JUST

SYSTEM ANALYSIS & DESIGN

Capstone Project Management System (CPMS)

Sunday | 2024 Jun 2th

Capstone Project Management System (CPMS)

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INTRODUCTION

This report explains the Capstone Project Management System (CPMS) using system analysis and design techniques, by making a use of the Agile methodology and Scrum framework besides, using different visual diagrams, aiming to present a clear vision for the purpose of implementing the system in real life.

First, let's talk about What is the Capstone Project Management System?

This is a system for projects assigning between students and some collage or faculty, where then the students will be able to work on projects based on the project titles announced by their Faculty, submit the reports, and get their grades in the end after being processed in the system entries.

Why using Scrum in Agile?

Well, Agile is more like a way of thinking, but it can be used by implementation of different practices as Scrum is one of them.

What is common between Agile and Scrum?

- **Individuals and interactions:** both focus on the communication between the people within the same workplace.
- **Working product:** instead of only focusing on documenting each process, both focus on the product itself, since the documenting exist only if it has value to the product.
- **Change:** agile and scrum are aware of any changes that might happen, each sprint, the work will be checked, to make sure we adapt to new changes.
- **Iterative and incremental:** instead of delivering product all at once, it will be divided into smaller pieces, each sprint/Iteration we decide wither to release the product or not.

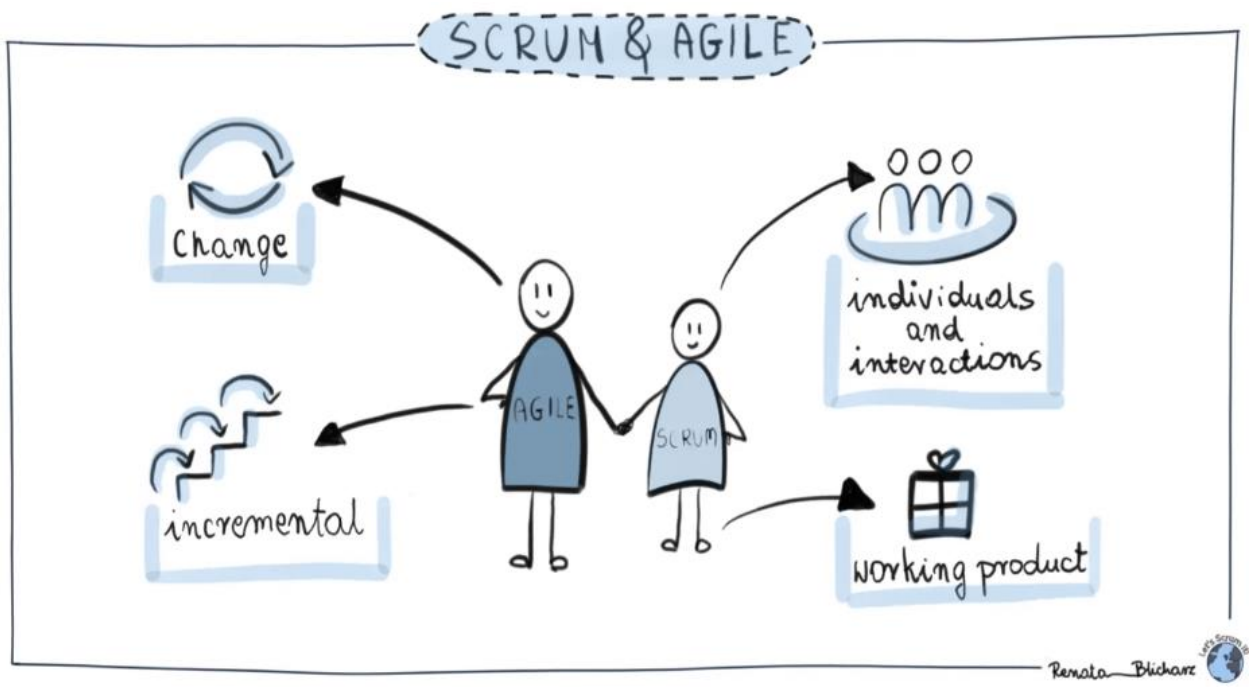

Figure 1: Scrum & Agile

SYSTEM ANALYSIS & DESIGN

QUESIONS

Question 1: Which methodology would you like to adopt for this project? Justify your choice by listing 2 arguments.

Answer: **Agile methodology within scrum framework.**

Argument 1: Exercises a user-oriented approach; agile alongside scrum(agile-scrum) approach enable feedback loops from the stakeholders (Faculty, Students, Coordinators, and Examiners), which insures the continuous of user involvement because of the use of sprints/iterative approach, as we know, one of the beneficial things of the agile methodology alongside the scrum framework is the sprints approach, since it enables the work in iterations which allow for continuous feedback from the CMPS stakeholders, each of the defined sprints focuses on one process (function) to ensure that the system is based on the stakeholders feedback and requirements continuously.

Argument 2: Flexibility and quick product development; agile-scrum approach is flexible, when having different requirements from the stakeholders (Faculty, Students, Coordinators, and Examiners), it makes it possible to adapt to any changes in these requirements quickly ensuring that our system can be updated continuously to meet our stakeholders needs, this flexibility also is based on the use of sprints, make it easier to make any changes or updates on the system for each sprint.

Argument 3: Provides feedback; agile-scrum approach enables the feedback process from users since it's easy to update or change on the system due to (Argument 1, Argument 2), which ensures the consideration of their opinions throughout the development process, by the feedback from our stakeholders (Faculty, Students, Coordinators, and Examiners) it will enables the development team in our framework to address new changes, make decisions, and deliver the system that meets the needs and expectations of all stakeholders within the system.

Any Arguments could be listed too, these listed Arguments are regarding to the slides.
Chapter 6, slide 55

QUESIONS

Question 2: Conduct the feasibility study for this project.

Technical Feasibility: in the technical feasibility of our CPMS, we need to know whether the current technical resources can support the development and implementation of the system or not.

This includes:

- **Upgrading or adding new technical resources:** we need to evaluate if the existing technical infrastructure like the faculty servers, databases, development tools…etc, can be upgraded or augmented to accommodate the CPMS requirements, if the existing infrastructure elements where not enough, we will need to add additional resources (less recommended due to economic costs but better efficiency).

- **Existence of the suitable technology of the CPMS:** we need to make sure whether there are existing technologies, frameworks, software...etc, in the faculty that can meet the CPMS specifications, it may involve researching for the available project management systems, tools, and database within the faculty and then make the right decision.

- **Scalability:** we also need to consider the scalability of the CPMS to the growth in users, projects, data and other components over time, for that, we will need to evaluate the system's ability to handle increased workload without performance decline or resource overflow in the data centers.

- **Security:** we will need to think about the security considerations, including data protection and integrity, access control for each member of the stakeholders making sure each gets their roles, and other security measurements, so… we need to consider the implementation of security measures to save sensitive login accounts of the stakeholders, save sensitive project information of the students and other data stored within the CPMS.

QUESIONS

Question 2: Conduct the feasibility study for this project…cont.

Economic Feasibility: in the economic feasibility of the CPMS, we need to ensure that the system does not exhaust economic resources and doesn't exceed the CPMS funding limit, as the cost should not exceed the benefit.

