scientific research team to assign a department-level topic evaluation committee for evaluating submitted final result topics.
Role	Department scientific research team
Preconditions	1. The topic status must be “Final results submitted”
Postconditions	The system notifies the assigned committee members.
Input	1. Selected topic 2. Committee name

	<ul style="list-style-type: none"> 3. Committee members, and member's role 4. Location 5. Deadline
Output	Confirmation message
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Track topic evaluation Management” page. 2. The system displays topics with proposal status “Submitted”. 3. The user selects one or multiple topics. 4. The user clicks “Assign topic evaluation committee”. 5. The system displays a list of available committees. 6. The user chooses a committee from the list. 7. The user clicks “Submit”. 8. The system assigns the topic to the selected committee and sends notifications to committee members. 9. The system displays a confirmation message indicating successful assignment.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Track topic evaluation management 2. Committee Management (To create and manage committees).

e) Approving research topic final results

Table 3.28 Approving research topic final results specification

Function name	Evaluate topic result
Description	This function allows the department-level topic evaluation committee to approve the list of assigned topic.
Role	Topic evaluation committee
Preconditions	The topic must be assigned to the committee
Postconditions	<ol style="list-style-type: none"> 1. The topic status is updated to “Final approved by department”.

	<p>2. The system notifies the student and research advisor about the evaluation</p>
Input	<p>1. Account ID</p> <p>2. Evaluation criteria:</p> <ul style="list-style-type: none"> • Review and Evaluation of the Topic (Text): <ul style="list-style-type: none"> ◦ Overview of research status in the topic's field. ◦ Topic idea and approach. ◦ Topic objectives. ◦ Research methodology. ◦ Research results. ◦ Presentation format of the final report. ◦ Scientific publications from the research results in national and international conferences/journals (if any). ◦ Other comments. ◦ Recommendations for additions and modifications to the project's product. • Evaluation Score: <ul style="list-style-type: none"> ◦ Overview of research status in the topic's field (Maximum score: 10) ◦ Research content (Maximum score: 20) ◦ Research methodology (Maximum score: 15) ◦ Research results (Maximum score: 40) ◦ Presentation format of the final report (Maximum score: 5) ◦ Scientific publications from the research results in national and international journals/conferences (if any) (Maximum score: 10) <p>3. Note</p>
Output	<p>1. Updated topic status</p> <p>2. A notification sent to the student and research advisor</p>

Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Topic evaluation assignment” page. 2. The system displays a table of assigned topic. 3. The user clicks the “Evaluate” button for a selected topic. 4. The system displays a popup for entering evaluation information. 5. The user clicks “Submit.” 6. The system saves the evaluation and updates the topic status. 7. The system sends a notification to the student and research advisor.
Alternative flows	
Related functions	View the list of assigned topic evaluation

f) View detail topic evaluation information

Table 3.29 View detail topic evaluation information specification

Function name	View Topic Evaluation Details
Description	Allow users to view the details of department topic evaluation
Role	Topic evaluation committee, Department scientific research team, Scientific research office, student, research advisor
Preconditions	Topic must be evaluated
Postconditions	
Input	
Output	Display of detailed evaluation scores and committee members’ evaluation
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Topic management” page. 2. The system displays a list of topics based on the user’s role. 3. The user selects a topic and clicks “View detail”. 4. The system navigates to “View research topic’s details”.

	<p>5. The user clicks “View topic evaluation details”.</p> <p>6. The system displays a popup containing:</p> <ul style="list-style-type: none"> • All evaluation criteria scores
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. View research topic list 2. View research topic’s details

g) View the list of department level topic approval assignments

Table 3.30 View the list of department level topic approval assignments specification

Function name	View the list of department level topic approval assignments
Description	This function allows the topic evaluation committee to view the list of assigned topic’s final result.
Role	Topic evaluation committee
Preconditions	A topic evaluation committee has been assigned to evaluate a topic at department level.
Postconditions	
Input	<ol style="list-style-type: none"> 1. User account ID (to determine access scope) 2. Filters (Optional): <ul style="list-style-type: none"> • Department ID • Year • Free-text search • Topic status
Output	<p>A list of final result topic assignments, including:</p> <ol style="list-style-type: none"> 1. Topic title 2. Deadline 3. Final result 4. Topic status 5. Action (Evaluate)
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Department level topic evaluation assignment” page. 2. The system displays a table of topic evaluation assignments based on applied filters.

Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Assign topic evaluation committee 2. Evaluate topic results 3. View detail topic evaluation information

3.2.6. University-level topic defense management

a) Track topic grading management

Table 3.31 Track topic grading management specification

Function name	Track topic grading management
Description	Allows users to view topic list that have been evaluated at department
Role	Department scientific research team, Scientific research office
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the Department scientific research team or Scientific research office role.
Postconditions	The user can select topics for further actions such as Nominating research topics for university defense, establishing grading committee and Entering evaluation result
Input	Filters (Optional): Topic status, topic title, year, department
Output	<p>List of research topics matching the applied filters. Topic details include:</p> <ol style="list-style-type: none"> 1. Topic Title 2. Notes 3. Department 4. Evaluated date 5. Topic status 6. Action (Checkbox selection)
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Track topic grading management” page.

	<ol style="list-style-type: none"> 2. The system displays all research topics with relevant details. 3. The user applies filters (Department, topic status, topic title, year) to refine the list. 4. The system updates the displayed topics based on the filters.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Nominate research topics for university defense 2. Establish grading committee 3. Enter evaluation result

b) Nominate research topics for university defense

Table 3.32 Nominate research topics for university defense specification

Function name	Nominate research topics for university defense
Description	Allow the Department scientific research team of each department to nominate research topics with high evaluation scores for university-level defense.
Role	Department scientific research team
Preconditions	<ol style="list-style-type: none"> 1. The user must be authenticated. 2. The user must have the Department Scientific Research Team role. 3. The topic must have been evaluated at the department level. 4. The topic must meet the university's nomination criteria (Minimum score threshold).
Postconditions	<ol style="list-style-type: none"> 1. The topic status is updated to "Nominated for University defense". 2. The nominated topics become available for grading committee establishment.
Input	<ol style="list-style-type: none"> 1. List of topic IDs that meet nomination criteria 2. Account ID

Output	University level status of topic is updated to "Nominated for University defense"
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the "Track Topic Grading Management" page. 2. The system displays a list of eligible research topics with relevant details. 3. The user applies filters (Department, Topic status) if needed. 4. The system updates the displayed list based on applied filters. 5. The user selects one topic for nomination by clicking a checkbox. 6. The user clicks the "Nominate" button to confirm. 7. The system updates the topic status to "Nominated for University defense".
Alternative flows	
Related functions	Track topic grading management

c) Establish grading committee

Table 3.33 Establish grading committee specification

Function name	Assigning topic defense committee
Description	Allows the Scientific research office to assign a grading committee for university-level research topic defense.
Role	scientific research office
Preconditions	<ol style="list-style-type: none"> 1. The topic status must be "Nominated for University defense"
Postconditions	<ol style="list-style-type: none"> 1. The topic status is updated to "Assigned to grading committee". 2. The system notifies: <ul style="list-style-type: none"> • Assigned committee members • Student responsible for the research • Research advisor

	<ul style="list-style-type: none"> • Department scientific research team
Input	<ol style="list-style-type: none"> 1. Selected topic 2. Committee name 3. Committee members and member's role 4. Date 5. Location (Building and room number where the defense will take place)
Output	<ol style="list-style-type: none"> 1. Confirmation message: Indicates successful committee assignment. 2. Notification messages: Sent to committee members, students, and relevant research personnel.
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the “Track topic grading management” page. 2. The system displays topics with proposal status “Nominated for University Defense”. 3. The user selects one topic. 4. The user clicks “Establish grading committee”. 5. The system displays a form 6. The user enters the form information 7. The user clicks “Submit”. 8. The system assigns the topic to the selected committee and sends notifications. 9. The system displays a confirmation message indicating successful assignment.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Track topic grading management 2. Committee management 3. Nominate research topics for university defense

d) Enter evaluation result

Table 3.34 Enter evaluation results specification

Function name	Enter evaluation results
Description	Allows the Scientific research office to enter the evaluation results after the grading committee has completed the university defense session.
Role	Scientific research office
Preconditions	<ol style="list-style-type: none"> 1. The topic must have been assigned to a grading committee. 2. The university defense session must have been completed.
Postconditions	<ol style="list-style-type: none"> 1. The average score is calculated and stored. 2. The system updates the topic status to “Completed”.
Input	<ol style="list-style-type: none"> 1. Selected topic 2. Final score 3. Supporting images of evaluation documents 4. Awards received (if any)
Output	Confirmation Message indicating successful score entry.
Main flow	<ol style="list-style-type: none"> 1. The user navigates the "Track topic grading management" page. 2. The system displays topics assigned for university defense. 3. The user selects a topic for evaluation entry. 4. The user clicks "Enter grading results". 5. The system displays a form for entering 6. The user clicks "Submit". 7. The system updates the topic status to “Completed”. 8. The system displays a confirmation message.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. Track topic grading management 2. Assign topic evaluation committee

e) View grading results

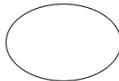
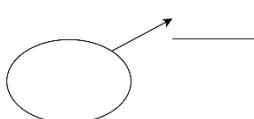
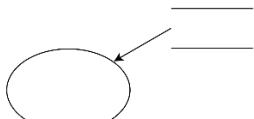
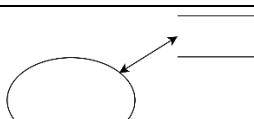
Table 3.35 View grading results specification

