Story:

An Intern and Placement Office Management(IPOM) for IIT

There is an Intern and Placement Office (IPO) at IIT, designated to send BSSE 4th Year students to reputed software companies as interns. The internship semester starts on 1st January and ends on 30th June of every year.

The IPO Committee (IPOC) consists of three members, presided by the head of IPO. Intern-taking companies first send their interest in taking interns to IPO head. Based on that IPOC member enters the intern taking company names, available intern positions, and the job responsibilities of each position with the company address and HR's email address. The IPOC member stores that information.

The IPOC member informs the student to upload their CV. Students upload their CVs and in a separate form mention their skillsets & CGPA.

Based on a student's CGPA and Skillset, the IPOC Member suggests the student list to the IPO head according to the company's requirements. The IPO head allocated the students to the companies according to the suggestion for the interview. However, the IPO head has the authority to place any students in any company.

After allocation, an admit card is generated to the student dashboard for an interview. The dashboard will show the status of the students & IPOC. After the interview, the company ensures that the student is either selected or rejected. The system will send an email to the student. Students & IPO committee can view the status of each stage.

After selection, a formal letter is generated to the company HR mentioning that this student has been selected for his/her company. And an email is sent on behalf of the IPO head. A copy of the letter is also sent to the IPOC Officer for office records. Upon receiving the letter, company HR will issue offer letters to each intern and a copy is given to the IPO head to preserve.

Elicitation

Requirements Elicitation, also known as requirements collecting, incorporates
negotiation, problem-solving, elaboration, and specification techniques. Stakeholders
collaborate to identify the issue, put forth components of a solution, discuss alternative
strategies, and describe a preliminary set of solution requirements to promote a
cooperative, team-oriented approach to requirements collecting.
The following tasks were accomplished throughout our elicitation phase.

- Collaborative Requirements Gathering
- Quality Function Deployment (QFD)
- Usage Scenario

Collaborative Requirements Gathering

Meetings have been held with key stakeholders, students. These meetings aided in problem identification, solution proposal, discussion of various strategies, and specification of an initial set of solution requirements.

Quality Function Deployment(QFD)

QFD, or Quality Function Deployment, is a structured approach used in product development and project management. It helps ensure that customer needs and expectations are translated into specific product or service features. Essentially, it's a way to bridge the gap between what customers want and what a company delivers. QFD involves capturing customer requirements, prioritizing them, and then aligning internal processes to meet those requirements efficiently. It's like a roadmap for turning customer desires into tangible results.

Normal Requirements:

Normal requirements typically refer to the standard or basic specifications and features that a product or system must meet to fulfill its intended purpose. These are the fundamental criteria that are considered essential for the product to be functional and acceptable to users. Normal requirements are often the baseline or minimum expectations that need to be satisfied, and they serve as the foundation for further enhancements or additional features. In contrast, exceptional or special requirements may address unique or specific needs that go beyond the standard expectations.

➢ Student, IPO head, IPO coordinator & company HR will sign up & sign in their accounts.
➢ Anyone with the permission of authority can be the head of the IPOC.

➢ IPOC coordinator can enter the intern taking company names, available intern positions, the job responsibilities of each position with company address and HR's email address.
➢ IPOC coordinator can inform the student to upload their CV.
➢ IPO head has the authority to allocate any student to any company.

Expected requirements :

Expected requirements are the anticipated criteria that stakeholders assume a product should meet, based on industry standards or common practices. They represent the baseline expectations for performance, functionality, or quality within a specific context.

➢ Student can upload their CV.
➢ Student also can upload their Skill set & CGPA.
➢ IPOC coordinator can suggest the student list.
➢ IPO head can allocate students.
➢ Student & IPOC can view the current status.
➢ The IPOC coordinator can utilize Skillset as search criteria, enabling the system to display the targeted list of students.

Exciting requirements:

Exciting requirements are the standout and innovative features that make a product unique and captivating, going beyond standard expectations to create a memorable user experience.

➢ Auto-generated Admit card.

➢ System can send email to the student.

➢ Auto-generated formal letter.

➢ A mapping system may be available to illustrate the route and distance between the student's address and the company.

Requirements Modeling

In software development projects, requirements and solutions are continuously altered through teamwork and collaborative efforts through a technique called requirements modeling. Relatively accurate representation of requirements is achieved by requirements modeling, which combines text and diagrammatic representations.

Scenario Based Modeling

One of the sub-stages of requirements modeling is scenario-based modeling. Since it specifies the main use cases for the proposed software system or application, it is often the first stage of requirements modeling. Later stages of requirements modeling will relate to these use

cases. The software team will be better equipped to accurately identify needs and create useful analysis and design models if we comprehend how end users (and other players) desire to engage with a system.

Use Case Diagram

A use case diagram is a tool for summarizing information about a system and the users within it. It is typically displayed as a graphic representation of how various system components interact with one another. Use case diagrams will detail the system's events and the order in which they occur, but they do not detail how those events are carried out.
An approach for identifying, outlining, and organizing system requirements is called a Use Case. The word "system" here refers to a thing that is being created or run, like a website for mail-order product sales and services. The application's 26 systems or subsystems are modeled using the diagram. A use case diagram encapsulates a certain specification. UML (Unified Modeling Language), a standard language for the modeling of real-world objects and systems, uses use case diagrams.

The use case diagram is comprised of different symbols and notations which are included as follows:

Actors:

Actors are the users who communicate with a system. They may be a person, group, or external system that communicates with your system or application. They must be external data-producing or data-consuming

objects. In the use case diagram, stick figures denote the actors employing the use cases. Actors are also divided into two parts:

- **Primary Actor**

Primary actors collaborate to accomplish necessary system functions and produce the system's desired requirements. They often and directly collaborate with the software.

- **Secondary Actor**

A secondary actor is a person, business procedure, or application that gives a use case a certain outcome or information to accomplish the use case's ultimate objective. Secondary actors support the whole system for the fluent execution of primary actors. And they accomplish this task by producing or consuming information.