This includes:

- **Development costs:** we need to first estimate the cost of developing the CPMS, including the time and resources required for the development team, the design of the system, the development of the system, the testing of the system, and the implementation of the system, this helps in determining the initial investment needed for the project.

- **Operational costs:** we need second to calculate the operational costs associated with maintaining and supporting the CPMS like training the stakeholders to use the system, the system continuous supporting team and other operations within the system.

- **Cost-Benefit calculation**: we will perform a cost-benefit analysis to quantify the financial implications of the developing and implementing the CPMS.

Operational Feasibility: in the operational feasibility of the CPMS we need to know whether the system will operate effectively when put into service and whether the system will be used.

This includes:

- **User satisfaction:** We need to gather feedback from the system's stakeholders (Faculty, Students, Coordinators, and Examiners) to assess their satisfaction with the current project management processes and identify strong points and areas for improvement, let's remember that If users are satisfied with current system resistance to implementing a new system will be strong, and if users are dissatisfied with the current system and have expressed a need for change chances are that the new system will be used.

- **The system suns without errors:** we need to make if the human resources are available to operate the system once it has been installed, making sure the system runs effectively with no errors and continuous monitoring by the operational team.

Chapter 3, slide 13

QUESIONS

Question 3: Define, discover, review, document, and understand the user's needs and constraints of the to-be system using at least two requirements gathering techniques. Justify your choice.

- **Interviewing:** Interviewing is an important method for collecting data on human and system information requirements, enable us to listen to user stories and understand their goals, feelings and get close to there view, so first we need to make interviews with each of the stakeholders (Faculty, Students, Coordinators, and Examiners).

Questions that could be asked for each of the stakeholders:

For Project Coordinators:

- Can u describe the functions and processes that u think we can add to the system?
- What do u think are the challenges that we may face while managing the CMPS projects?
- What features do you think we can add to the CMPS?
- How would you like to get notifications from the system about the new project proposals?
- What permissions should different the system users (faculty, students, examiners) in the system? (good for access control system)
- How do you think the approval process for project titles and group allocations works?
- Are there any specific policies or like any specific regulations that u think we need to add to the system?
- Do u have any concerns for data privacy and security within the system?

For Examiners:

- How much time does it take from u to grade all the students projects?
- Do u face any problems within the current system in the grading process?
- Did u relies any suspicious changes within the grades list before?
- Do u think if there is any features that we may add to the system to make the grading process easier?
- Are u happy using the current grading system, or u think it needs some changes?

QUESIONS

Question 3: Define, discover, review, document, and understand the user's needs and constraints of the to-be system using at least two requirements gathering techniques. Justify your choice…cont.

For Faculty:

- How do you currently manage project titles for students?
- Do u have any concerns for data privacy and security within the system?
- What any difficulties within your current system for managing project titles for students that we can fix in the new system?
- Is there any functionalities u think it will make it easier for you when submitting and managing project proposal?
- How do u wanna be notified about student groups requesting for project titles?
- How do u think the system should handle situations when multiple groups want the same project title?
- Do u have any goal that u wanna achieve foe the current system, like making it faster or more flexible?

For Students:

- Do u face any problems or challenges when creating groups or joining a one?
- What any features u think if we add to the system it will managing the capstone projects?
- What is the kind of notifications that u think it would be most useful for you (like is it group requests or project title allocations)?
- Before u join a project group, what info do u need to know?
- Is there any sensitive data in your student project profile that u think we need to save its integrity?
- Do u like the current system of your faculty and if no why?

QUESIONS

Question 3: Define, discover, review, document, and understand the user's needs and constraints of the to-be system using at least two requirements gathering techniques. Justify your choice…cont.

- **Questionnaires:** useful in gathering information from key organization members about (Attitudes, Beliefs, Behaviors, Characteristics) and enable us to document user need to be used in building the proper system!

Capstone Project Management System (CPMS) Questionnaire

Introduction:

Thank you for taking the time to provide your answers to our Questionnaire for the development of the Capstone Project Management System (CPMS).

Your feedback is an important aspect for us to ensure that the system meets the needs of all stakeholders involved in your system.

Please answer the following questions to help us understand your expectations to the new system more!

(*) required

Section 1: General Information (*)

- Full Name:
- Role (Project Coordinator, Faculty, Student, Examiner):
- Department:
- Which date have you started attending this institution (DD/MM/YYYY):

Section 2: System Features and Functionality (*)

1. Please rank these features from 1 to 5 consider that 1 is the most important and 5 being the least important)

- Project title submission and approval: ( )
- Group formation and management: ( )
- Project allocation and tracking: ( )
- Report submission and grading: ( )
- Notifications and communication tools: ( )

2. How would you prefer to receive notifications from the CPMS? (u can select all that apply!)

- Email:
- Faculty app notifications:
- SMS/text messages:
- Other (any other):

QUESIONS

Question 3: Define, discover, review, document, and understand the user's needs and constraints of the to-be system using at least two requirements gathering techniques. Justify your choice…cont.

Capstone Project Management System (CPMS) Questionnaire

Section 2: System Features and Functionality…cont (*)

3. What any additional features or functionalities you think you would like to see in the CPMS?

Section 3: User Permissions (*)

- What level of control and permissions do you think different user roles (Project Coordinator, Faculty, Student, Examiner) should have within the system?

Section 4: Constraints and policies (*)

- Do you think there could be any specific policies or constraints that need to be met within the CPMS?

- Do you have any data privacy and security concerns within the CPMS?

QUESIONS

Question 3: Define, discover, review, document, and understand the user's needs and constraints of the to-be system using at least two requirements gathering techniques. Justify your choice…cont.

Capstone Project Management System (CPMS) Questionnaire

Section 5: Any Comment

- U can write your comment here…

Conclusion:

Thank you for completing the CPMS questionnaire!

Your answers will help us make the system to better meet the needs of our stakeholders, if you have any further comments or concerns, please feel free to contact on one of these emails (dyalzubi21@cit.just.edu.jo).

Chapter 4, slides 6 and 43

QUESIONS

Question 4: Create an activity diagram describing the behavior of the business process.

