SOFTWARE DESIGN AND ARCHITECTURE REPORT

Noakhali Science and Technology University

INSTITUTE OF INFORMATION TECHNOLOGY

Submitted by:

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Project Name: IIT E-Platform

1. Project Context

IIT E-Platform is an automation system of IIT, NSTU. IIT E-Platform which is a clever, versatile, and cost-effective solution for our Institute. It's a whole end-to-end system that takes care of every detail of an Institute workflow, which is exactly what we needed. IIT-E Platform is a cloud-based Institute management system that addresses all elements of institute. It offers an easy-to-use interface for managing university workflow and integrating all Institute procedures. IIT E-Platform makes management or user (teacher & student) to get the most update information always by avoiding manual accounting process. We have done a long process of analyzing and collecting requirements, designing prototypes and then started coding. We tried to ensure that every gap inside the institute have been fulfilled. We have added dynamic routine, notice board, event management system, result management system and even library and a discussion forum for our departmental purpose. Though there have many areas that could be improved and could be updated in future, this website can solve many problems and give extra comfort to all users.

2. Architecture Requirements

2.1. Overview of Key Objectives

IIT E-Platform is built to serve the following purposes:

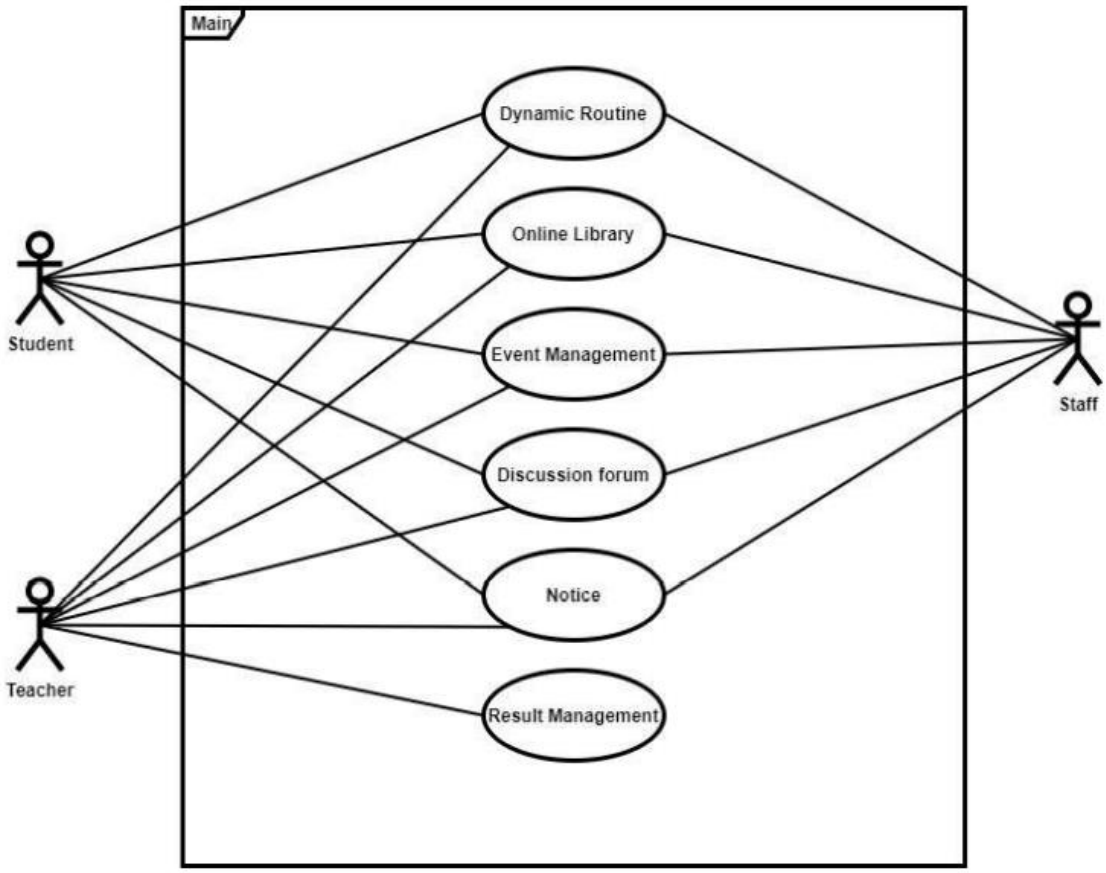
- **Provide dynamic routine:** In order to provide more fluency and manage workload we have built dynamic routine which serve many purposes. Teachers can easily update and change their classes according to the need and student also will be able to see the update from the teachers.
- **Result management System:** In order to manage the performance of a student evaluation quite important factor. Our result management system will provide ample features for teachers to manage it. All exams including class test, mid-term, final have can be easily calculated through the system.
- **Event Management System:** There are a lot of events always occur in IIT. So, students and teachers find it difficult to manage all the event according to their free time. Our event management will throw update to everyone if any event is happening soon. Also, it contains event calendar to manage and get it better.