Associations

Associations are depicted through a line between actors and use cases. It’s quite important because when the diagram becomes complex, associations help to understand the association between actors and use cases.

System

System means a certain pattern of actors' behaviors and interactions. The system is also titled Scenario. In the diagram, a box is used to represent the system scope to use cases. The use case outside the box is considered out of the system’s scope.

Module

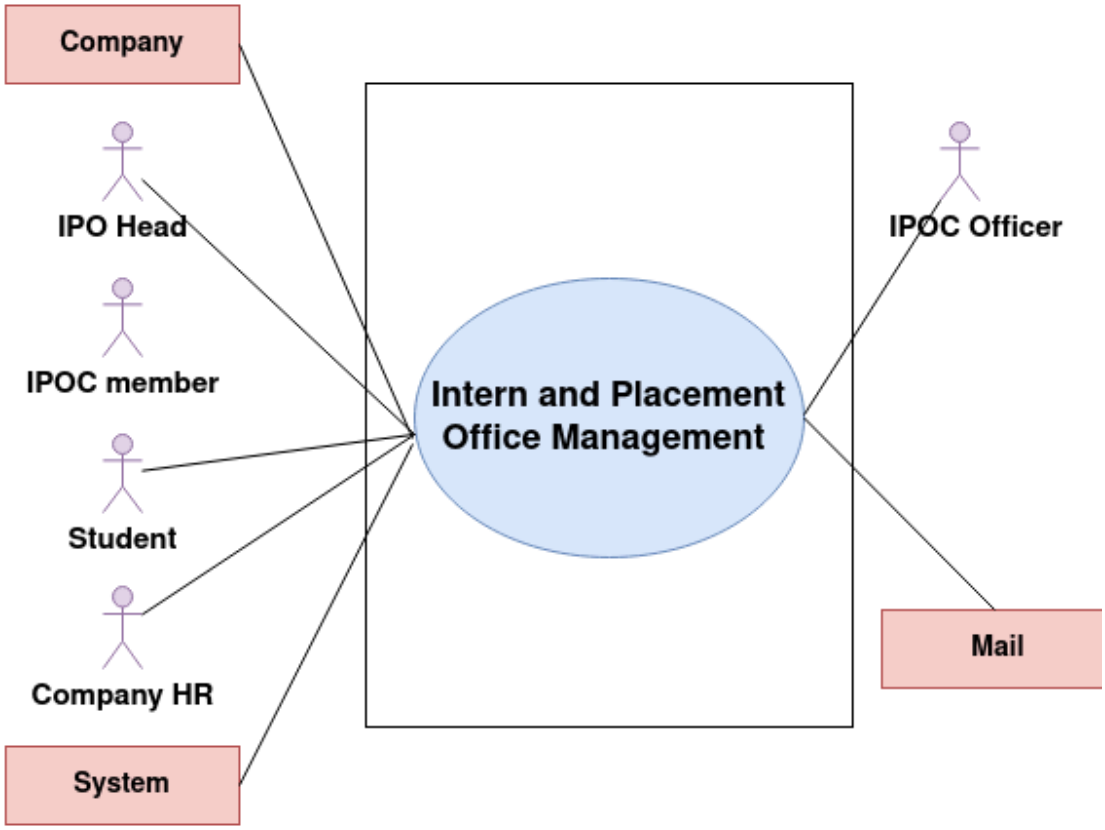
All of the use case components are gathered within a single UML shape. This module is also signified as a file or folder.

Level 0

Name: Intern & Placement Office Management (IPOM)