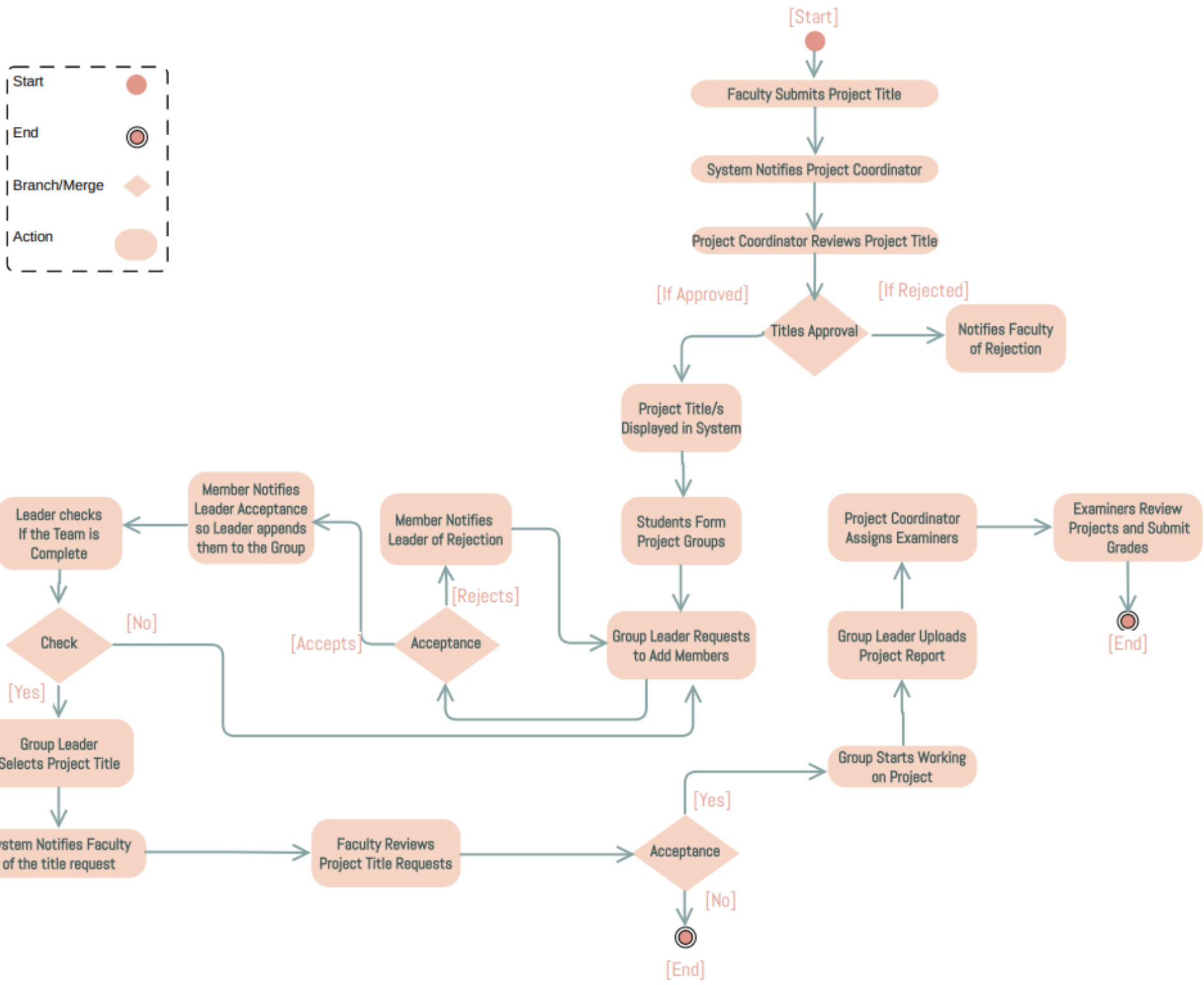

Figure 2: CPMS Activity Diagram

QUESIONS

Question 5: What is the perimeter of the to-be system?

What are our boundaries in the CPMS system?, What our system will cover?, And what our system will not cover?

The Perimeter Includes (what the system will cover):

1. Project title submission and approval:

- The faculty should be able to submit new project titles to the capstone system, the members of the faculty will login to the system and fill a form with project titles and any needed details and submit it.
- The coordinators should be able to review and (approve or reject) the submitted project titles, they will get any notifications of any new submission, the coordinate will login to the system and view the notifications, approve or reject.
- The system role is to handle the workflow between the faculty and the coordinators.

2. Groups creation:

- Students should be able to make groups, manage the members in the group, and then select their project title, the students can create groups, invite members, members accept or reject, and at last groups will be locked when complete.
- The system role here is to enable those functionalities (creation, inviting, acceptance/rejection, and blocking) by providing a friendly interface of the system.

3. Project allocation:

- Groups will select project titles then the system notifies the relevant faculty for approval, only one group can request a title at a time, but why one at a time?

When one of the groups request a project title, the system immediately will lock that title for that group to prevent the other groups from requesting it until the faculty review and (approve or reject) that request.

QUESIONS

Question 5: What is the perimeter of the to-be system?...cont.

4. Report submission:

- Here, each group gonna submit their final project report work by the leader of each.
- The system role here is to allow complete submission process so the report files arrive safely to the right direction (the coordinator since he is responsible for managing the submission process).

5. Grading:

- First, the coordinator will assign the reports for the examiners, second, the examiners will download report files, check each report and submit the right grade via the system.
- The system will allow project coordinators to assign the reports for the examiners, and enable the examiners to download report files, review each, and lastly grade them within the system.

The Perimeter Excludes (what the system won't cover), a lot of examples can be included!

1. Other college activities than the Projects management, like exams, quizzes, assignments,…etc.

Our system focuses on the projects allocation and management process only, and its functionality will be limited only for this reason, it can't include other functionalities in the college.

2. Personal info management like the info of each of the stakeholders, our system doesn't focus on the information managements process of each member, this is out of the range of the required system ability!

Our system will focus only on the project allocation and management between the right entities!

QUESIONS

Question 6: Identify the functional and non-functional requirements of the to-be system?

First, let's explain what do we mean by Functional and Non-functional:

Functional Requirements: these requirements describe specific behaviors or functions of a system (something the system does), they tell about what the system do, what are the tasks that should be included in the system to be performed, and also the interactions between the system and the users, so, it means the main core functions for performing specific tasks.

Non-functional Requirements: these requirements are used for system improvements and quality attributes on the system's performance, they describe how the system performs its functions, rather than what specific functions the system performs.

CPMS Functional Requirements:

- Project title submission and approval
- Group creation, team members management, and projects allocation
- System notifications for the events
- Project report submission and examiner allocation
- Grading reports by examiners.

CPMS Non-functional Requirements:

- **Security:** ensuring the data integrity, confidentiality, availability, and privacy, and ensuring secure access to the system with authenticated users
- **Performance:** system should be able to handle the processes efficiently without errors
- **Usability of the system:** make a user friendly interface.
- **Scalability:** the system should be able to adapt with any future growth in the number of users and number of projects.

Both of the functional and non-functional requirements build our CPMS completely, having both the core functionalities needed to be accessed by the users, and the non-functionalities that help in enhancing the system!

QUESIONS

Question 7: According to your answer in Question 1 and 6, describe the requirements using either a product backlog or a use case diagram.