- **Dynamic Library:** Internal library inside the institute does not have an automation system. Students find it difficult to get books from it. So, our dynamic library will provide a manageable system for the users.
- **Discussion forums:** Discussion forums are perhaps the earliest form of social media platform. Early adopters of Internet technology may recall news groups or special interest groups (SIGs) that were hosted on the early websites and systems connected to the Internet. These communities were rooted in technical topics but eventually expanded to cover just about any category that could attract an audience.

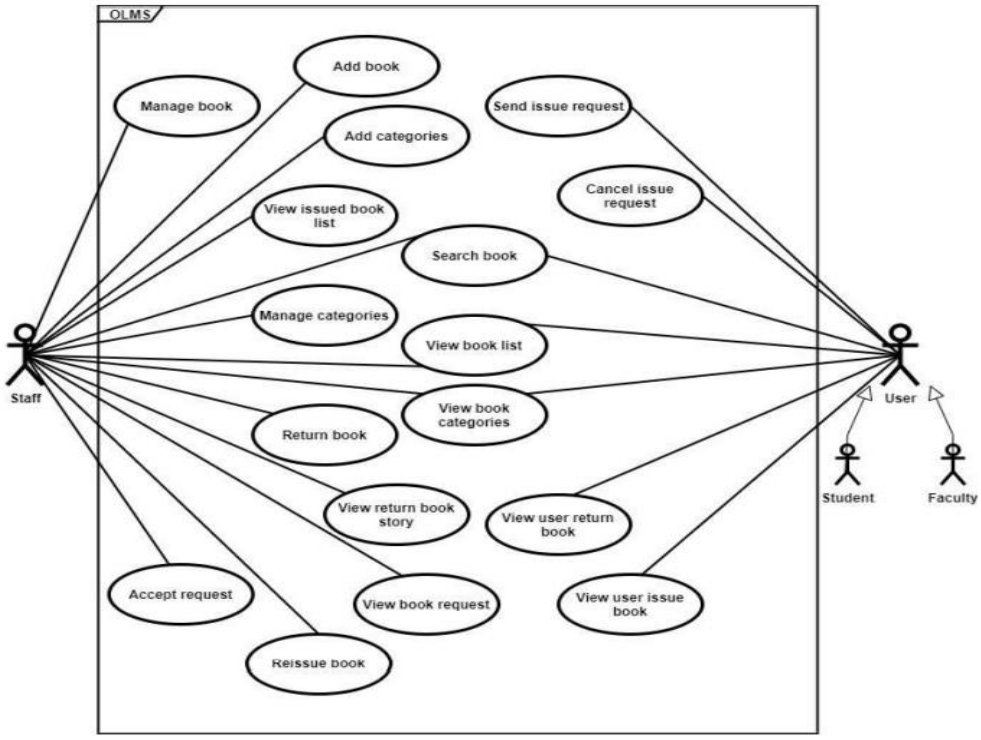
2.2. Architecture Use Cases

In IIT E-Platform, we can see a use case diagram. In this use case diagram has 6 use cases.

Use Case Diagram: IIT E-Platform



Use case 01: Online Library Management System



Use Case 02: Dynamic Class Routine

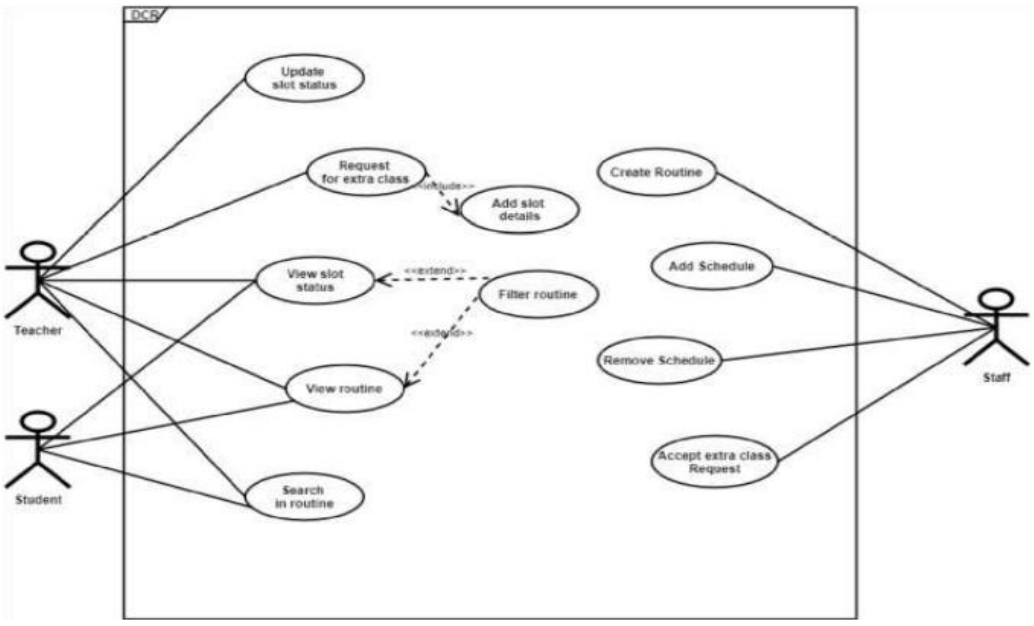


Figure 4.2: Use Case Diagram of "Dynamic Class Routine"