Primary Actor: IPO Head, IPOC Member, Student, Company HR, System

Secondary Actor: Mail, IPOC Officer

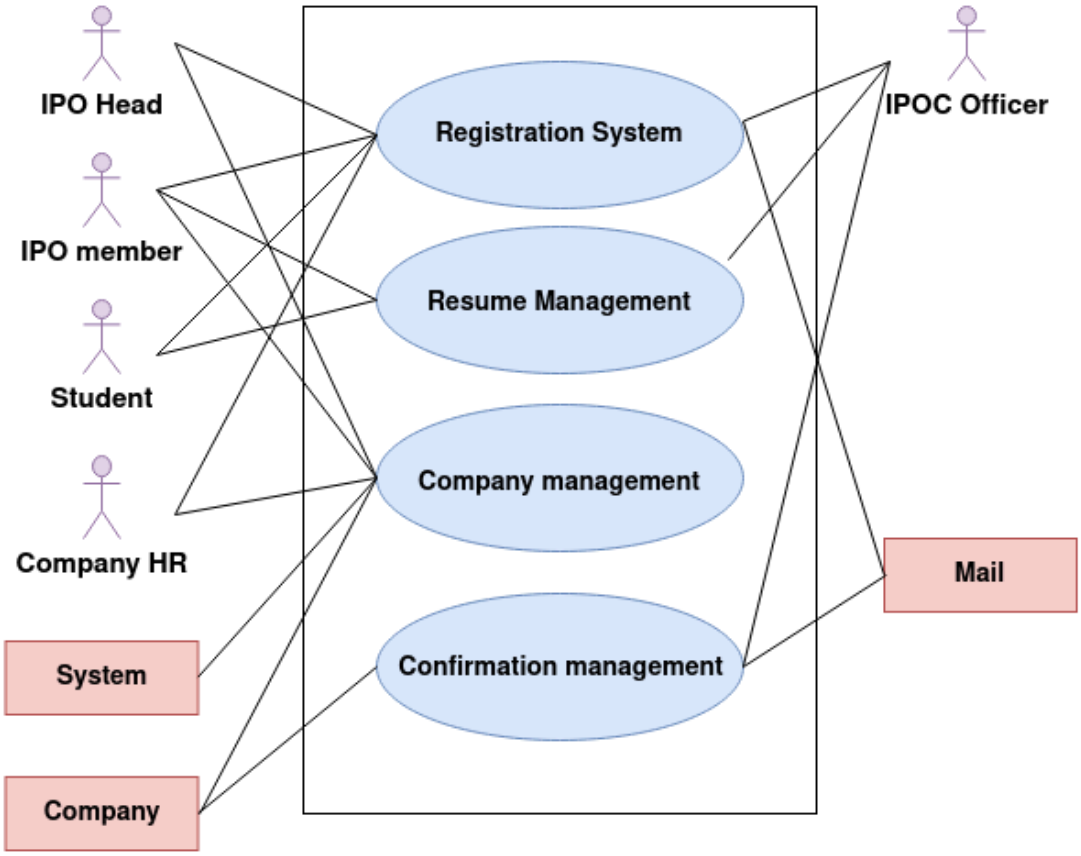


Level 1

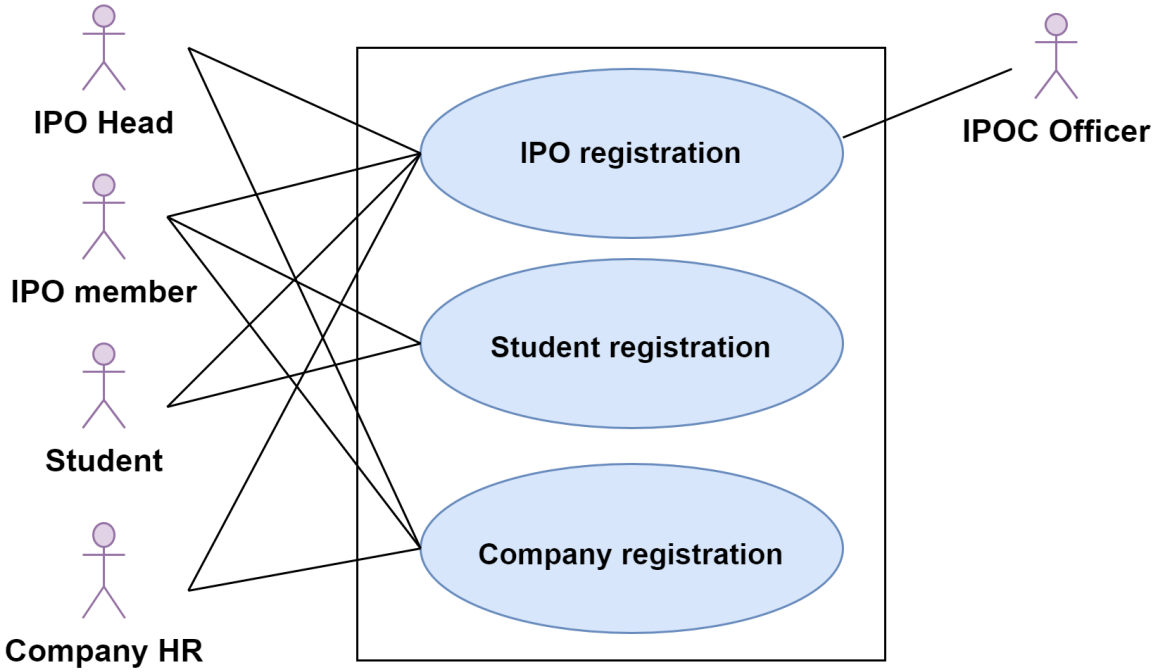
Name : Details IPOM

Primary Actor : IPO Head, IPOC Member, Student, Company Hr, System

Secondary Actor : Mail, IPOC Officer



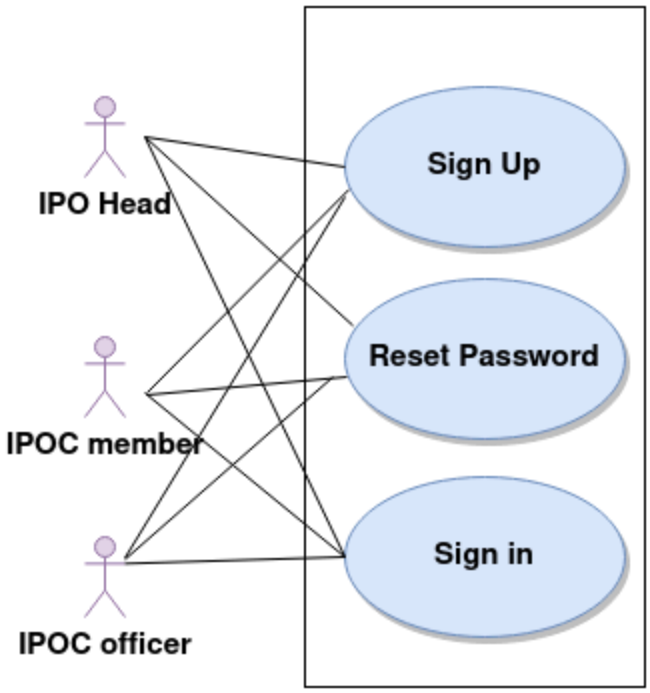
Level 1.1
Name: Registration System
Primary Actor: IPO Head, IPOC Member, Student, Company HR
Secondary Actor: IPOC Officer