Function name	View topic grading details
Description	Allow users to view the details of grading results
Role	Department scientific research team, Scientific research office, student, research advisor
Preconditions	<ol style="list-style-type: none"> 1. The topic must have a status of "Completed". 2. The topic must have entered grading results information.
Postconditions	
Input	Selected research topic
Output	Popup with detailed grading information, including: <ol style="list-style-type: none"> 1. Final score 2. Supporting images of evaluation documents 3. Awards (if any)
Main flow	<ol style="list-style-type: none"> 1. The user navigates to the "Topic management" page. 2. The system displays a list of research topics based on the user's role. 3. The user selects a topic and clicks "View detail". 4. The system navigates to the "View research Topic's details" page. 5. The user clicks "View topic grading details". 6. The system displays results.
Alternative flows	
Related functions	<ol style="list-style-type: none"> 1. View research topic list 2. View research topic's details

3.3. Data flow diagram

3.3.1. The symbols used

Table 3.36 The symbols used in data flow diagram

No.	Symbol	Description
1		Internal/External actor
2		Process
3		Data flow
4		Data store
5		Relationship between data stores (In)
6		Relationship between data stores (Out)
7		Relationship between data stores (Update)

3.3.2. Context-level data flow diagram

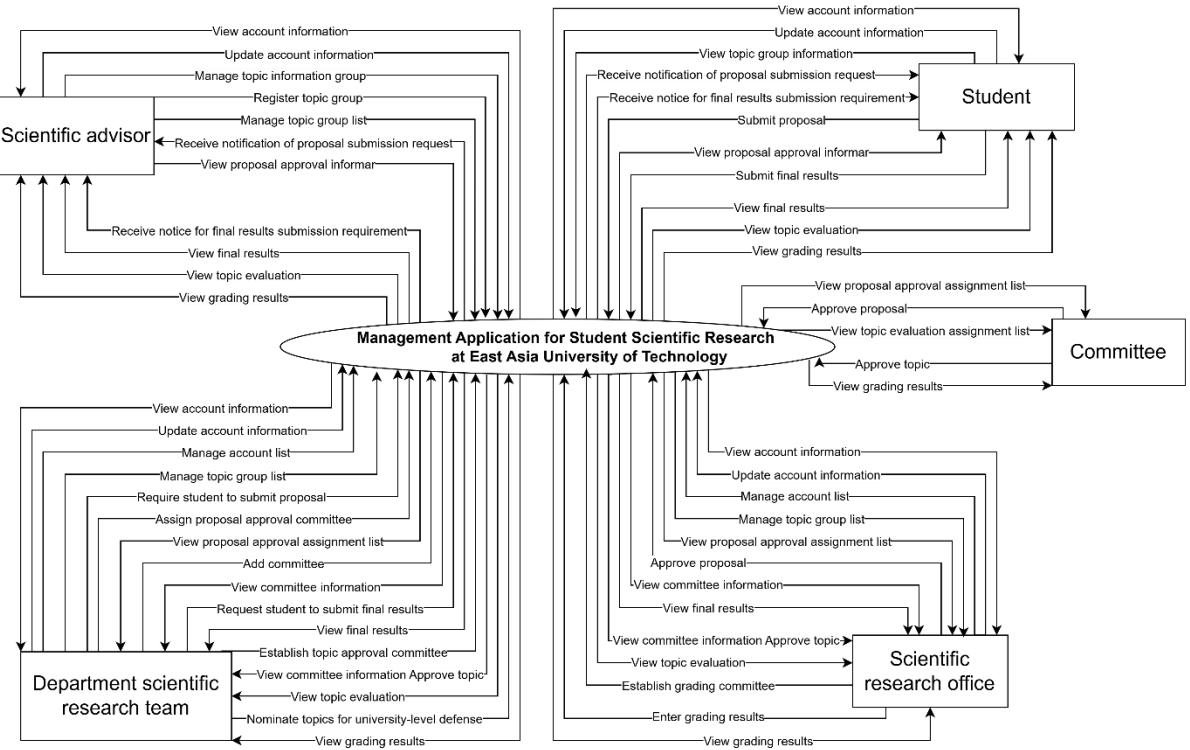


Figure 3.37 Context-level data flow diagram