Use Case 03: Online Notice Board

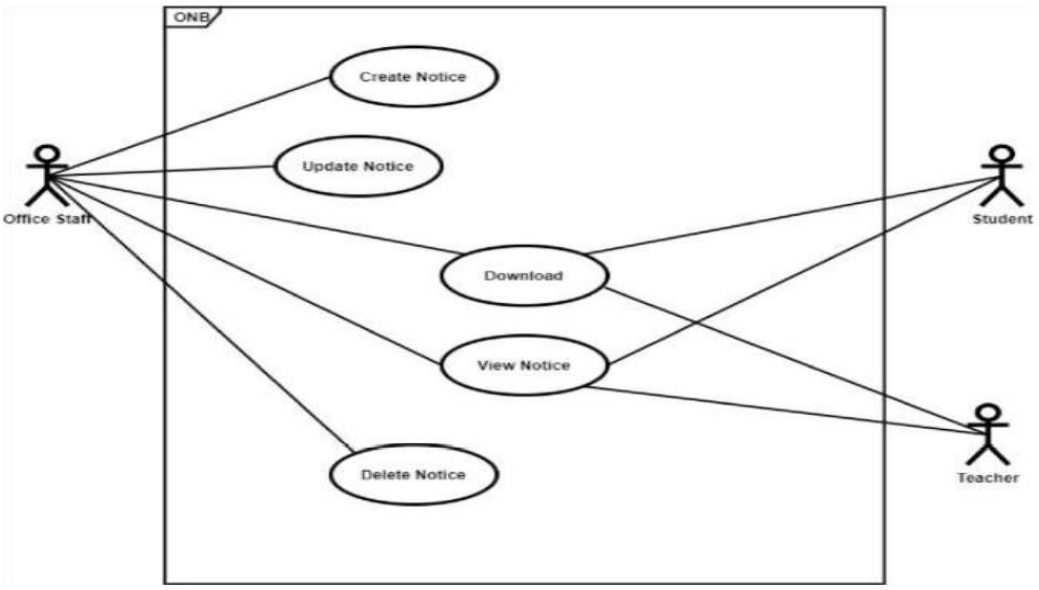


Figure 4.3: Use Case Diagram of "Online Notice Board"

Use Case 04: Result Management System

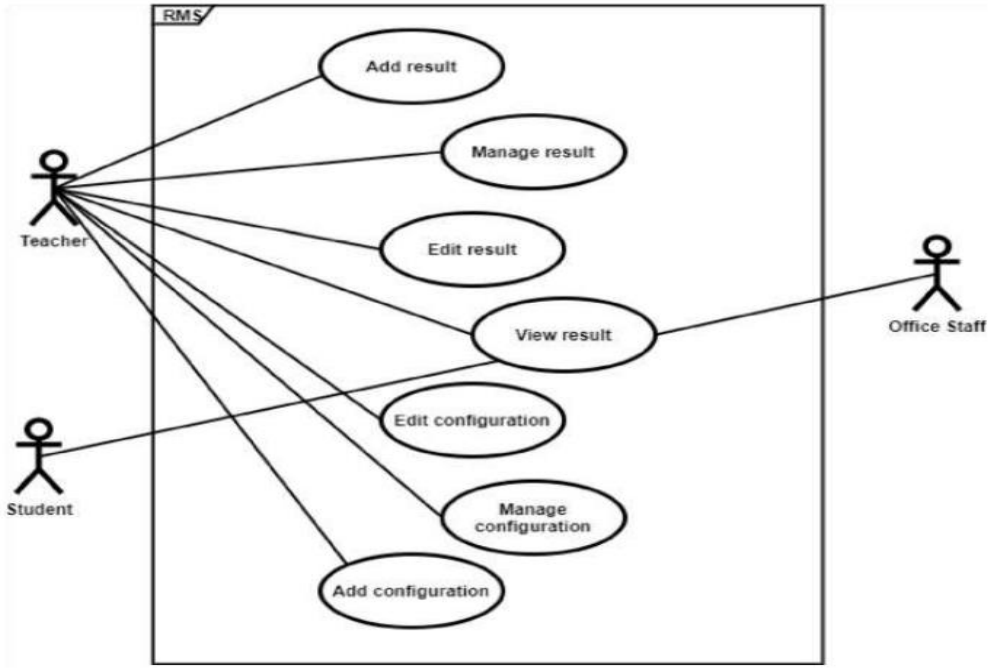


Figure 4.4: Use Case Diagram of "Result Management System"