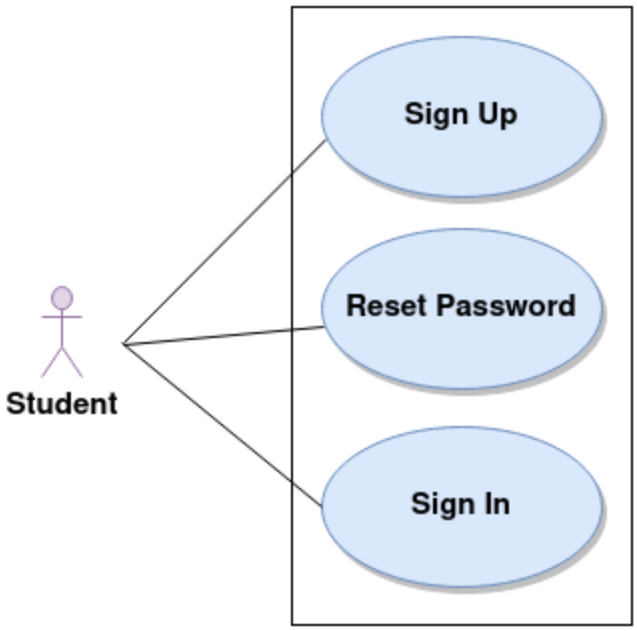
Level 1.1.1

Name: IPO Registration

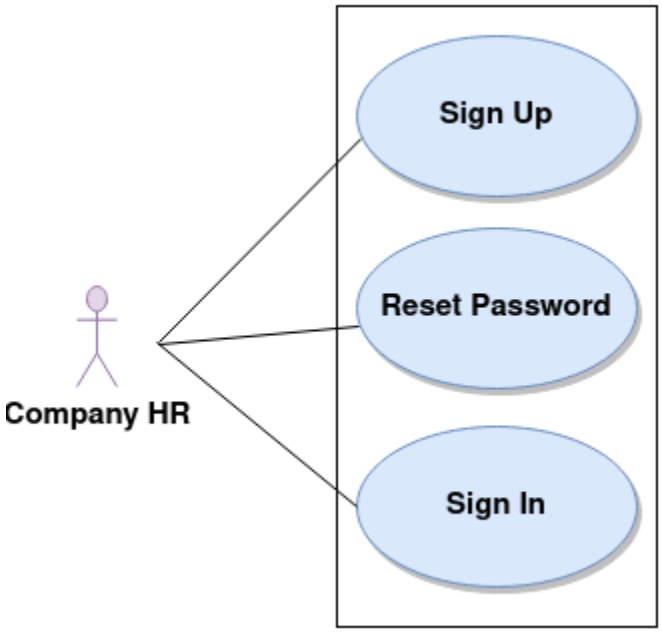
Primary Actor: IPO Head, IPOC Member, Student, IPO Officer Company Hr