3.3.3. Top-level data flow diagram

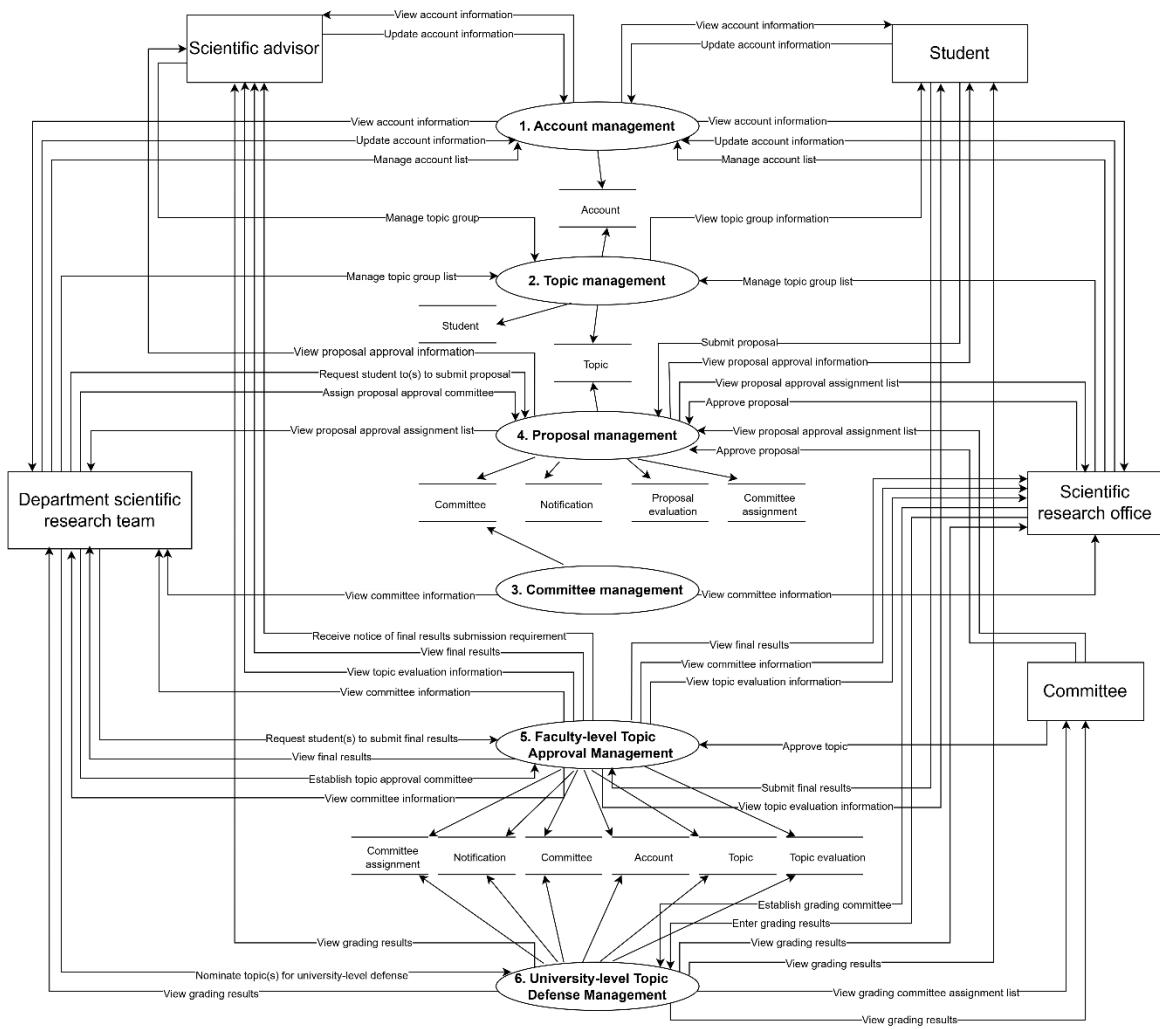


Figure 3.38 Top-level data flow diagram

3.3.4. Sub-level data flow diagram

a) Account management

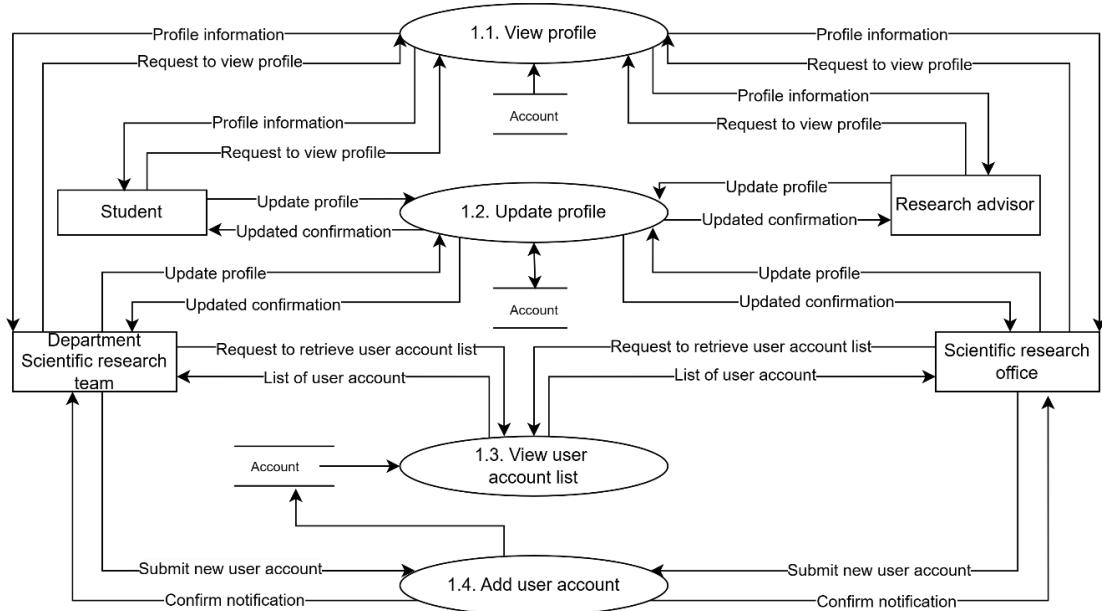


Figure 3.39 Sub-level DFD for Account management

b) Topic management

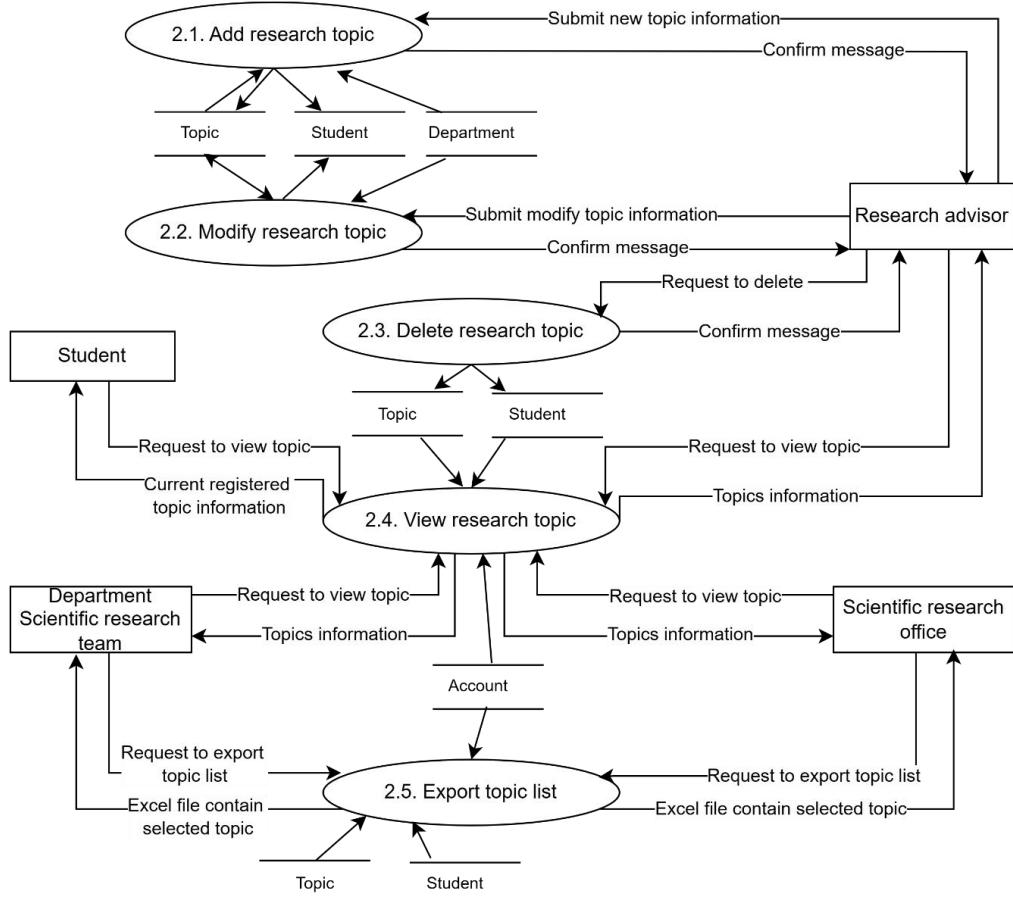


Figure 3.40 Sub-level DFD for Topic management

c) Committee management

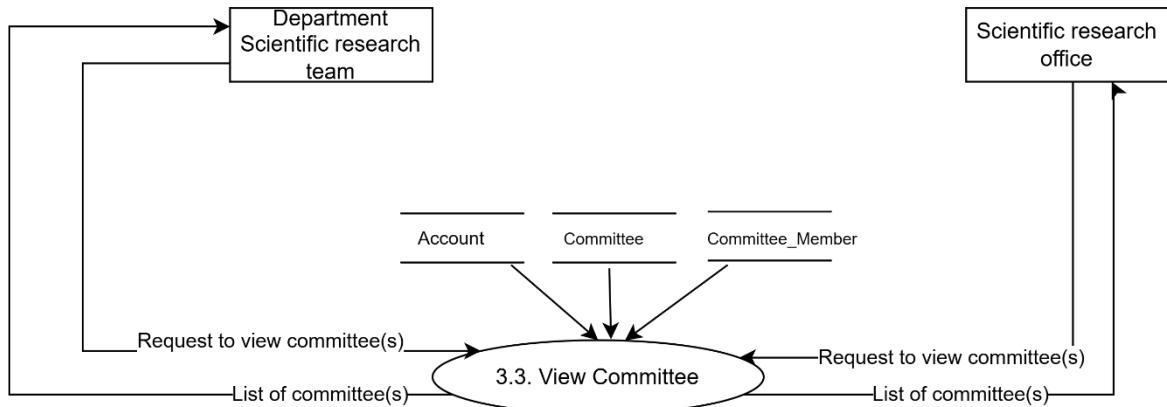


Figure 3.41 Sub-level DFD for Committee management

d) Proposal management

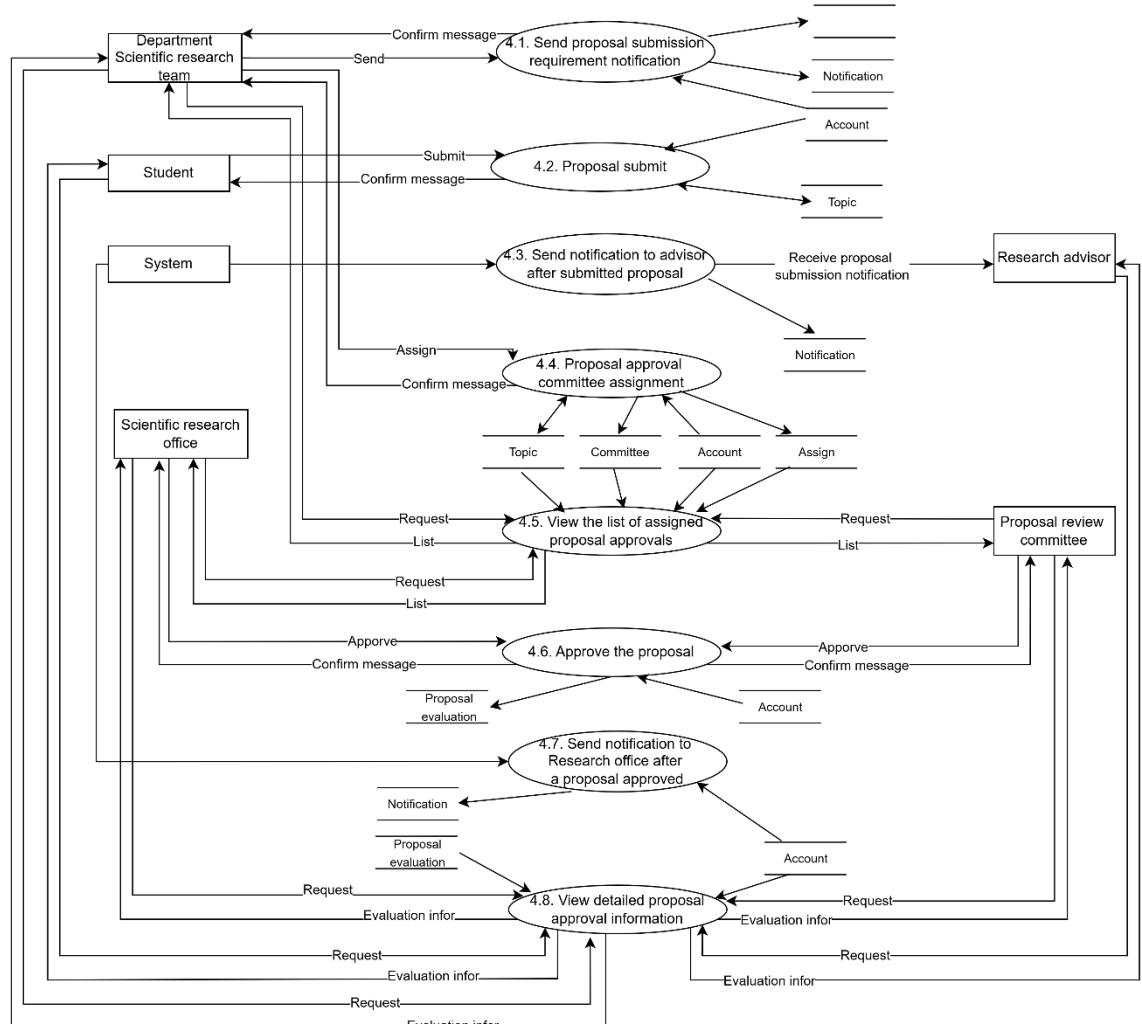


Figure 3.42 Sub-level DFD for proposal management

e) Faculty-level topic approval management

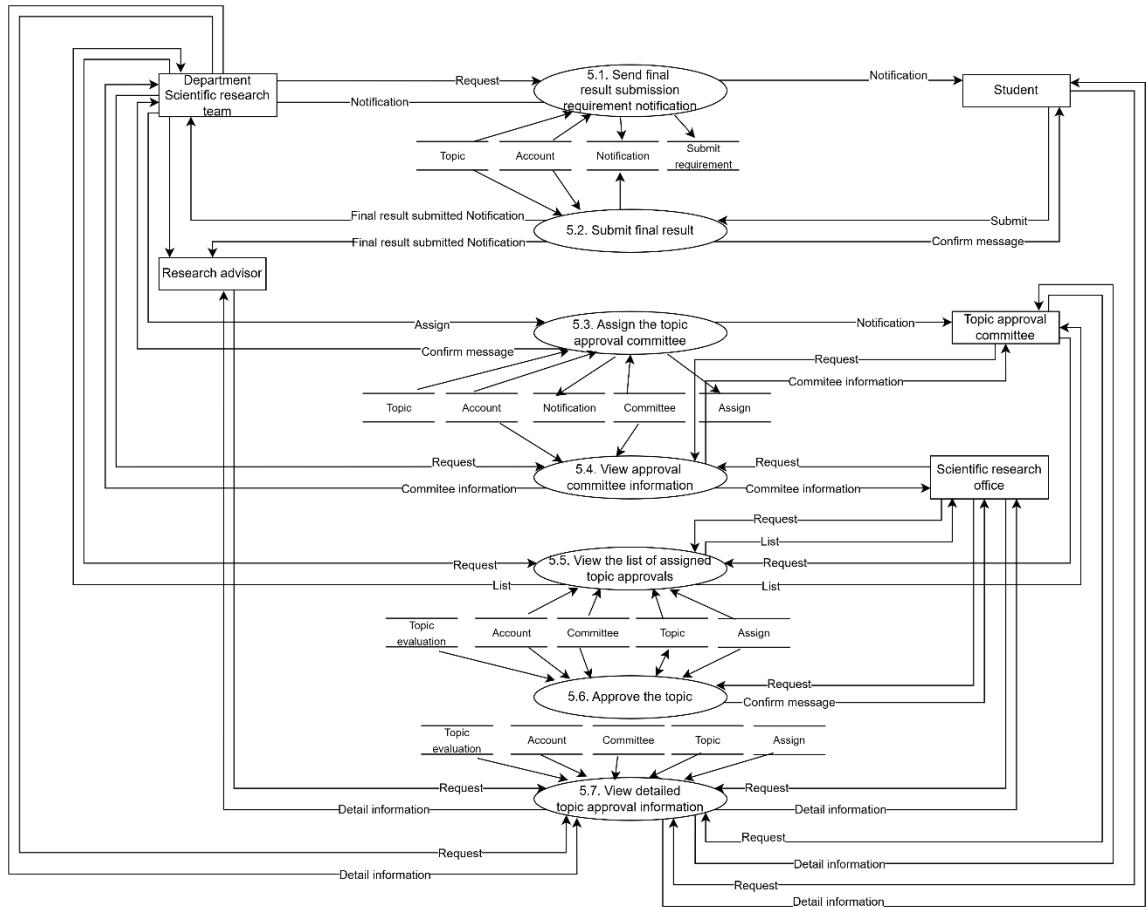


Figure 3.43 Sub-level DFD for Faculty-level topic approval management

f) University-level topic defense management

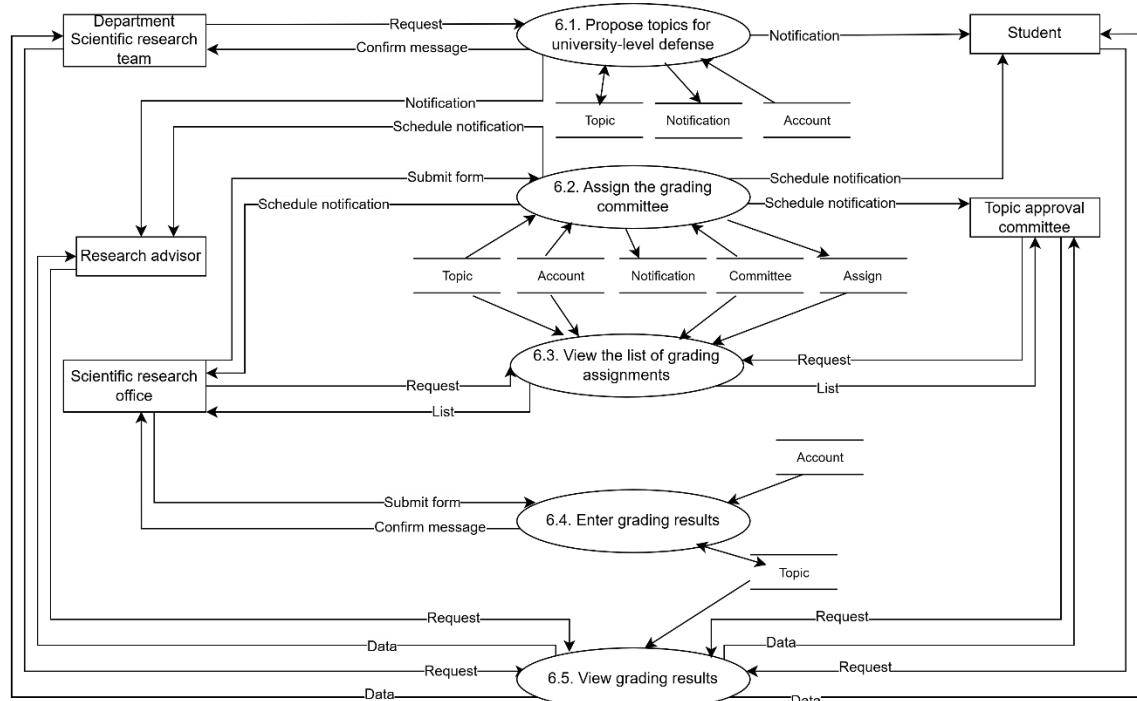


Figure 3.44 Sub-level DFD for University-level topic defense management

CHAPTER 4: SYSTEM DESIGN

4.1. Database design

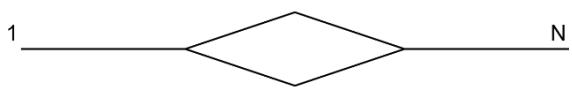
4.1.1. Extended ERD

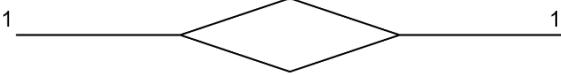
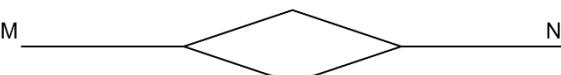
a) Extended organization

- Account: Full name, sex, department, email, phone number, avatar, password, role
- Student: Student code, class name, account
- Teacher: Academic title, major, account
- Department: Department name
- Role: Role name
- Committee: Committee name, topic id, members, committee type, member's position in committee, date time (Latest date approval for committee), building, room
- Committee type: name