Using product backlog

CPMS product backlog

Each sprint = 2 week

Num	USER STORY	PRIORITY	SPRINT	STATUS
1	Faculty Submits Project Title	Must	1	To do
2	Project Coordinator Reviews Project Title and approving	Must	1	To do
3	Students Form Project Groups	Should	2	To do
4	Group Requests Project Title	Must	2	To do
5	Faculty approving	Must	2	To do
6	Submit Project Report	Should	3	To do
7	Assign Examiners	Must	3	To do
8	Examiner Grades Project	Must	3	To do

Table 1: CPMS Product Backlog

QUESIONS

User Story 1: Faculty submits project title

User Story 1						
Need or Opportunity:	Submitting Project Titles successfully by Faculty					
Story:	As a faculty member, I wanna submit the project titles to the system so that students can choose and work on them					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding			X		
	Testing			X		
	Listening			X		
	Designing			X		
Resources:	Time			X		
	Cost			X		
	Quality			X		
	Scope			X		

Table 2: CPMS User Story 1

User Story 2: Project coordinator reviews project title

User Story 2						
Need or Opportunity:	Reviewing Project Titles by the Project Coordinator and approving					
Story:	As a project coordinator, I wanna review the project titles submitted by faculty and approve or reject					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding				X	
	Testing				X	
	Listening			X		
	Designing				X	
Resources:	Time				X	
	Cost				X	
	Quality				X	
	Scope				X	

Table 3: CPMS User Story 2

QUESIONS

User Story 3: Students Form Project Groups

User Story 3						
Need or Opportunity:	Creating Project Groups by Students					
Story:	As a student, I wanna create a Project Group or join a one so that we can collaborate on a project together					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding			X		
	Testing			X		
	Listening			X		
	Designing			X		
Resources:	Time			X		
	Cost			X		
	Quality			X		
	Scope			X		

Table 4: CPMS User Story 3

User Story 4: Group Requests Project Title

User Story 4						
Need or Opportunity:	Requesting Project Titles by Groups					
Story:	As a group leader, I wanna request a project title so that our group can start working on it					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding			X		
	Testing			X		
	Listening			X		
	Designing			X		
Resources:	Time			X		
	Cost			X		
	Quality			X		
	Scope			X		

Table 5: CPMS User Story 4

QUESIONS

User Story 5: Faculty Approves Group Allocation

User Story 5						
Need or Opportunity:	Approving Project Titles by Faculty					
Story:	As a faculty member, I wanna approve or reject the project titles requested by groups					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding			X		
	Testing			X		
	Listening			X		
	Designing			X		
Resources:	Time			X		
	Cost			X		
	Quality			X		
	Scope			X		

Table 6: CPMS User Story 5

User Story 6: Submit Project Report

User Story 6						
Need or Opportunity:	Submitting Project Reports by Students					
Story:	As a Team Leader, I wanna submit a project report so that it graded					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding			X		
	Testing			X		
	Listening			X		
	Designing			X		
Resources:	Time			X		
	Cost			X		
	Quality			X		
	Scope			X		

Table 7: CPMS User Story 6

QUESIONS

User Story 7: Assigning Examiners

User Story 7						
Need or Opportunity:	Assigning Examiners by Coordinators					
Story:	As a project coordinator, I wanna assign examiners to project reports so that they can be reviewed and graded					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding				X	
	Testing				X	
	Listening				X	
	Designing				X	
Resources:	Time				X	
	Cost				X	
	Quality				X	
	Scope				X	

Table 8: CPMS User Story 7

User Story 8: Examiner Grades Project

User Story 8						
Need or Opportunity:	Grading Project Reports by Examiners					
Story:	As an examiner, I wanna review and grade the project reports submitted by students to provide feedback and grades					
		Well Below	Below Average	Average	Above Average	Well Above
Activities:	Coding				X	
	Testing				X	
	Listening				X	
	Designing				X	
Resources:	Time				X	
	Cost				X	
	Quality				X	
	Scope				X	

Table 9: CPMS User Story 6

QUESIONS

Sprint 1

Goal: To ensure that project titles are displayed on the system for viewing by student groups.

Attendees:

Management Team, Product Owner (coordinator), Stakeholders(Faculty).

Scenario:

The Faculty submits project titles to the system that the system will then notify the coordinators for the reviewing and approving processes.

Feedback:

- Complete approval
- Successful Notification function between Faculty and Coordinator

Sprint Backlog:

Num	USER STORY	PRIORITY	SPRINT	STATUS
1	Faculty Submits Project Title	Must	1	To do
2	Project Coordinator Reviews Project Title and approving	Must	1	To do

Table 10: Sprint 1 backlog

QUESIONS

Sprint 2

Goal: Students can access the system, form groups, join groups, and choose project titles.

Attendees:

Management Team, Product Owner (coordinator), Stakeholders (Students, Faculty).

Scenario:

The students start forming groups after the titles are displayed, and after the correct group creation process, they then can submit a request that contains the titles of the project they wanna work with, then the faculty will get notifications of these requests and approve or reject.

Feedback:

- Successful Groups allocation functions within the system
- Successful Notifications functions via the system
- Successful titles allocation for each group functions within the system

Sprint Backlog:

Num	USER STORY	PRIORITY	SPRINT	STATUS
3	Students Form Project Groups	Should	2	To do
4	Group Requests Project Title	Must	2	To do
5	Faculty approving	Must	2	To do

Table 11: Sprint 2 backlog

QUESIONS

Sprint 3

Goal: Students submit reports, coordinators assign examiners, and examiners grade projects.

Attendees:

Management Team, Product Owner (coordinator), Stakeholders (Examiners).

Scenario:

The students here will start work in their project after the approval process from the faculty and then submit a report with their work to the system, the system then will notify the coordinators that the reports of each group are submitted, then the coordinator can assign the examiners, now the examiners will be able to login to the system, download the reports files, and submit a grad and a feedback notification for each student via the system.

Feedback:

- Successful assigning between coordinators and examiners
- Successful reports files access by the examiners
- Successful and easy to use grading system
- Successful notification

Sprint Backlog:

Num	USER STORY	PRIORITY	SPRINT	STATUS
6	Submit Project Report	Should	3	To do
7	Assign Examiners	Must	3	To do
8	Examiner Grades Project	Must	3	To do

Table 12: Sprint 3 backlog

QUESIONS

Question 8: For each sprint/iteration, create a system sequence diagram describing the behavior of or a user story/a use case.