Level 1.1.2
Name: Student Registration
Primary Actor: Student

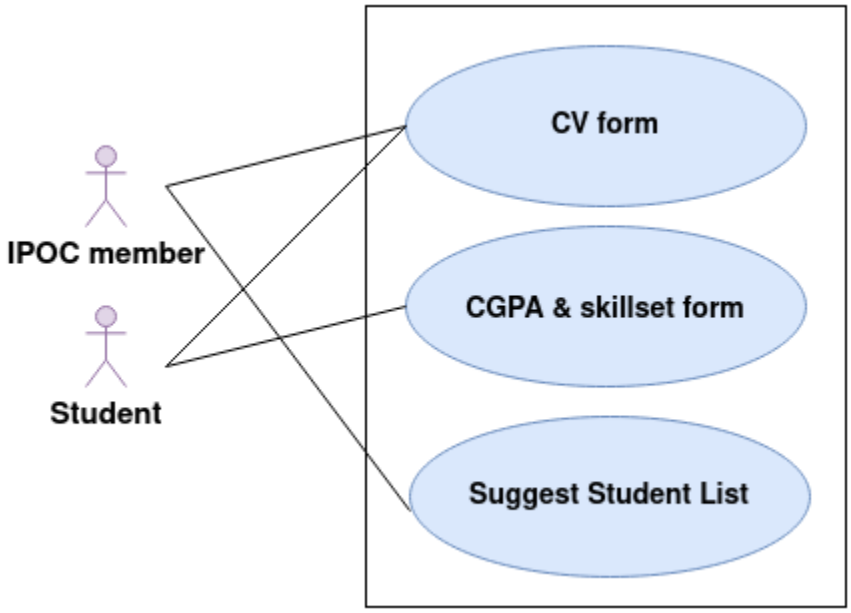


Level 1.1.3
Name: Company Registration
Primary Actor: **Company HR**

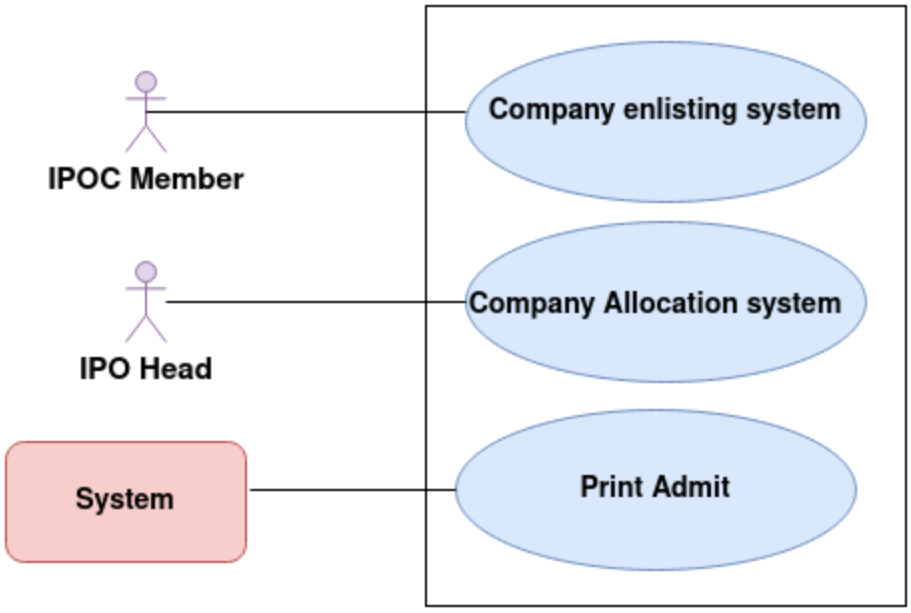


Level 1.2

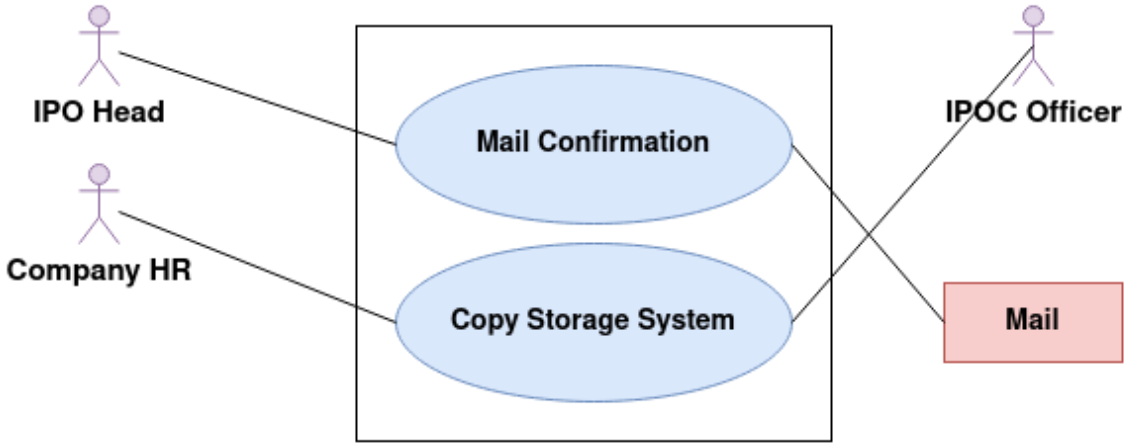
Name: Resume Management
Primary Actor: IPOC Member, Student



Level 1.3
Name: Company Management
Primary Actor: IPOC Member, IPO Head, System



Level 1.4
Name: Confirmation Management
Primary Actor: **IPOC Head, Company HR**
Secondary Actor: **Mail, IPOC Officer**



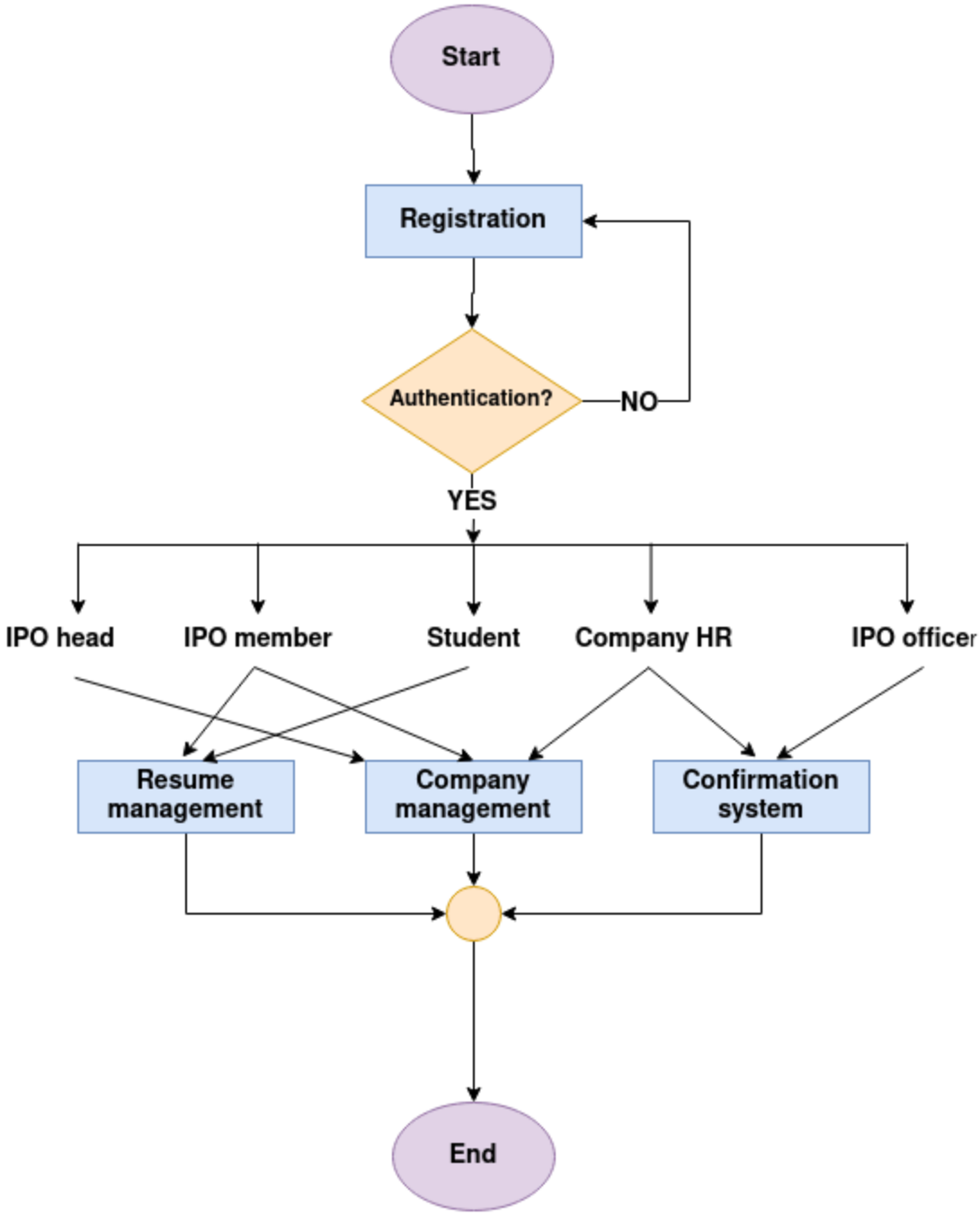
Activity Diagram

An activity diagram is a flowchart showing how one activity leads to another. It is a more sophisticated flowchart that depicts how one activity leads to another.