Use Case 05: Event Management System

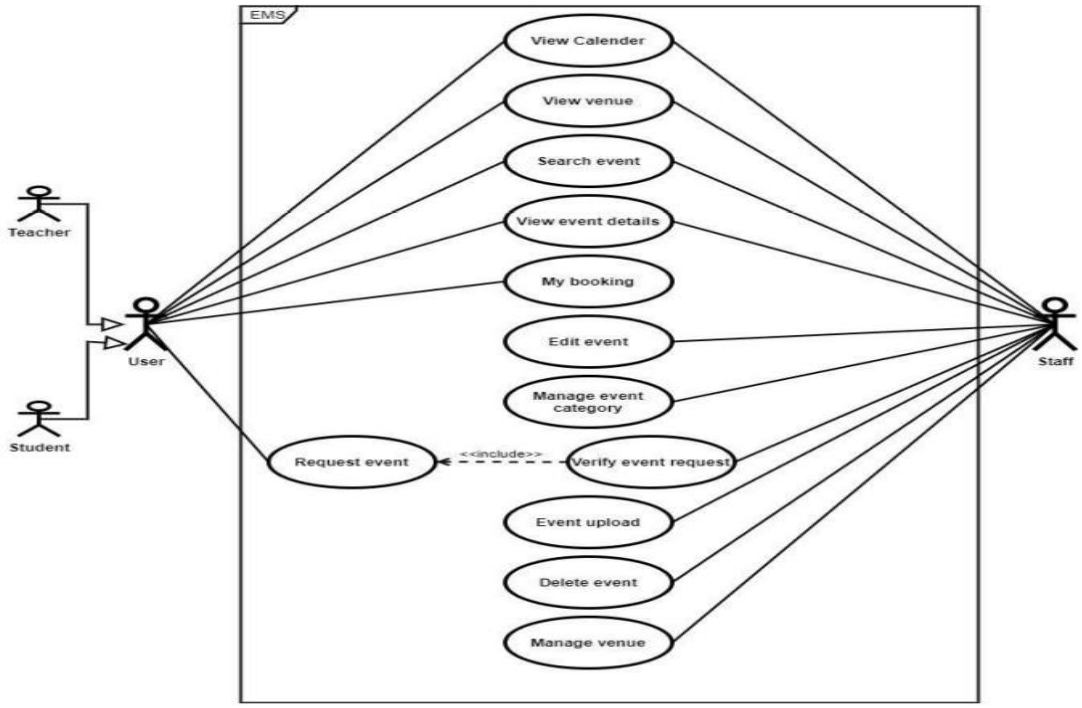


Figure 4.5: Use Case Diagram of "Event Management System"

Use Case 06: Discussion forums

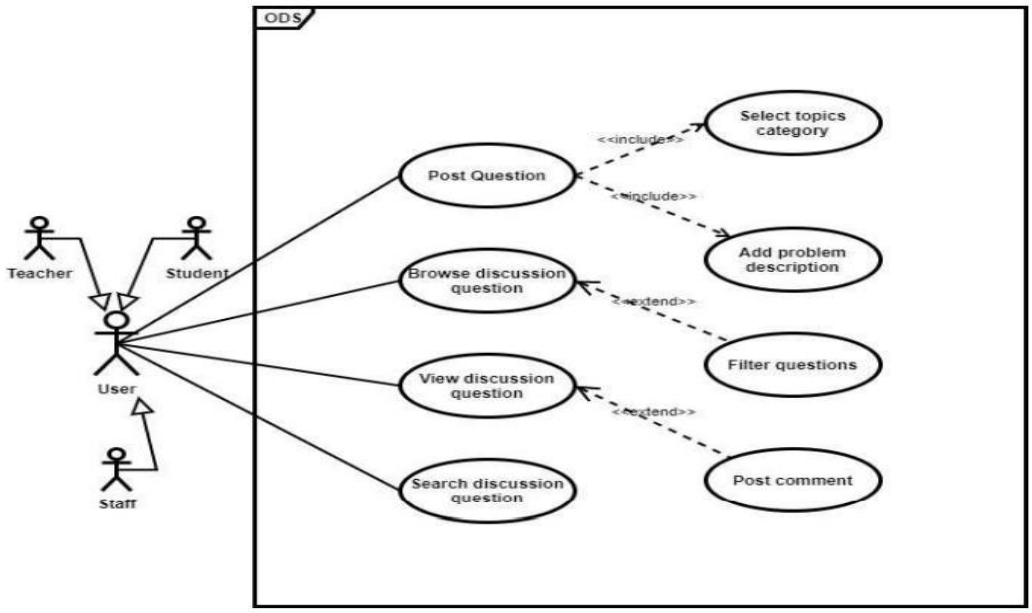


Figure 4.6: Use Case Diagram of "Discussion forums"

2.3. Stakeholder Architectural Requirements

Here, Stakeholder architectural requirements are the functional requirements which is collected from client. A Functional Requirement (FR) is a description of the service that the software must offer. It describes a software system or its component. A function is nothing but inputs to the software system, its behavior, and outputs.