- Topic: Topic title, department, note, student members, presentative student, register date, year, teacher who registered topic, second teacher, start date, end date, status
- Topic status: name
- Proposal: Topic, submit deadline, submit date, file path, note, current stage, status
- Proposal evaluation: Proposal id, topic id, approver, type (committee or scientific research office), feedback, evaluation date
- Final result: Topic, submit deadline, status, file word, file PowerPoint
- Evaluation criteria type: name, type
- Final result evaluation: final result, committee member, criteria, value
- University defense assignment: topic, final score, note, supporting images of evaluation document
- Notification: Receiver accounts, title, notification content, sent date, is read

b) Symbols used

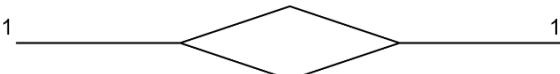
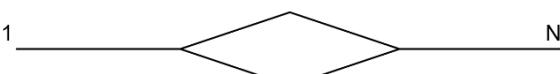
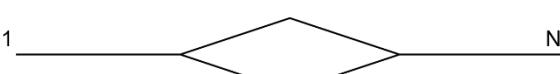
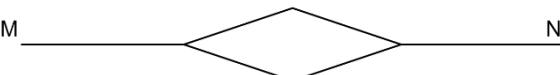
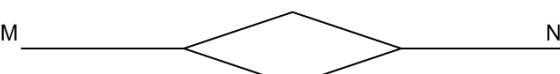
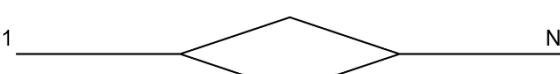
Table 4.1 Symbols used for illustrating the relationship between entities

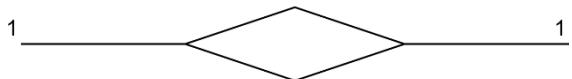
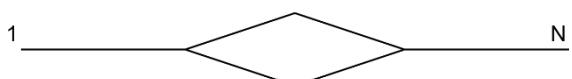
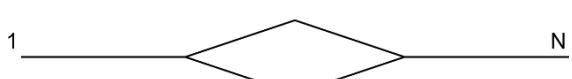
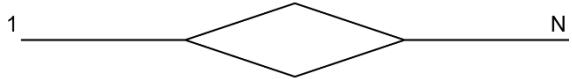
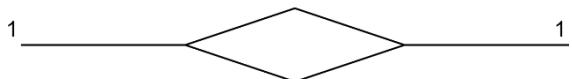
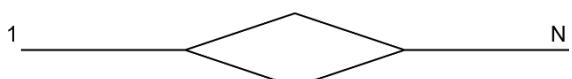
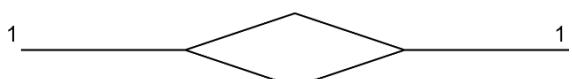
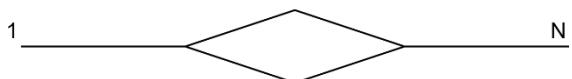
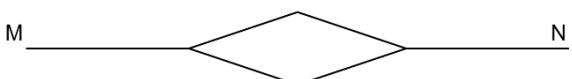
No.	Symbol	Description
1		One-to-many relationship