Level: 1

Name: Details IPOM

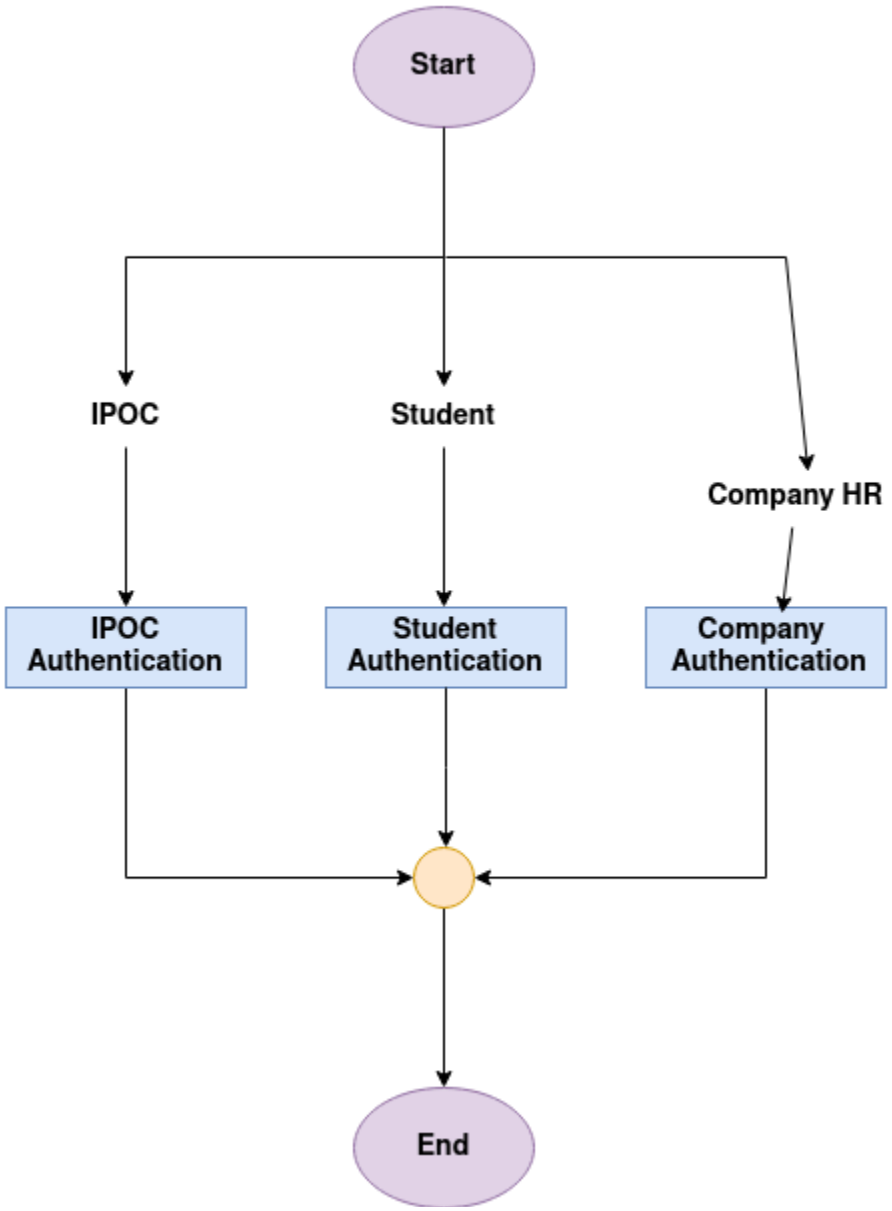
Reference: Use Case Diagram Level – 1


Start
Registration
Authentication?
NO
YES
IPO head
IPO member
Student
Company HR
IPO officer
Resume management
Company management
Confirmation system
End

Level: 1.1

Name: **Registration System**

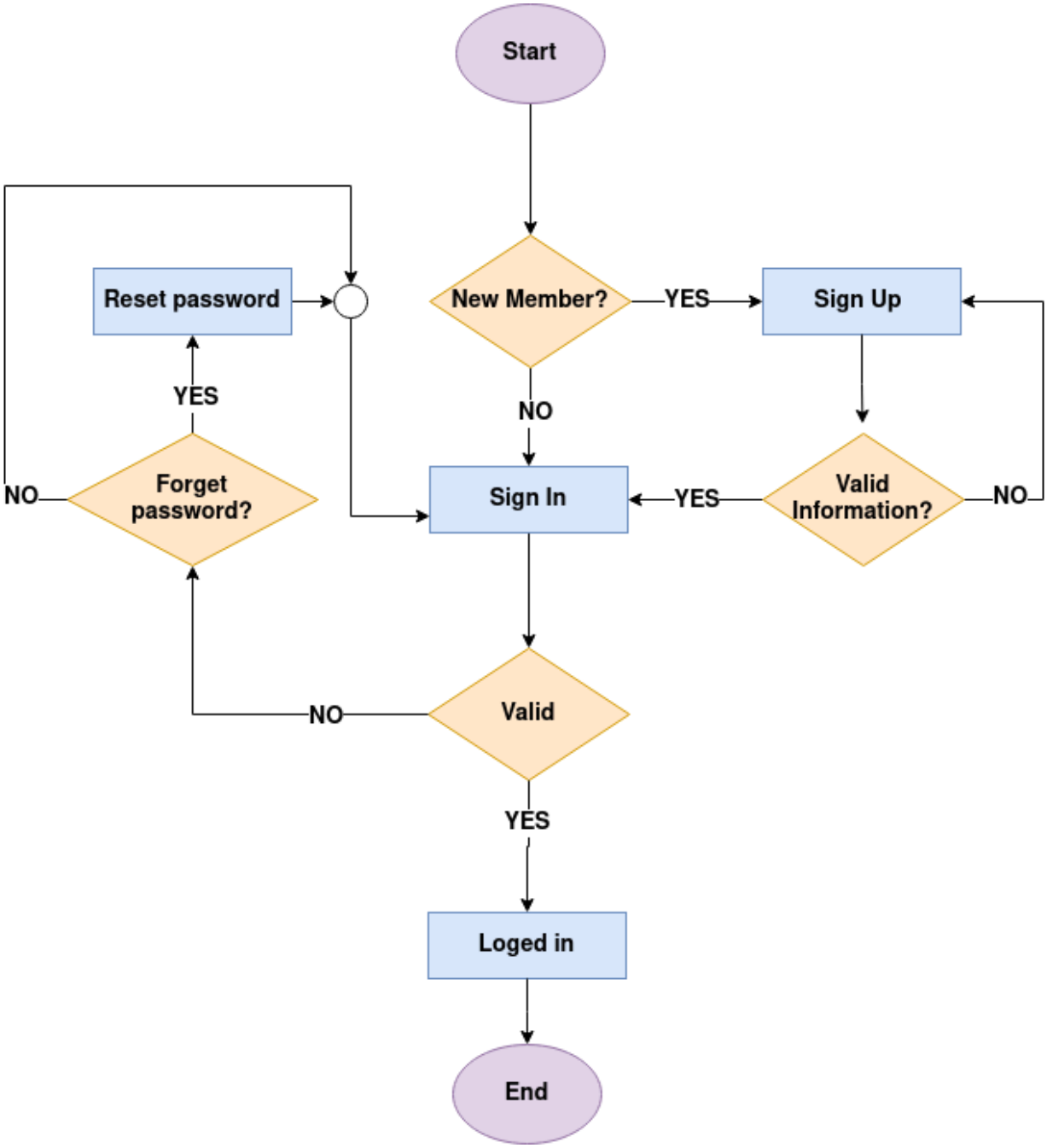
Reference: **Use Case Diagram Level – 1.1**