Online Library Management System

FR 01: Add new Book

FR 01	Add Book	
Goal	Staff can add book	
Preconditions	Staff have to sign in to their account	
Success End Condition	Staff can add book successfully	
Fail End Condition	Staff cannot add book successfully	
Primary Actors: Secondary Actors:	Staff	
Trigger	Add book request	
Main Success Flows	**Step**	**Action**
	1	System will add book according to categories
	2	Click on button
	3	If book is added successfully, system will show you a success message.
Alternative Flows	**Step**	**Action**
	2	If book added previous- a) System will not add book.

FR 02: Manage Book

FR 02	Manage Book	
Goal	Staff can manage book	
Preconditions	Staff have to sign in to their account	
Success End Condition	Staff can manage book successfully	
Fail End Condition	Staff cannot manage book successfully	
Primary Actors: **Secondary Actors:**	Staff	
Trigger	Add book request	
Main Success Flows	**Step**	**Action**
	1	System will edit book details.
	2	If book is managed successfully, system will show you a success message.
Alternative Flows	**Step**	**Action**
Quality Requirements	**Step**	**Action**
	1	Not Applicable

FR 03: Add Book Category

FR 03	Add Categories
Goal	Staff can add category
Preconditions	Staff have to sign in to their account

Success End Condition	Staff can add category successfully	
Fail End Condition	Staff cannot add category successfully	
Primary Actors: **Secondary Actors:**	Staff	
Trigger	Add book request	
Main Success Flows	**Step**	**Action**
	1	System will add categories.
	2	Click on button.
	3	If category is added successfully, system will show you a success message.
Alternative Flows	**Step**	**Action**
	2	If category exists already- a)System will not add category and will show you a failure message.
Quality Requirements	**Step**	**Action**
	1	Not Applicable

FR 04: Manage Book Categories
FR 05: View issued book list
FR 06: Search book
FR 07: View book list
FR 08: View book category
FR 09: Return book
FR 10: View return book history
FR 11: View book request
FR 12: Accept book request
FR 13: Send book request

FR 14: Cancel book request
FR 15: View user return book
FR 16: View user issue book

Dynamic Class Routine
FR 17: Create Routine
FR 18: Add Schedule
FR 19: Remove Schedule
FR 20: Update Slot Status
FR 21: Request for Extra Class
FR 22: Add Slot Details
FR 23: View Slot Status
FR 24: View Routine
FR 25: Search in Routine
FR 26: Filter Routine
FR 27: Accept Extra Class Request
FR 28: Create Notice
FR 29: Update and Delete Notice
FR 30: View Notice

Result Management
FR 31: Add Result
FR 32: Manage Result
FR 33: Edit Result
FR 34: Add Configuration
FR 35: Manage Configuration
FR 36: Edit Configuration
FR 37: View Result

Discussion Forums
FR 38: Post Question in forum
FR 39: Select Topic question Category
FR 40: Add Problem Description
FR 41: Browse Discussion Question
FR 42: Filter Questions
FR 43: View Discussion Question
FR 44 Post Comment

FR 45 Search Discussion Question

2.4. Design and Implementation Constraints

Design and implementation constraints are those that we have used to implement this project make successful. It also describes tool that enables developers and testers to view and interact with the user interface (UI) elements of this application.

- **User Interface Technology**
  a. Programming Language: For developing this system, we will use HTML, CSS, JavaScript and PHP as programming languages.
- **Implemented Tools and Platform**
  - Database Server
  - Web Server

2.5. Non-functional Requirements

- ✓ Data Requirements
  In IIT E-Platform would be loaded from remote user. Moreover, for that purpose we need to focus on some major points. Such as:
  - Types of entity of the system
  - Route data locations
  - Capacity and resources of the data requirements
  - Data source sequence
  - Data availability schedules
  - Quantity of data
  - Availability of data
- ✓ Performance Requirements
  Performance requirements define how well the software system accomplishes certain functions under specific conditions. To ensure performance, they take some steps
- ✓ Capacity Requirements
- ✓ Dependability Requirements
- ✓ Supportability Requirements
- ✓ Security Requirements
- ✓ Access Requirements
- ✓ Integrity Requirements
- ✓ Privacy Requirements
- ✓ Usability and Human-Interaction Requirements