2		One-to-one relationship
3		Many-to-many relationship

c) Relationship between entities

Table 4.2 Relationship between entities table

Entity	Relationship	Entity
Account		Student
Account		Teacher
Department		Account
Role		Account
Department		Topic
Topic		Student
Topic		Teacher
Topic status		Topic
Committee		Account

Committee type	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Committee
Proposal	 A diamond shape representing a one-to-one relationship. It has one line labeled '1' entering from the left and one line labeled '1' exiting to the right.	Topic
Proposal	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Account
Account	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Proposal evaluation
Committee	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Final result
Final result evaluation	 A diamond shape representing a one-to-one relationship. It has one line labeled '1' entering from the left and one line labeled '1' exiting to the right.	Account
Final result	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Final result evaluation
University defense assignment	 A diamond shape representing a one-to-one relationship. It has one line labeled '1' entering from the left and one line labeled '1' exiting to the right.	Committee
University defense assignment	 A diamond shape representing a many-to-one relationship. It has one line labeled '1' entering from the left and two lines labeled 'N' exiting to the right.	Supporting images of evaluation document
Notification	 A diamond shape representing a many-to-many relationship. It has one line labeled 'M' entering from the left and one line labeled 'N' exiting to the right.	Account

4.1.2. Database normalization

Based on the relationship tables between entities, the normalization process will break down entities into smaller tables, define primary keys and foreign keys, and add necessary constraints.

1. Account

Table 4.3 Account table

Table name	t_account		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	Account code
a_fullname	NVARCHAR	NOT NULL	
a_sex	BIT	NOT NULL	
a_email	VARCHAR	UNIQUE, NOT NULL	
a_phonenumber	VARCHAR	UNIQUE, NOT NULL	Phone number
a_avatar	VARCHAR	NULL	
a_password	NVARCHAR	NOT NULL, DEFAULT N'Abc@123'	
a_departmentid	INT	FOREIGN KEY, NULL	Department code
a_roleid	INT	FOREIGN KEY, NOT NULL	Role code
a_otp	VARCHAR	NULL	
a_otpgeneratedat	DATETIME	NULL	Otp generated at
A_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
A_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

2. Department

Table 4.4 Account table

Table name	t_department		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	Department code
a_name	NVARCHAR	NOT NULL	Department name
a_order	INT	NOT NULL	Display order

3. Role

Table 4.5 Role table

Table name	t_role		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	Role code
a_name	NVARCHAR	NOT NULL	Role name
a_order	INT	NOT NULL	Display order

4. Student

Table 4.6 Role table

Table name	t_student		
Column name	Data type	Constraints	Description
a_id	VARCHAR	PRIMARY KEY	Student code
a_classid	INT	FOREIGN KEY, NOT NULL	Class id
a_accountid	INT	FOREIGN KEY, NOT NULL	Account id
a_trainingprogramid	INT	NOT NULL	
a_majorid	INT	NOT NULL	
a_fullname	NVARCHAR	NOT NULL	
a_email	VARCHAR	NOT NULL	
a_phonenumber	VARCHAR	NOT NULL	

a_departmentid	INT	NOT NULL	
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

5. Teacher

Table 4.7 Teacher table

Table name	t_teacher		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_academictitle	NVARCHAR	NOT NULL	Academic title
a_accountid	INT	FOREIGN KEY, NOT NULL	Account id
a_majorid	INT	NOT NULL	
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

6. Committee

Table 4.8 Role table

Table name	t_committee		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_name	NVARCHAR	NOT NULL	Class name
a_typeid	INT	FOREIGN KEY, NOT NULL	Committee type

a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

7. Committee type

Table 4.9 Role table

Table name	t_committeetype		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	Type id
a_name	NVARCHAR	NOT NULL	
a_order	INT	NOT NULL	Display order

8. Committee member

Table 4.10 Role table

Table name	t_committeemember		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	Type id
a_committeeid	INT	FOREIGN KEY, NOT NULL	Committee
a_accountid	INT	FOREIGN KEY, NOT NULL	Account id
a_roleid	INT	FOREIGN KEY, NOT NULL	Role in committee
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

9. Role in committee

Table 4.11 Role table

Table name	t_committeerole		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	Type id
a_name	NVARCHAR	NOT NULL	Role name
a_order	INT	NOT NULL	Display order

10. Topic

Table 4.12 Role table

Table name	t_topic		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_title	NVARCHAR	NOT NULL	Topic title
a_departmentid	INT	FOREIGN KEY, NOT NULL	
a_studentid	INT	FOREIGN KEY, NOT NULL	Presentative student
a_substatus	VARCHAR	NULL	
a_note	NVARCHAR	NOT	
a_createdby	INT	FOREIGN KEY, NOT NULL	Major teacher
a_secondteacherid	INT	FOREIGN KEY, NULL	Second teacher
a_year	INT	NOT NULL	
a_startdate	DATETIME	NULL	Research start date
a_enddate	DATETIME	NULL	Research end date
a_status	INT	NOT NULL	Topic status

a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Register date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

11. Topic student

Table 4.13 Role table

Table name	t_topicstudent		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_topicid	INT	FOREIGN KEY, NOT NULL	
a_studentcode	INT	FOREIGN KEY, NOT NULL	
a_createddate	DATETIME	NOT NULL, DEFAULT TIMESTAMP	Created date

12. Topic status

Table 4.14 Role table

Table name	t_topicstatus		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_name	NVACHAR	NOT NULL	
a_code	VARCHAR	NOT NULL	
a_description	NVARCHAR	NULL	
a_order	INT	NOT NULL	Display order

13. Proposal

Table 4.15 Role table

Table name	t_proposal		
Column name	Data type	Constraints	Description

a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_topicid	INT	FOREIGN KEY, NOT NULL	Topic id
a_submitdeadline	DATETIME	NOT NULL	Proposal submission deadline
a_submitdate	DATETIME	NULL	Proposal submission date
a_filepath	VARCHAR	NULL	Proposal file path
a_currentstage	TINYINT	NOT NULL DEFAULT 0	Proposal approval stage, 0 is not in approval, 1 is department stage, 2 is university stage
a_status	INT	NOT NULL	Approval status
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

14. Building

Table 4.16 Role table

Table name	t_building		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_name	VARCHAR	NOT NULL	Building name
a_order	INT	NOT NULL	Display order

15. Room

Table 4.17 Role table

Table name	t_room		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_buildingid	INT	FOREIGN KEY, NOT NULL	
a_name	VARCHAR	NOT NULL	Room number
a_order	INT	NOT NULL	Display order

16. Proposal evaluation

Table 4.18 Role table

Table name	t_proposalevaluation		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_proposalid	INT	FOREIGN KEY, NOT NULL	Proposal id
a_approverid	INT	FOREIGN KEY, NOT NULL	Approver id
a_type	BIT	NOT NULL	0 is committee approval, 1 is scientific research office approval
a_feedback	NVARCHAR	NULL	
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Evaluation date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

17. Final result

Table 4.19 Role table

Table name	t_finalresult		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_topicid	INT	FOREIGN KEY, NOT NULL	Topic id
a_submitdeadline	DATETIME	NOT NULL	Final result submission deadline
a_status	INT	NOT NULL	Department evaluation status
a_wordfilepath	VARCHAR	NULL	File path to the file Word
a_pptfilepath	VARCHAR	NULL	File path or canvas link to PowerPoint
a_submitdate	DATETIME	NULL	Final result files submission date
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

18. Final result evaluation

Table 4.20 Role table

Table name	t_finalresultevaluation		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_finalresultid	INT	FOREIGN KEY, NOT NULL	Final result id
a_criteriaid	INT	FOREIGN KEY, NOT NULL	Criteria id

a_value	NVARCHAR	NULL	Evaluation value
a_createdby	INT	FOREIGN KEY, NOT NULL	Evaluator
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

19. Criteria evaluation type

Table 4.21 Role table

Table name	t_criteriaevaluationtype		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_content	NVARCHAR	NOT NULL	Title
a_type	BIT	NOT NULL	0 is text base, 1 is score base criteria
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date

20. University defense assignment

Table 4.22 Role table

Table name	t_defenseassignment		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_topicid	INT	FOREIGN KEY, NOT NULL	Topic id
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

21. Supporting images of evaluation document

Table 4.23 Role table

Table name	t_evaluationimage		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_defenseassignmentid	INT	FOREIGN KEY, NOT NULL	Defense assignment id
a_filepath	VARCHAR	NOT NULL	File path
a_filename	VARCHAR	NOT NULL	File name
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

22. Notification

Table 4.24 Role table

Table name	t_notification		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_title	NVARCHAR	NOT NULL	
A_notificationtemplate	NVARCHAR	NOT NULL	
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date
a_updateddate	DATETIME	NULL ON UPDATE TIMESTAMP	Updated date

23. Notification account

Table 4.25 Role table

Table name	t_notificationaccount		
Column name	Data type	Constraints	Description

a_id	INT	PRIMARY KEY, AUTO_INCREMENT	
a_receiverid	INT	FOREIGN KEY, NOT NULL	Notification receiver id
a_notificationid	INT	FOREIGN KEY, NOT NULL	Notification id
a_notificationcontent	NVARCHAR	NOT NULL	
a_link	VARCHAR	NOT NULL	
a_isread	BYTE	NOT NULL DEFAULT 0	0 is not read, 1 is read
a_createddate	DATETIME	NOT NULL DEFAULT TIMESTAMP	Created date