Sprint 1

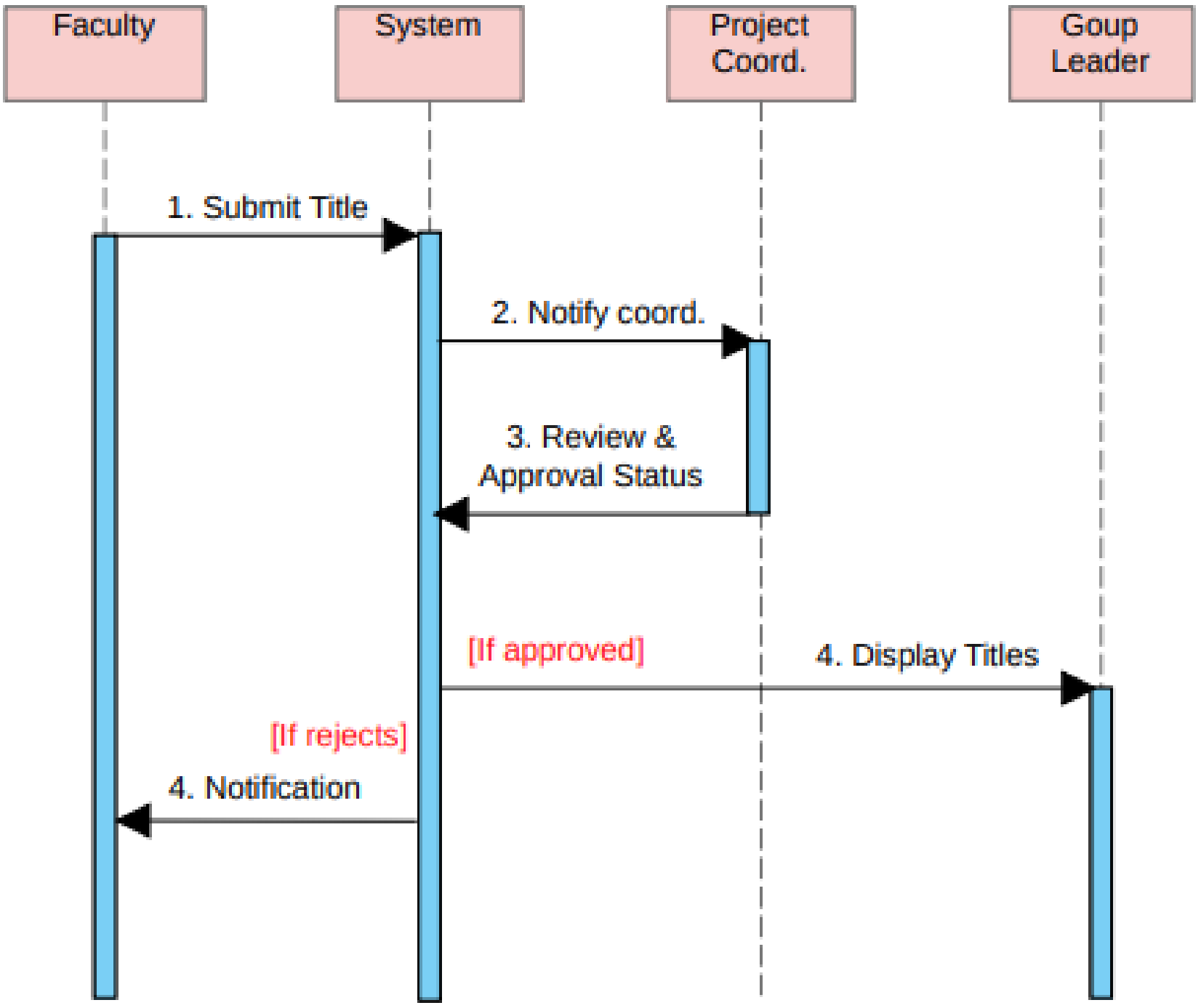

Figure 3: Sprint 1 Sequence Diagram

QUESIONS

Question 8: For each sprint/iteration, create a system sequence diagram describing the behavior of or a user story/a use case…cont.

Sprint 2

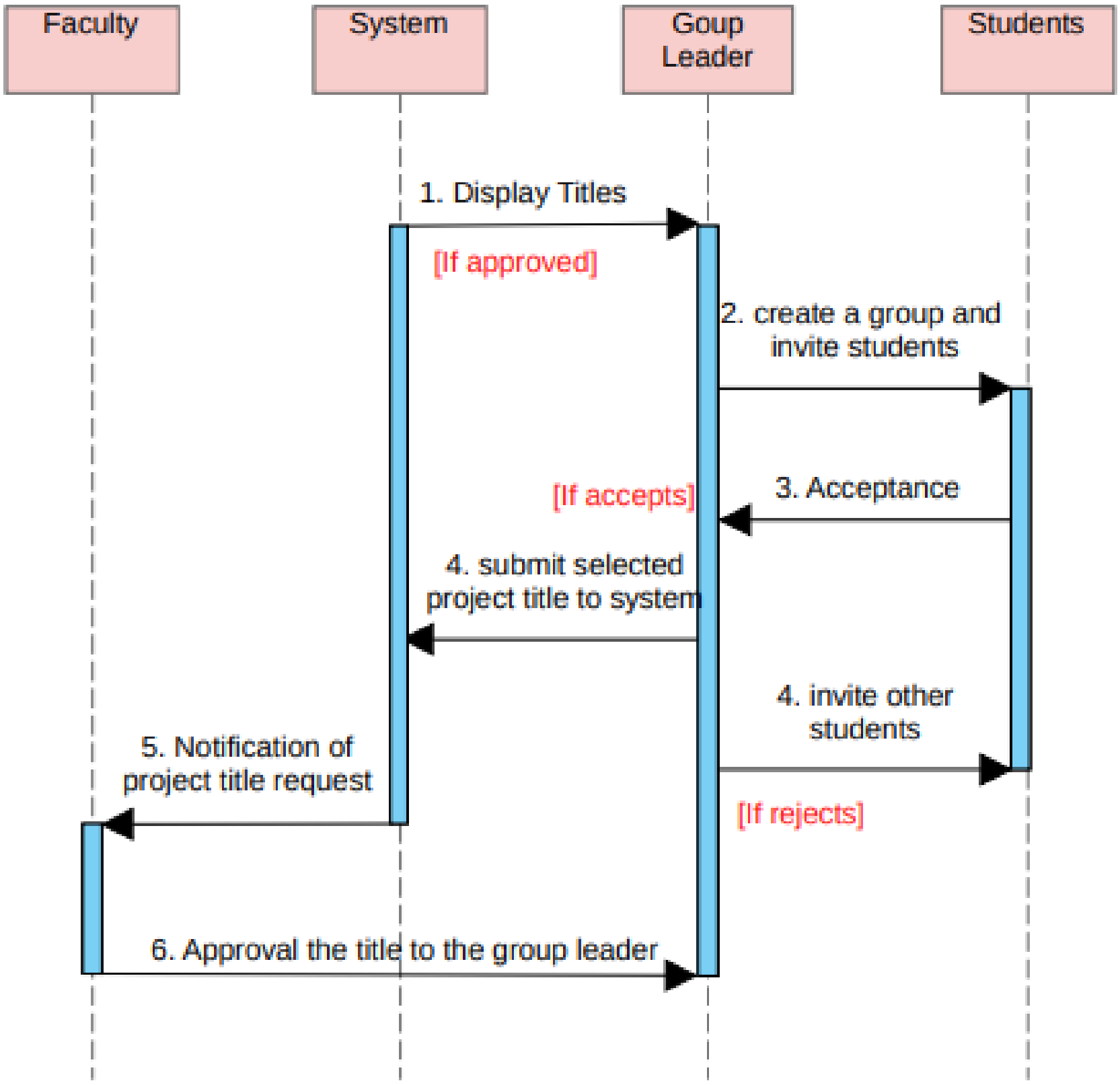

Figure 4: Sprint 2 Sequence Diagram

QUESIONS

Question 8: For each sprint/iteration, create a system sequence diagram describing the behavior of or a user story/a use case…cont.