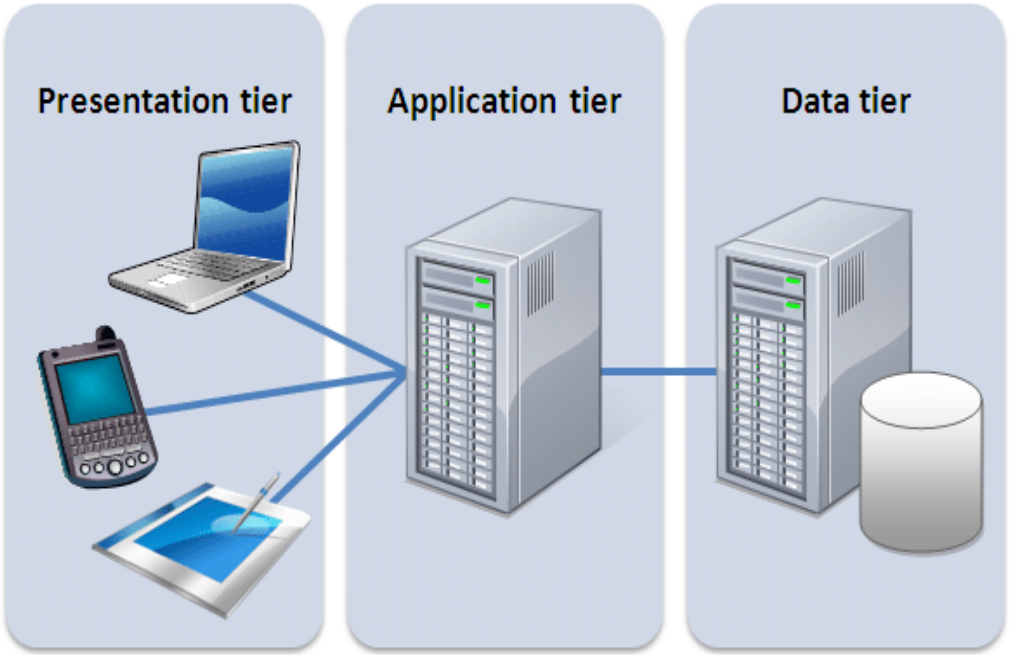
- ✓ Look and Feel Requirements
- ✓ Operational and Environmental Requirements
- ✓ Legal Requirements

3. Solution

3.1. Relevant Architectural Patterns

We can see that there are three kinds of architectural patterns we can find.

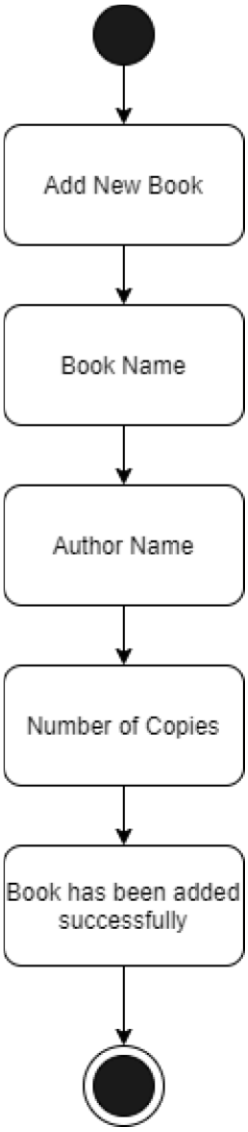
- ➢ Client server: IIT E-Platform follows client server architectural pattern. Client sends request method to the server and based on this request server will be response.
- ➢ Publish-subscribe: IIT E-Platform has a dynamic routine system where teacher change the class schedule and student can see the update class schedule. Here, teacher publish the update class time and all students of the specific class can see the update routine.
- ➢ Three-tier: IIT E-Platform also follows three tier patterns because there are client, application, and database.