24. Training program

Table 4.26 Role table

Table name	t_trainingprogram		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	
a_name	NVARCHAR	NOT NULL	
a_code	VARCHAR	NOT NULL	
a_displayorder	INT	NOT NULL	Display order

25. Major

Table 4.27 Role table

Table name	t_major		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	
a_name	NVARCHAR	NOT NULL	
a_code	VARCHAR	NOT NULL	
a_displayorder	INT	NOT NULL	Display order

a_departmentid	INT	NOT NULL	
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26. Academic title

Table 4.28 Role table

Table name	t_academictitle		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	
a_name	NVARCHAR	NOT NULL	
a_code	VARCHAR	NOT NULL	
a_displayorder	INT	NOT NULL	Display order

27. Substatus

Table 4.29 Role table

Table name	t_substatus		
Column name	Data type	Constraints	Description
a_id	INT	PRIMARY KEY	
a_name	NVARCHAR	NOT NULL	
a_code	VARCHAR	NOT NULL	
a_displayorder	INT	NOT NULL	Display order
a_description	NVARCHAR	NULL	

4.1.3. Relational model

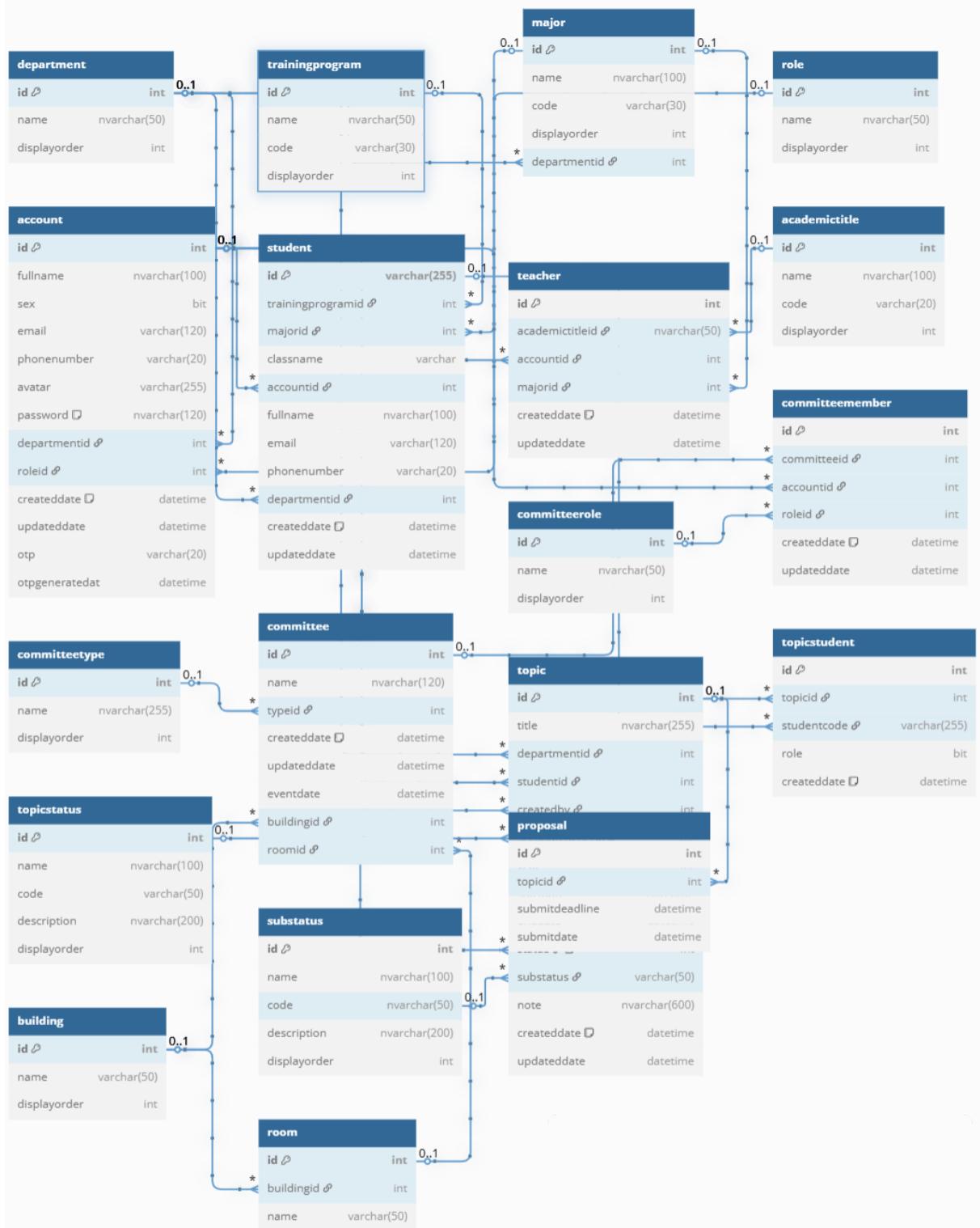


Table 4.30 Role table

4.2. User interface design

4.2.1. Account management

a) Login page

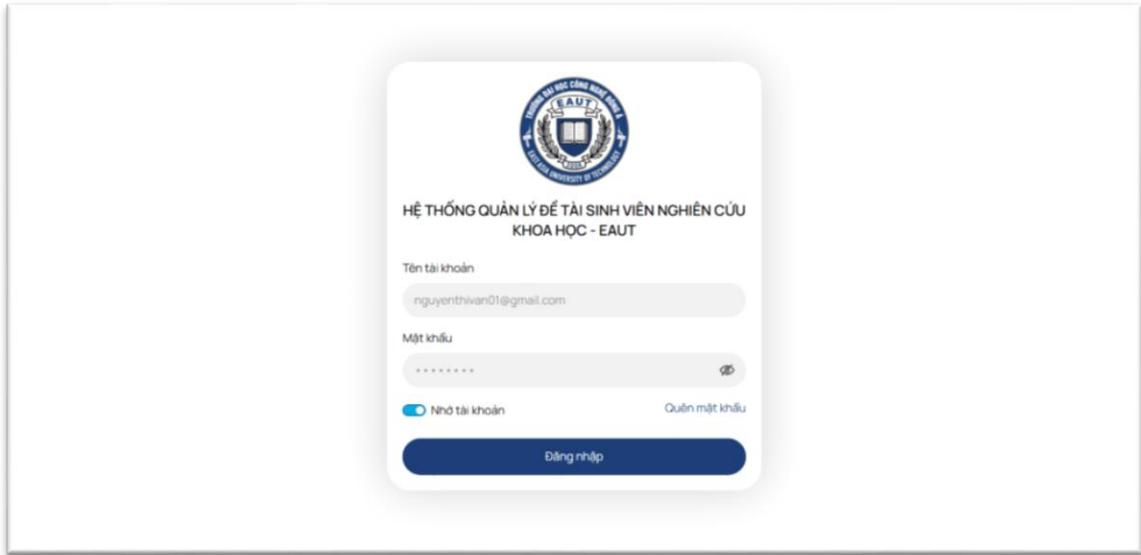


Figure 4.30 Login page

b) Update profile

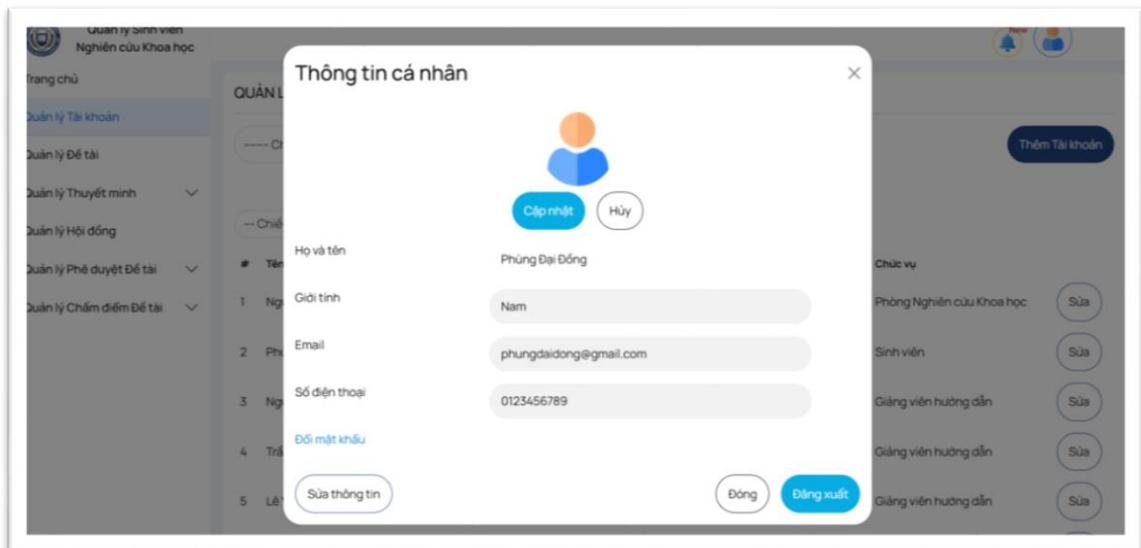


Figure 4.31 Update profile

c) Account management

The screenshot shows a web-based account management interface. At the top, there's a header with the university logo and the text "Quản lý Sinh viên Nghiên cứu Khoa học". On the right side of the header are two icons: a bell with a "New" notification and a user profile. Below the header is a sidebar with navigation links: Trang chủ, Quản lý Tài khoản, Quản lý Đề tài, Quản lý Thuyết minh, Quản lý Hội đồng, Quản lý Phê duyệt Đề tài, and Quản lý Chấm điểm Đề tài. The main content area is titled "QUẢN LÝ TÀI KHOẢN". It features several search and filter options: "Chọn role" (Select role), "Khoa Du lịch" (Faculty of Tourism), a search bar with placeholder "van", and a "Tim kiếm" (Search) button. To the right of these is a "Thêm Tài khoản" (Add account) button. The main table lists four users with columns: # (ID), Tên (Name), Email, Số điện thoại (Phone number), Khoa (Faculty), and Chức vụ (Position). Each user row includes an "Sửa" (Edit) button. The table also shows a pagination bar with pages 1, 2, and 3.