Level: 1.1.1

Name: IPOC Registration

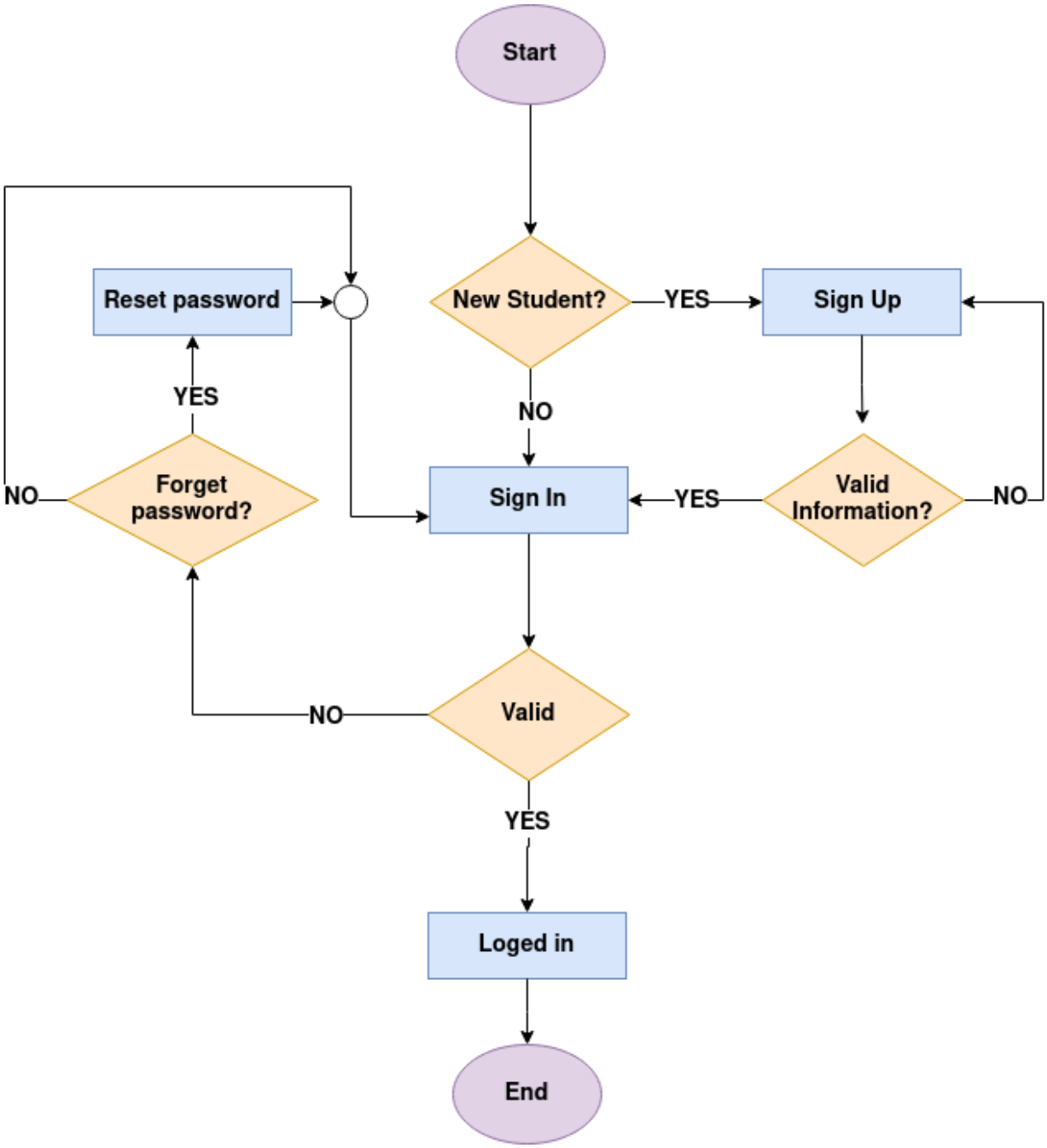
Reference: Use Case Diagram Level – 1.1.1