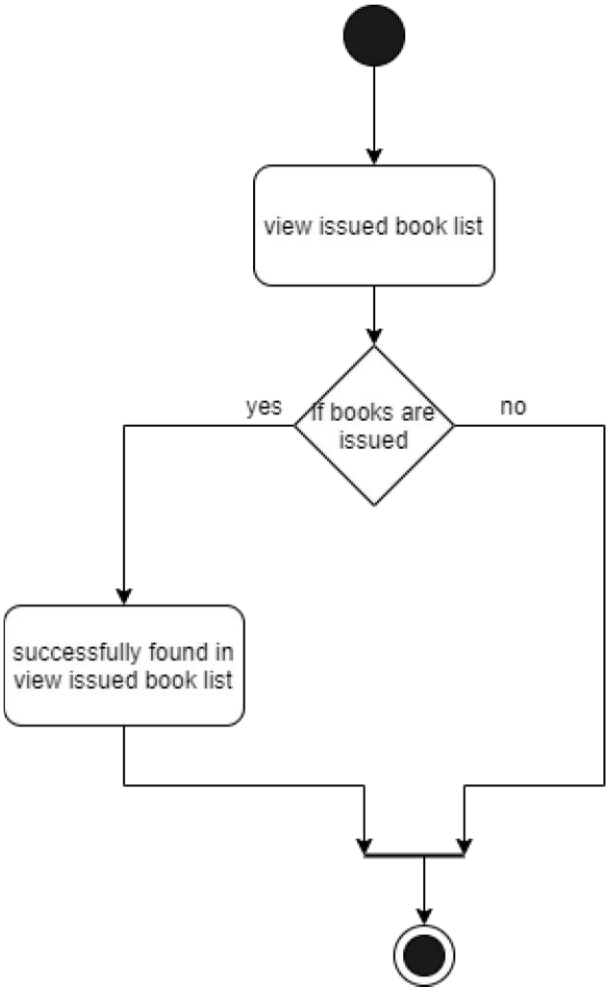
3.2. Architecture Overview

Architecture overview are referring with activity diagram. An activity diagram is a graphical representation of an executed set of procedural system activities and considered a state chart diagram variation. Activity diagrams describe parallel and conditional activities, use cases and system functions at a detailed level.