Sprint 3

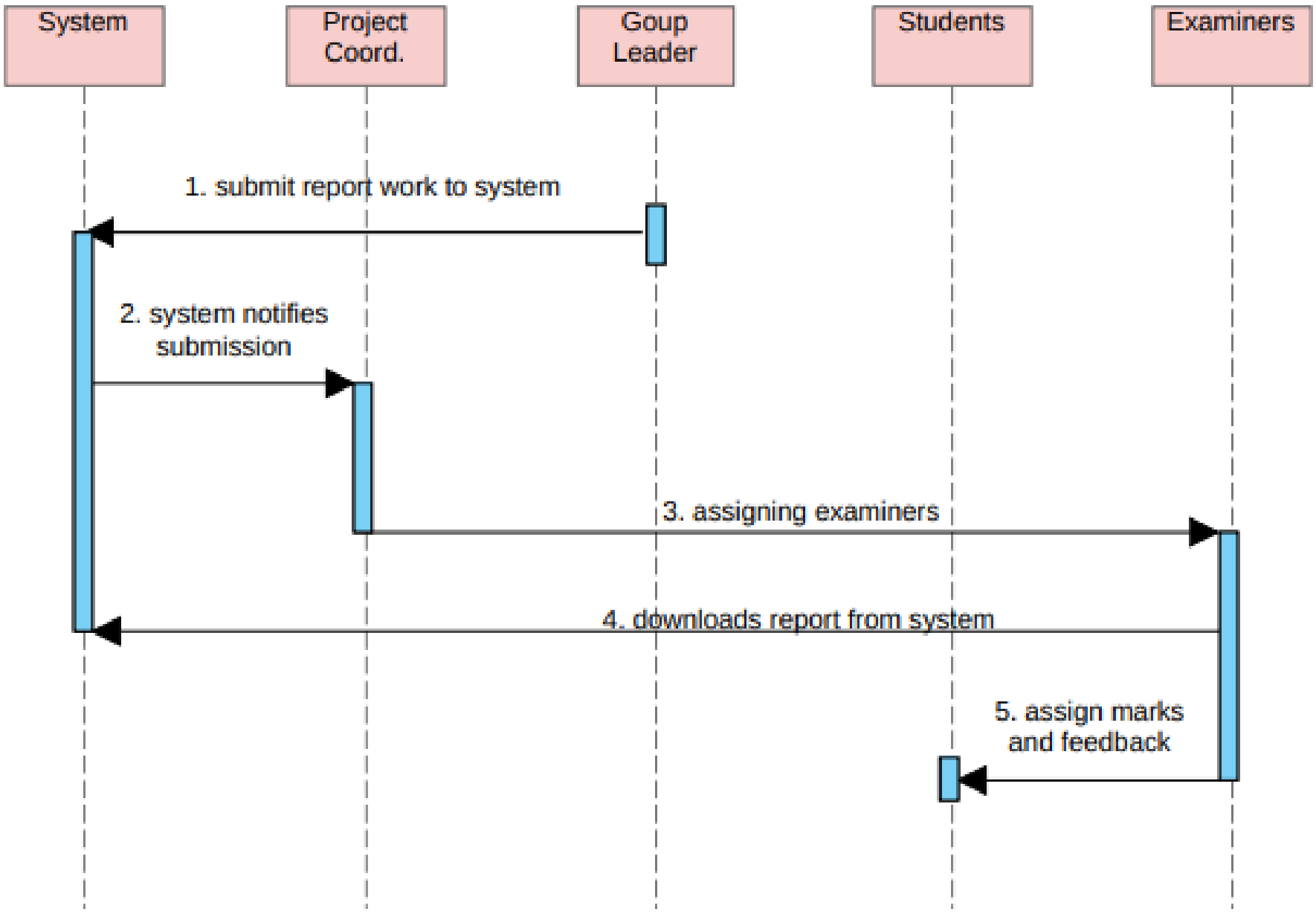

Figure 5: Sprint 3 Sequence Diagram

QUESIONS

Question 8: For each sprint/iteration, create a system sequence diagram describing the behavior of or a user story/a use case…cont.

Full Sequence Diagram

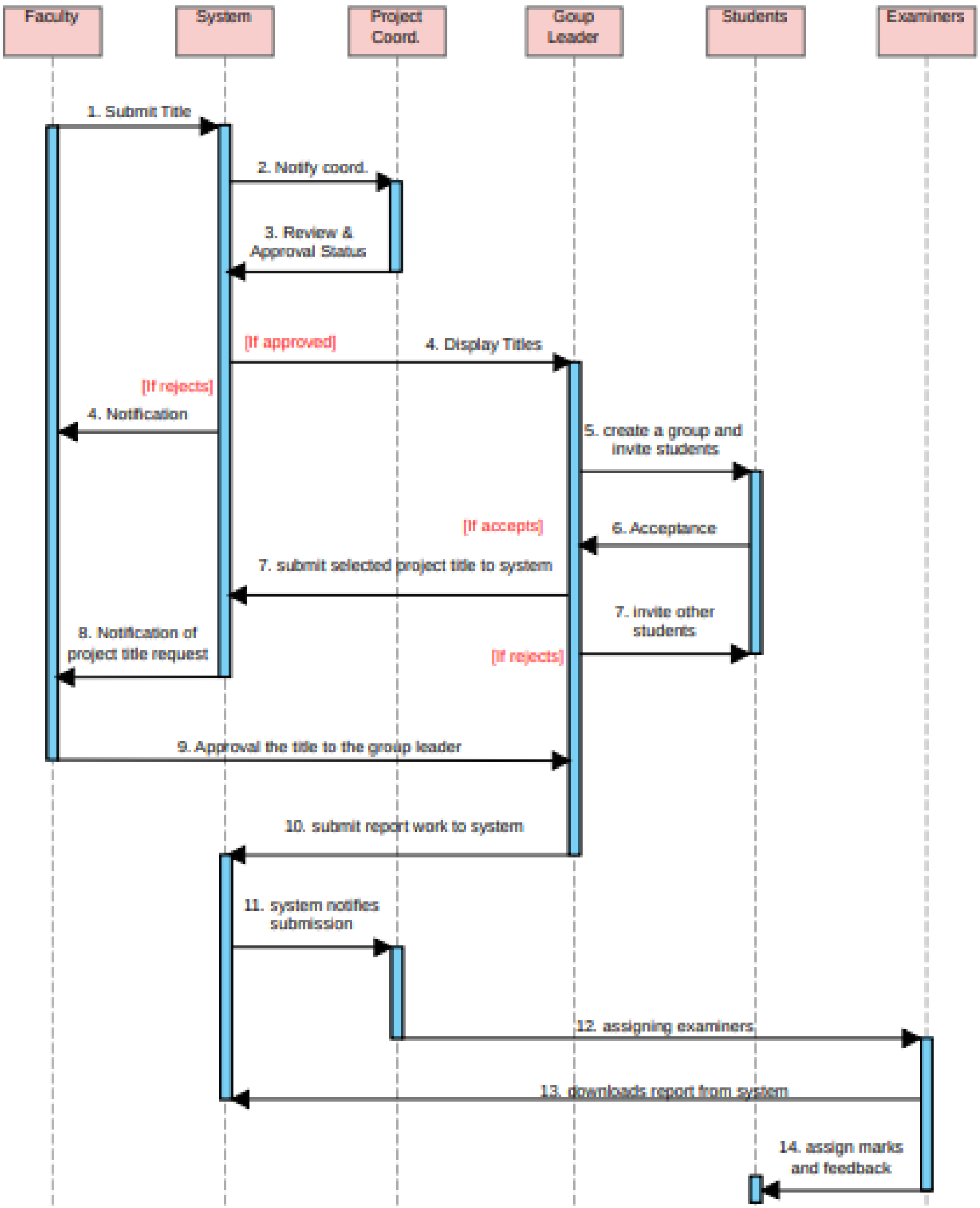

Figure 6: Full Sequence Diagram

QUESIONS

Question 9: For each sprint/iteration, create a fragment of the domain class diagram describing the structure of the to-be system.