Figure 4.32 Account management page

d) Change password

The screenshot shows a browser window with the URL "localhost:7110/trang-chu". The page title is "Trang chủ - EAUT NCKH". The sidebar on the left is identical to Figure 4.32. A modal dialog box is centered on the screen with the title "Đổi mật khẩu" (Change password). It contains three input fields: "Mật khẩu hiện tại" (Current password), "Mật khẩu mới" (New password), and "Xác nhận mật khẩu mới" (Confirm new password). Below these fields is a section titled "Quy tắc đặt mật khẩu:" (Password rules) with a list of requirements: it must be at least 8 characters long, contain uppercase letters, lowercase letters, numbers, and special characters, and not be identical to the current password or user names. There is also a note about avoiding common words. At the bottom of the modal are "Hủy" (Cancel) and "Đổi mật khẩu" (Change password) buttons.

Figure 4.33 Change password page

e) Add account

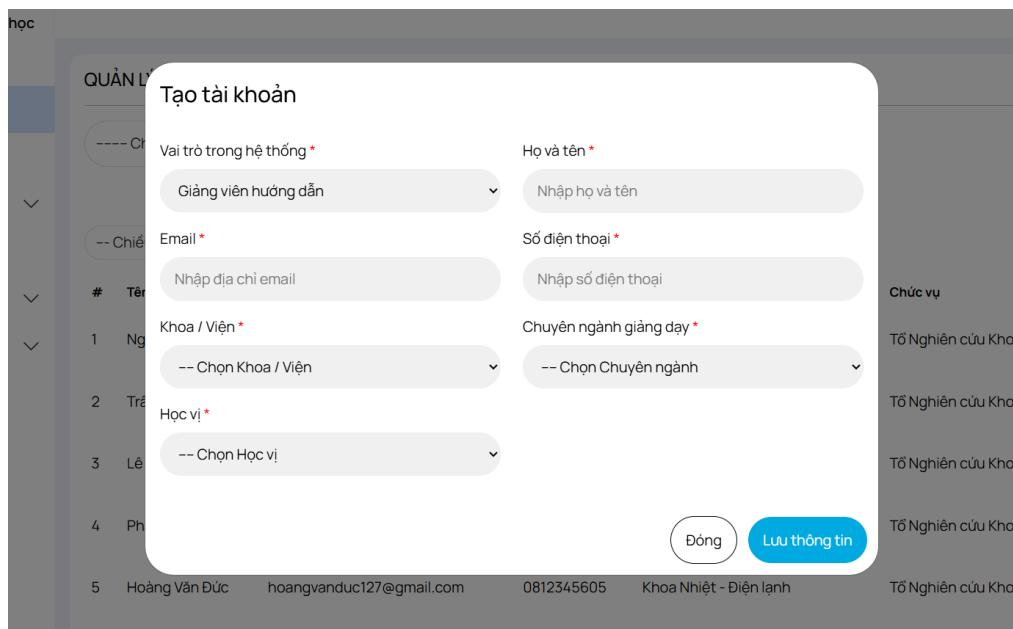


Figure 4.34 Add account

f) Forgot the password

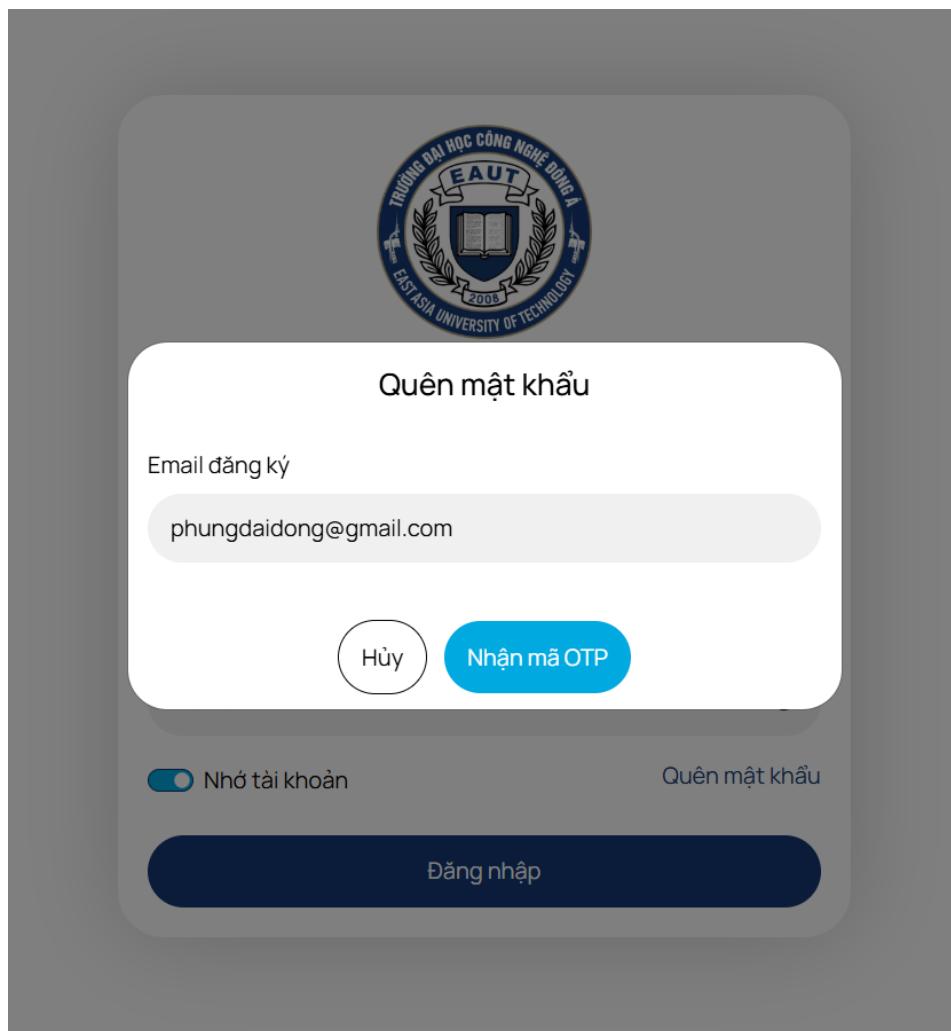


Figure 4.35 Forgot the password interface

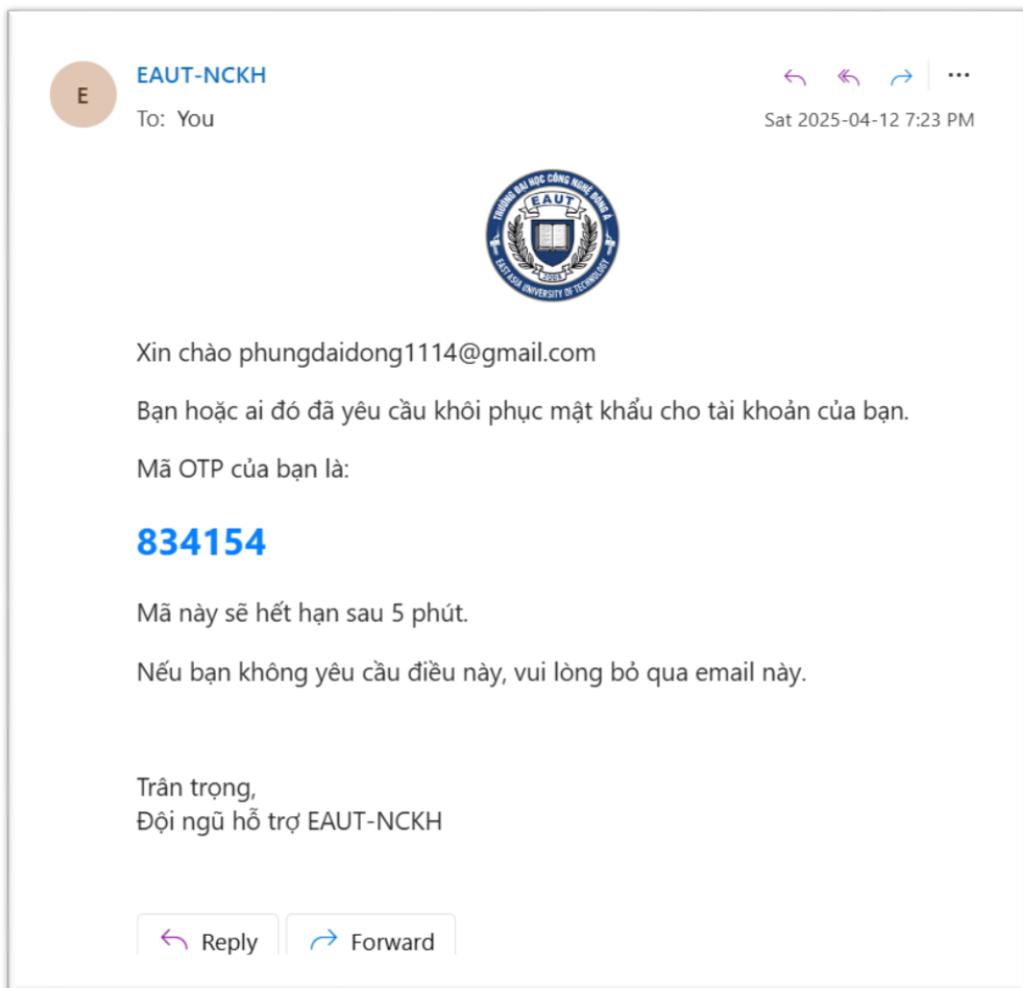


Figure 4.36 OTP email

4.2.2. Topic management

a) View list

#	Tên Đề tài	Giảng viên đăng ký	Ngày đăng ký	Trạng thái	Điểm	Ghi chú
1	Chuyên đổi số trong Marketing: Nghiên cứu trường hợp một thương hiệu bán lẻ tại Việt Nam	Gian vien hai	20/04/2025	Pending		Trường hợp nghiên cứu về cách một doanh...
2	Chiến lược phát triển thương hiệu trong thời đại chuyển đổi số: Trường hợp doanh nghiệp vừa và nhỏ tại Việt Nam	Nguyễn Hà Lan Ba	18/04/2025	Pending		Đề tài nghiên cứu các chiến lược quản tr...
3	Ứng dụng Trí tuệ Nhân tạo trong Phân loại Văn bản Tiếng Việt	Nguyễn Hà Lan Ba	18/04/2025	Pending		Đề tài nghiên cứu và xây dựng một hệ thố...
4	Ứng dụng trí tuệ nhân tạo trong lập trình	Chu Thị Danh	13/04/2025	Pending		Trí tuệ nhân tạo (AI) đang ngày càng đượ...

Figure 4.37 View list topic interface

b) Register topic group

Đăng ký Đề tài

Tên đề tài *

Ứng dụng Trí tuệ Nhân tạo trong Hệ thống Gợi ý Sản phẩm Thương mại điện tử

Mô tả *

Đề tài nghiên cứu và xây dựng một hệ thống gợi ý sản phẩm dựa trên hành vi người dùng trong các trang thương mại điện tử bằng cách ứng dụng các

Tìm kiếm Giảng viên hướng dẫn thứ 2

Giảng viên hướng dẫn thứ 2

Nhập email hoặc số điện thoại ...

Tên giảng viên

Bảng nhóm sinh viên

Mã sinh viên	Họ và tên	Số điện thoại	Email	Vai trò	Tên lớp
20211374	phung dai dong	0368728265	sfdsf@gmail.com	Trưởng nhóm	CQ.IT.12.10
20211375	Phùng Thanh Phượng	0358728267	phunghanhphuong@gmail.com	Thành viên	CQ.IT.12.10
20211372	Nguyen Van An	0358728267	vanan@gmail.com	Thành viên	CQ.IT.12.10

Nhập mã sinh viên

Nhập Họ và tên

Nhập email

Nhập số điện thoại

Hệ đào tạo thường

Viện Đào tạo và Hợp tác Quốc tế

Ngành Công nghệ Thông tin bằng tiếng

Thành viên

CQ.IT.12.10

Làm mới

Thêm

Hủy

Đăng ký

Figure 4.38 Register topic interface

4.2.3. Proposal management

a) Proposal list

Quản lý Sinh viên

Nghiên cứu Khoa học

Trang chủ

Quản lý Tài khoản

Quản lý Đề tài

Quản lý Thuyết minh

Phân công Hội đồng

Phê duyệt thuyết minh

Quản lý Hội đồng

Quản lý Phê duyệt Đề tài

Quản lý Chấm điểm Đề tài

PHÂN CÔNG HỘI ĐỒNG PHÊ DUYỆT THUYẾT MINH

Viện Đào tạo và Hợp tác