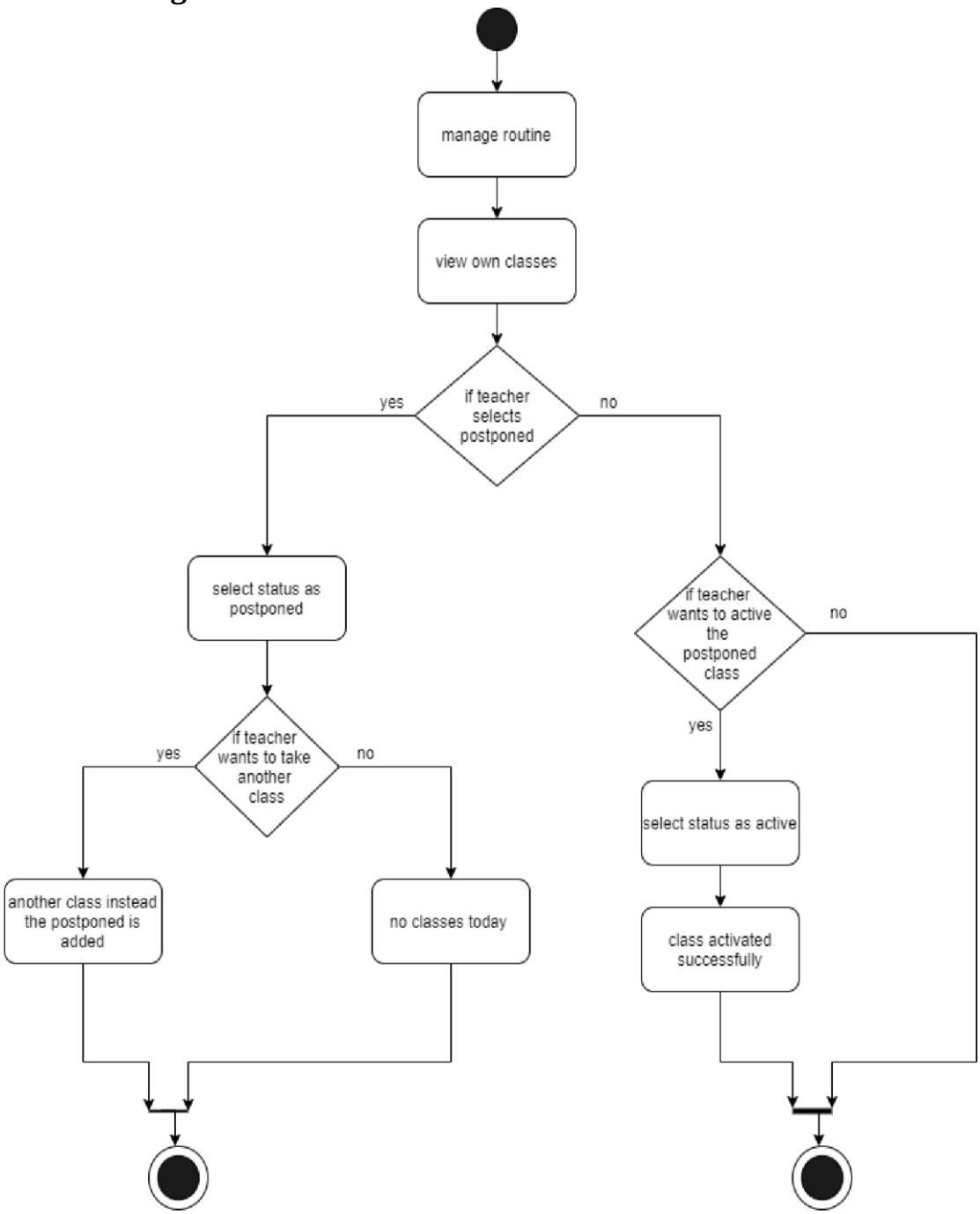
I. Add new Book



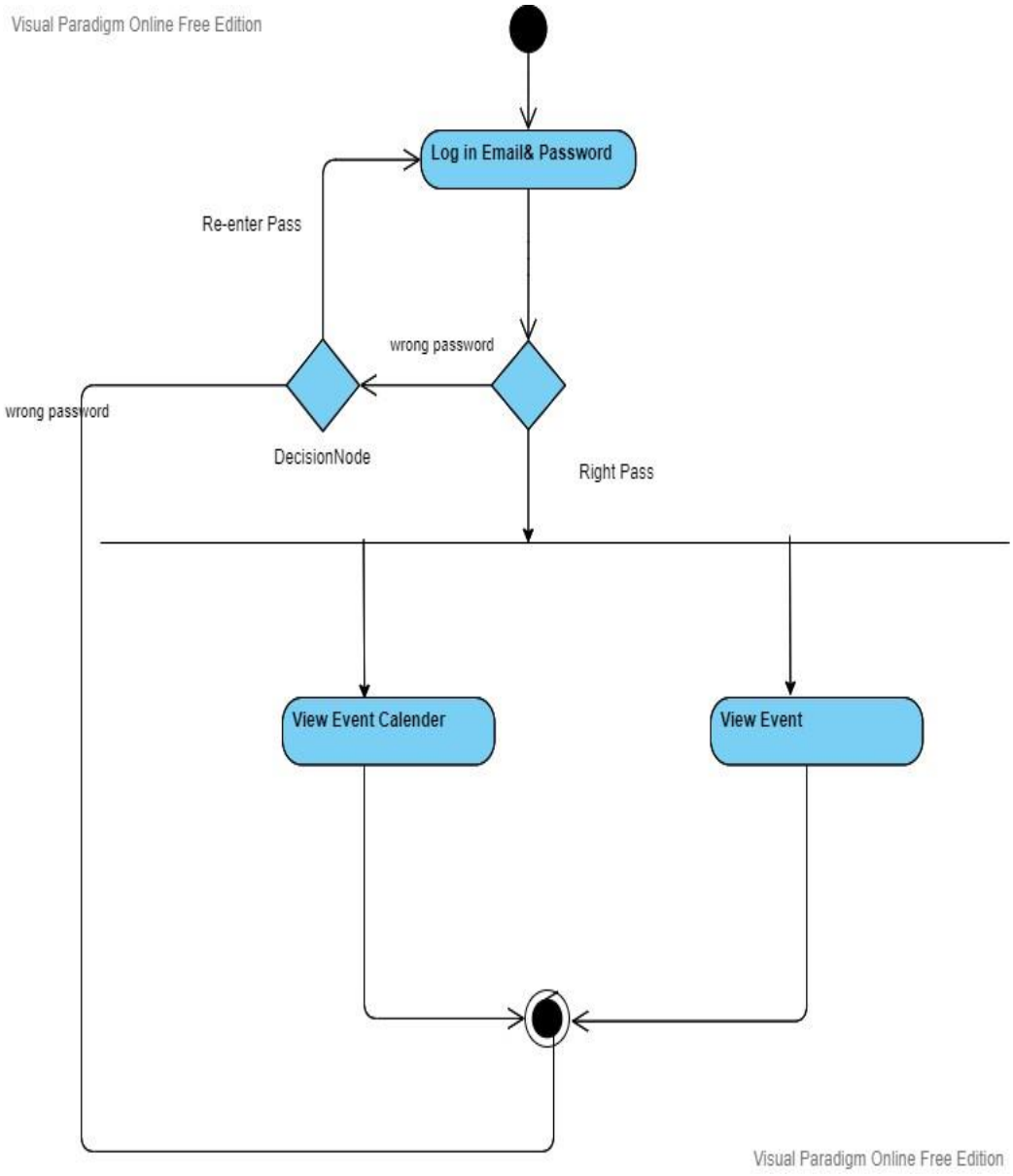
II. View issued booklist



III. Manage Routine



IV. Sign in as Student or Teacher



4. Architecture Analysis

4.1. Quality Attributes:

- Performance – shows the response of the system to performing certain actions for a certain period of time. In IIT E-Platform, to ensure performance, we need to maintain some steps.
- Interoperability is an attribute of the system or part of the system that is responsible for its operation and the transmission of data and its exchange with other external systems.
- Usability is one of the most important attributes, because, unlike in cases with other attributes, users can see directly how well this attribute of the system is worked out.
- Reliability is an attribute of the system responsible for the ability to continue to operate under predefined conditions. After a log time use, our system cannot down their service.
- Availability is part of reliability and is expressed as the ratio of the available system time to the total working time.
- Security is responsible for the ability of the system to reduce the likelihood of malicious or accidental actions as well as the possibility of theft or loss of information.
- Maintainability is the ability of the system to support changes.
- Modifiability determines how many common changes need to be made to the system to make changes to each individual item.
- Testability shows how well the system allows performing tests, according to predefined criteria.
- Scalability is the ability of the system to handle load increases without decreasing performance, or the possibility to rapidly increase the load.
- Reusability is a chance of using a component or system in other components/systems with small or no change.
- Supportability is the ability of the system to provide useful information for identifying and solving problems.