Sprint 1

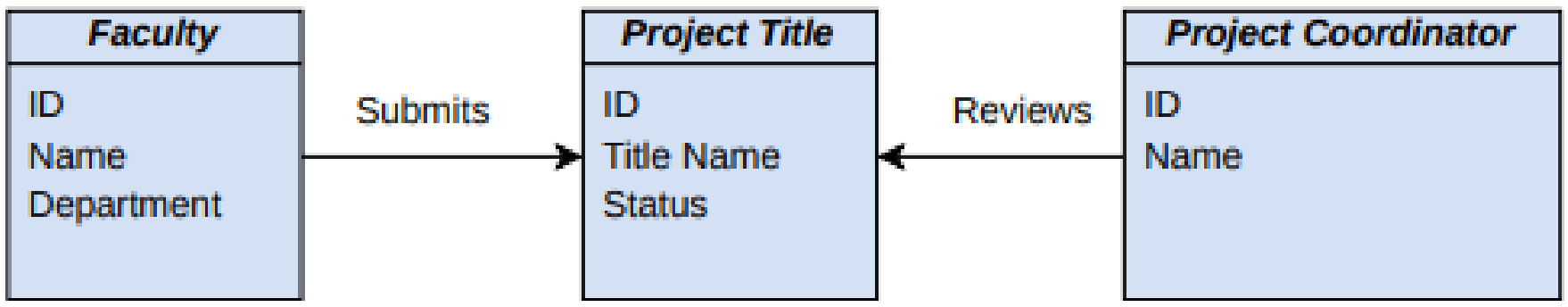

Figure 7: Sprint 1 Domain Class Diagram

Sprint 2

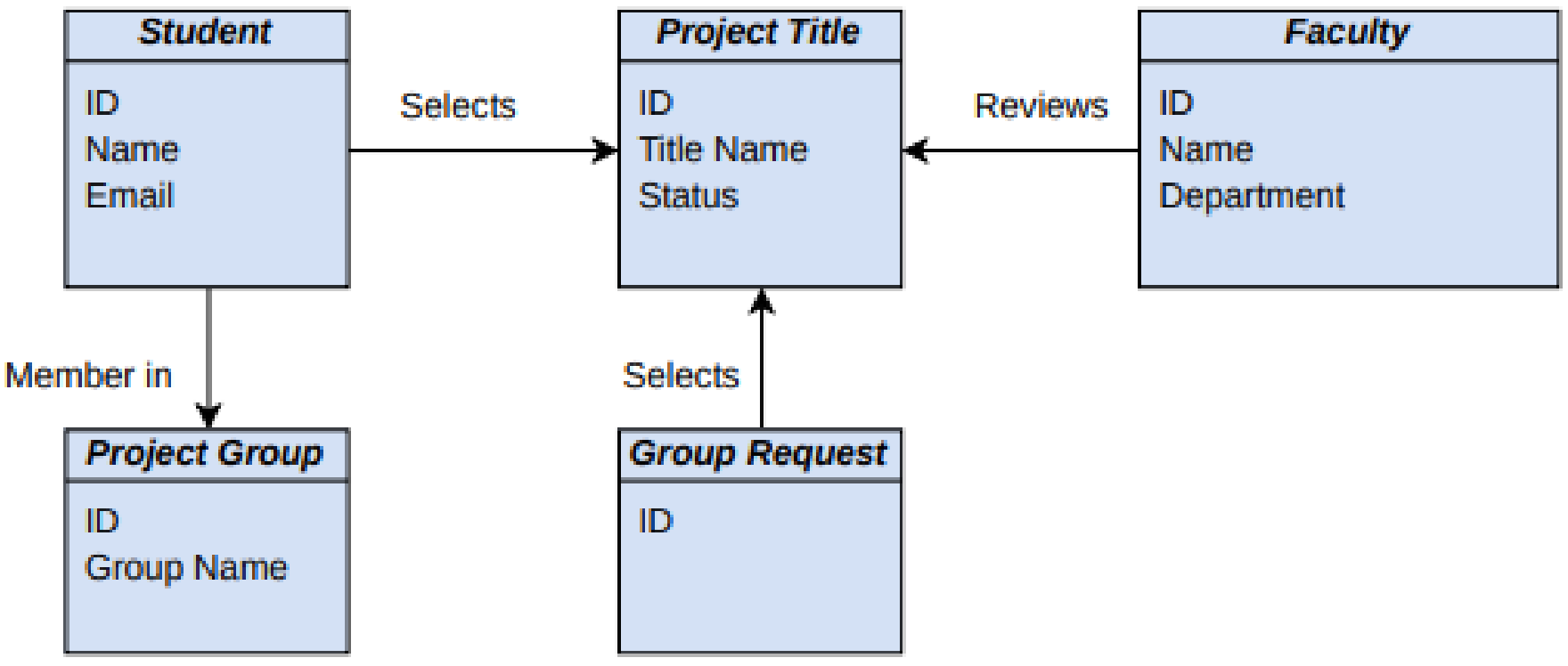

Figure 8: Sprint 2 Domain Class Diagram

QUESIONS

Question 9: For each sprint/iteration, create a fragment of the domain class diagram describing the structure of the to-be system…cont.