Chọn ngành

Trạng thái Đề tài

Tìm kiếm

Phân công Hội đồng

Kết quả tìm kiếm: 4

#	Tên Đề tài	Giảng viên đăng ký	Ngày đăng ký	Trạng thái
1	Chuyển đổi số trong Marketing: Nghiên cứu trường hợp một thương hiệu bán lẻ tại Việt Nam	Gian viên hai	20/04/2025	Đã nộp thuyết minh
2	Chiến lược phát triển thương hiệu trong thời đại chuyển đổi số: Trường hợp doanh nghiệp vừa và nhỏ tại Việt Nam	Nguyễn Hà Lan Ba	18/04/2025	Đã nộp thuyết minh
3	Ứng dụng Trí tuệ Nhân tạo trong Phân loại Văn bản Tiếng Việt	Nguyễn Hà Lan Ba	18/04/2025	Đã nộp thuyết minh
4	Ứng dụng trí tuệ nhân tạo trong lập trình	Chu Thị Oanh	13/04/2025	Đã nộp thuyết minh

xem thuyết minh

xem thuyết minh

xem thuyết minh

xem thuyết minh

Figure 4.39 Proposal list interface

b) Notification

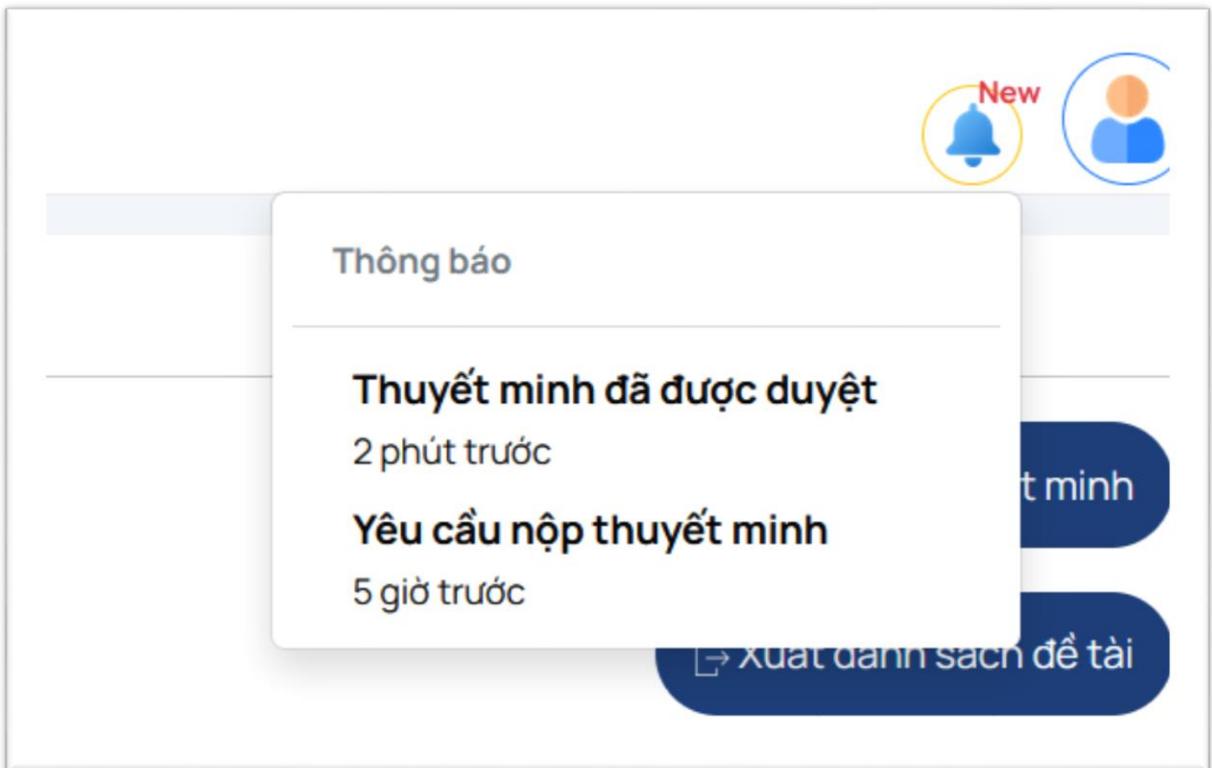


Figure 4.40 Notification interface

CHAPTER 5: CONCLUSION

This research project aimed to develop a student scientific research management system, designed to improve the efficiency of managing and storing data, while reducing the reliance on paper-based processes. By leveraging technology, the system strives to streamline the research workflow, making it more accessible and convenient for students and administrators throughout all phases of the research process.

The findings from interviews with both students involved in scientific research and research management personnel revealed that the proposed technological solution offers significant benefits. Automating many processes such as notifications and document storage has resulted in time savings, increased transparency, and better organization. While the topic approval process is not fully automated and still requires human input, the system allows for more flexibility in terms of time and location, making the approval process more convenient for both students and administrators.

However, as this project was undertaken by a single individual, it faced limitations in terms of brainstorming, collaboration, and the overall depth of development. Despite these challenges, this work lays a solid foundation for further development and enhancement of the system.

Looking ahead, additional features such as plagiarism checks, detection of duplicate research topics, and progress tracking tools could be integrated into the system. These enhancements would provide more comprehensive support for managing student scientific research and contribute to improving the overall research environment.

In summary, this project contributes to the ongoing effort to digitize scientific research management, offering a fresh approach to education management systems in the context of digital transformation. The research paves the way for future developments in the field and highlights the potential of technology to support academic and research activities more effectively.

REFERENCES

- [1] Ministry of Education and Training. (2021). *Circular No. 26/2021/TT-BGDDT on regulations for scientific research activities of students in higher education institutions.* Hanoi, Vietnam.
- [2] Ministry of Education and Training, East Asia University of Technology. (2024). *Procedure for implementing projects at all levels* (Issued together with the Decision of the Rector of East Asia University of Technology). Bac Ninh, Vietnam.