Sprint 3

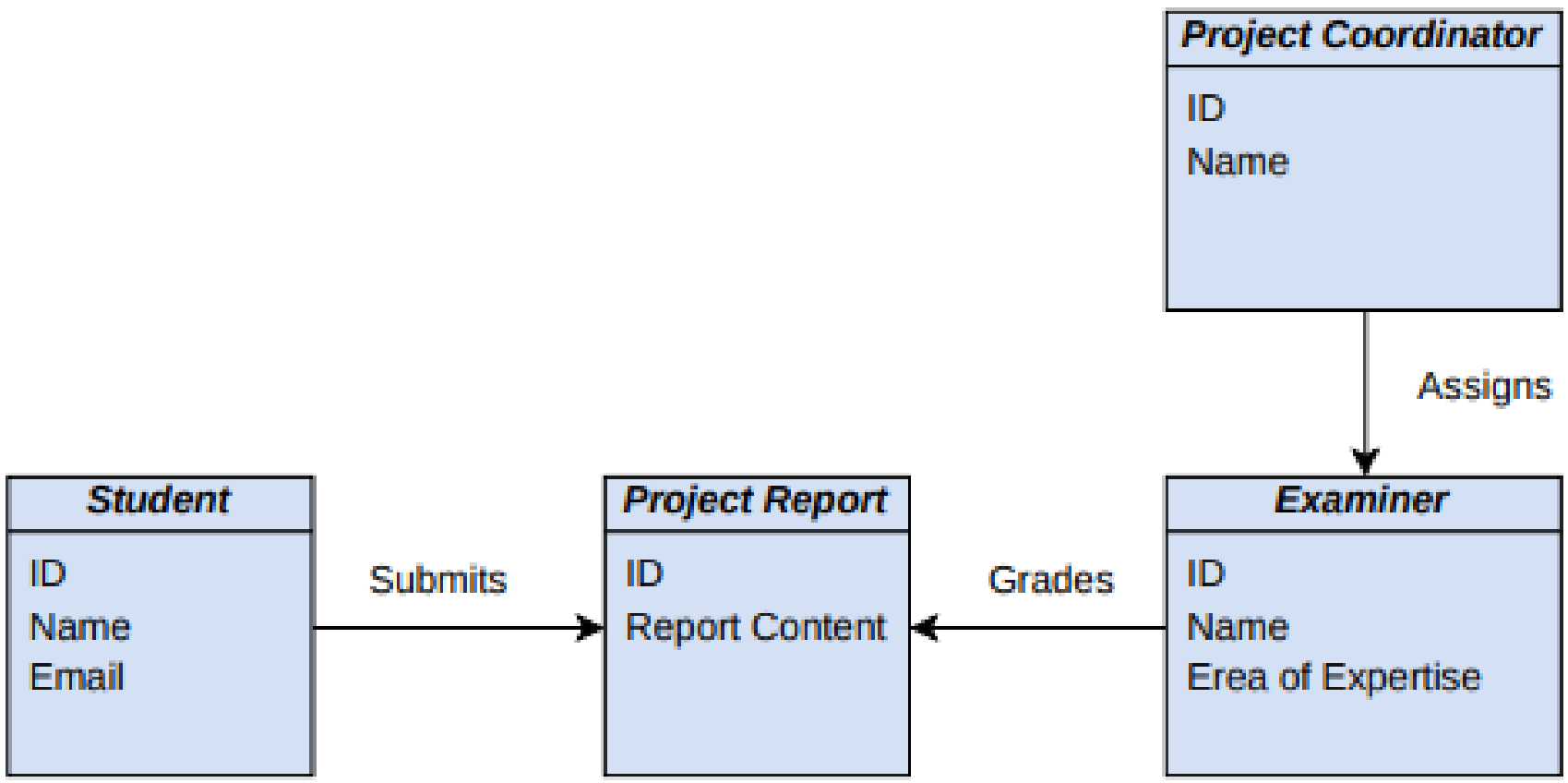

Figure 9: Sprint 3 Domain Class Diagram

QUESIONS

Question 10: Merge/Refine all fragments to define the domain class diagram.

Full Domain Class Diagram

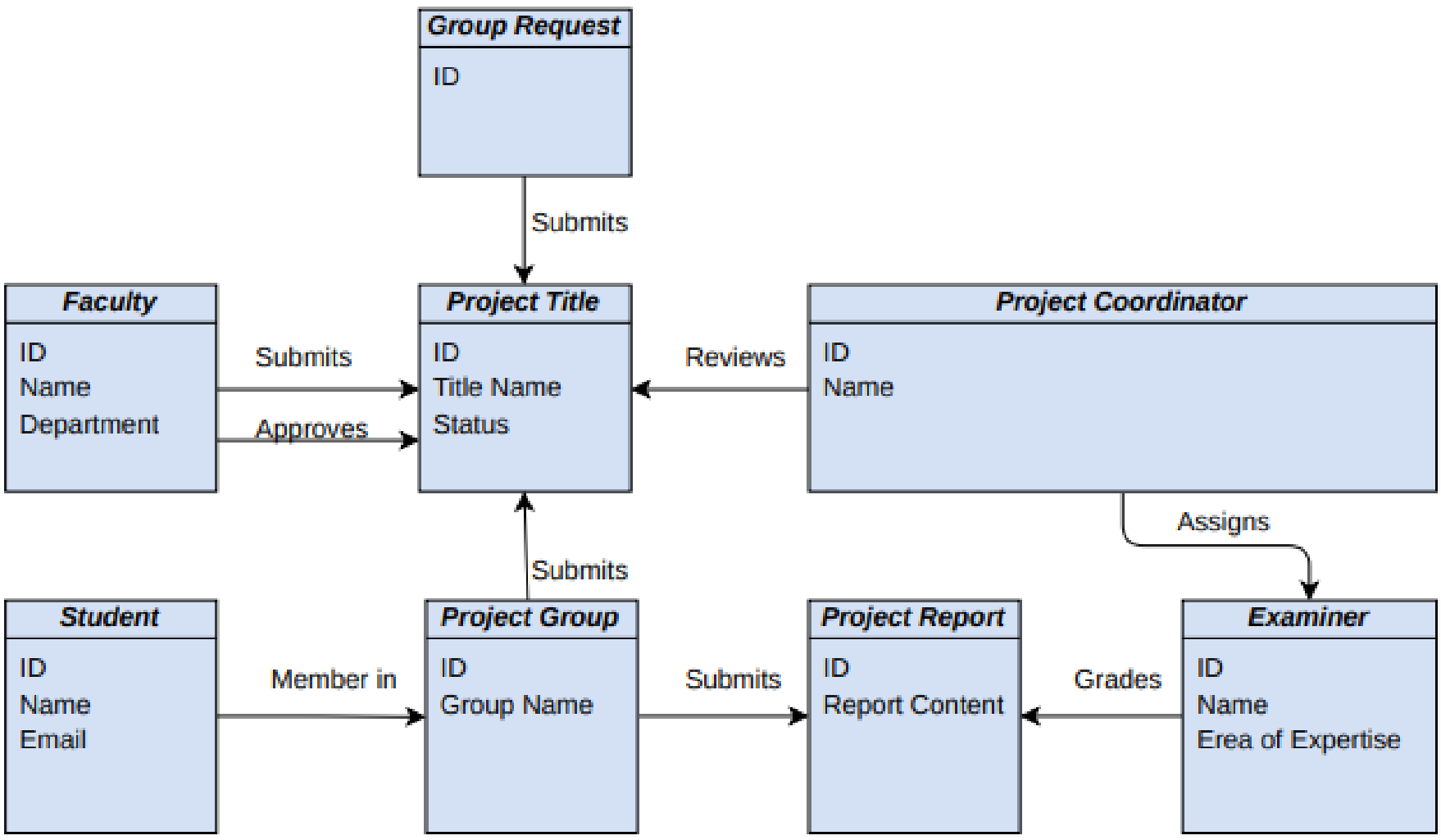

Figure 10: Full Domain Class Diagram

CONCLUSION

The detailed analysis and design of Course Project Management System (CPMS) showed explained the complex workflow interaction between different stakeholders as we saw in the diagrams like Activity, Sequence, and Class Diagrams, since mapped out a step-by-step for the processes and showed a clear vision for what's going on within the system.

And since we applied the Agile-Scrum methodology, it allowed us to divide the system into smaller pieces (sprints/Iterations), each of them has a sprint backlog of the original product backlog (dividing the backlog to deal easier with the development process, such iterative approach not only shows continuous improvement of the system, but also makes us sure that the system will meet the user requirements due to the continuous feedback each stage in the system development process.

Last words, still the system made is not perfect and doesn't have to be 100% accurate, but it is an analyzing experience that will enhance our abilities to future system analysis and design project and will be a good and a basic start for such career!

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