Level: 1.1.2

Name: Student Registration

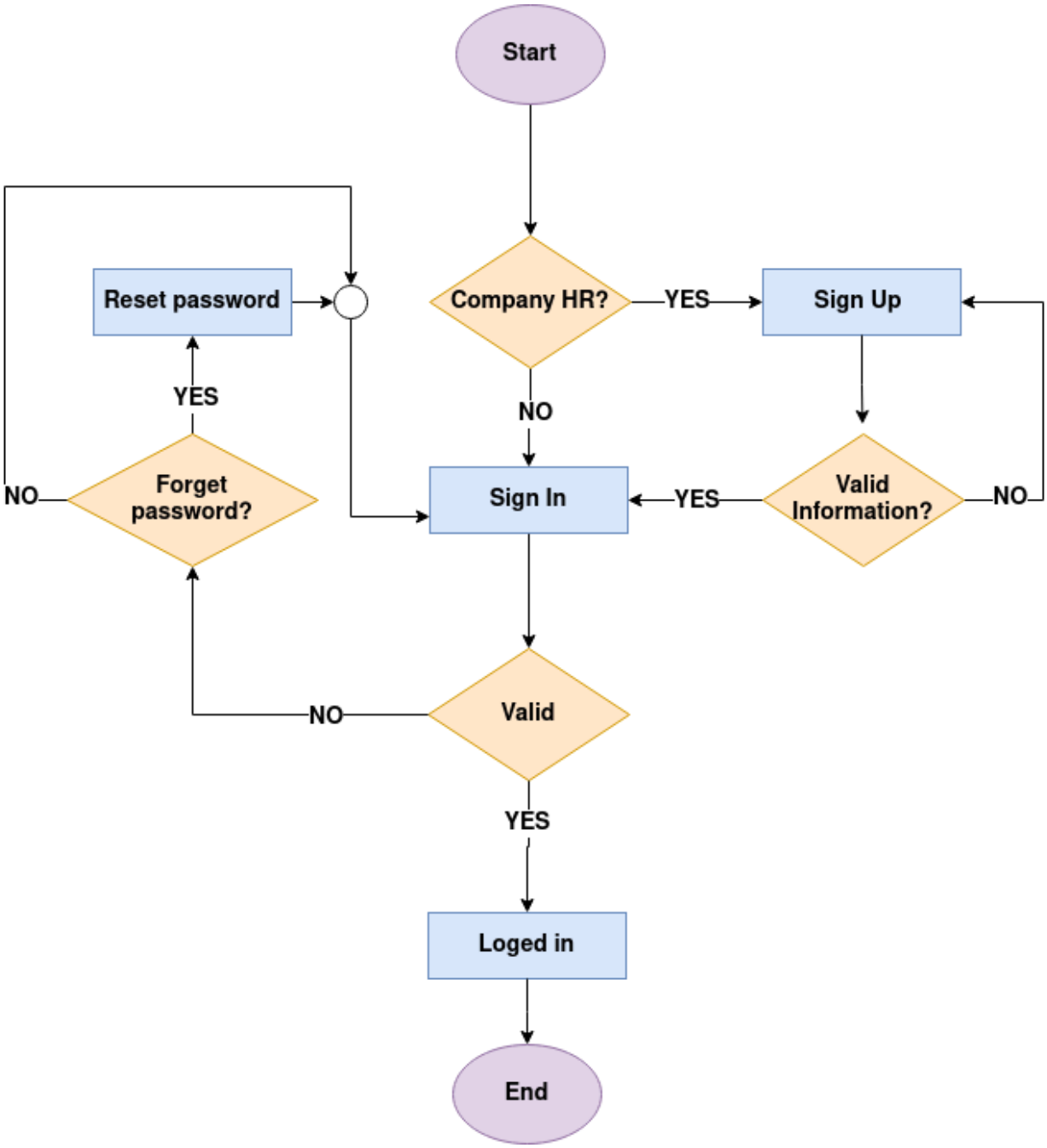
Reference: Use Case Diagram Level – 1.1.2



Level: 1.1.3

Name: Company Registration

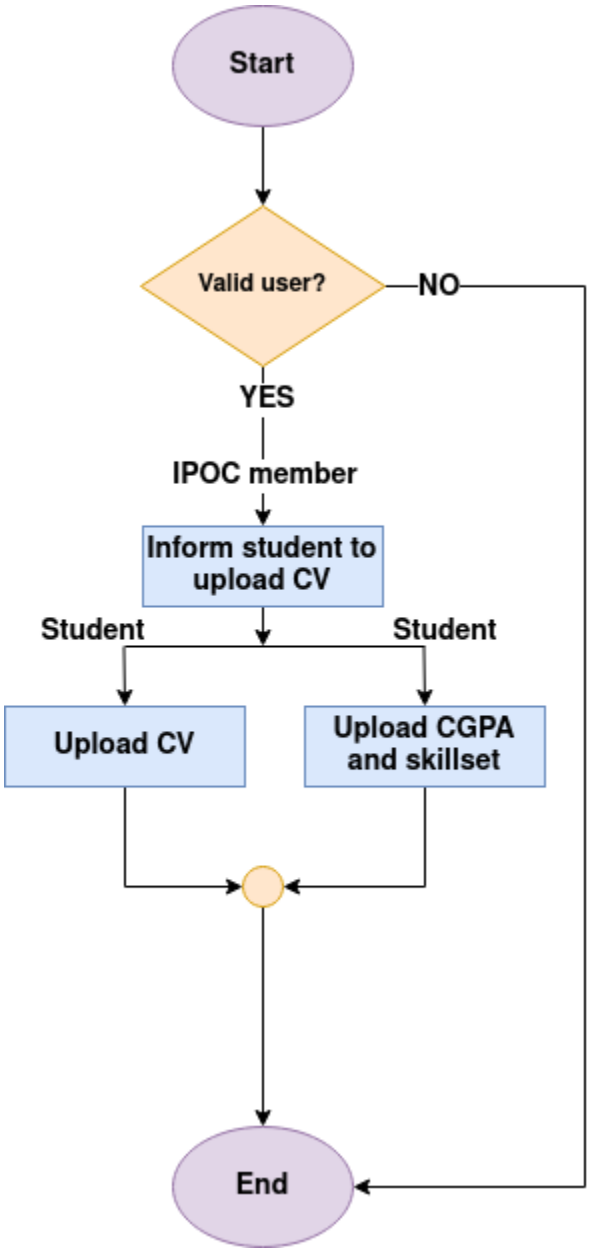
Reference: Use Case Diagram Level – 1.1.3



Level: 1.2

Name: **Resume Management**

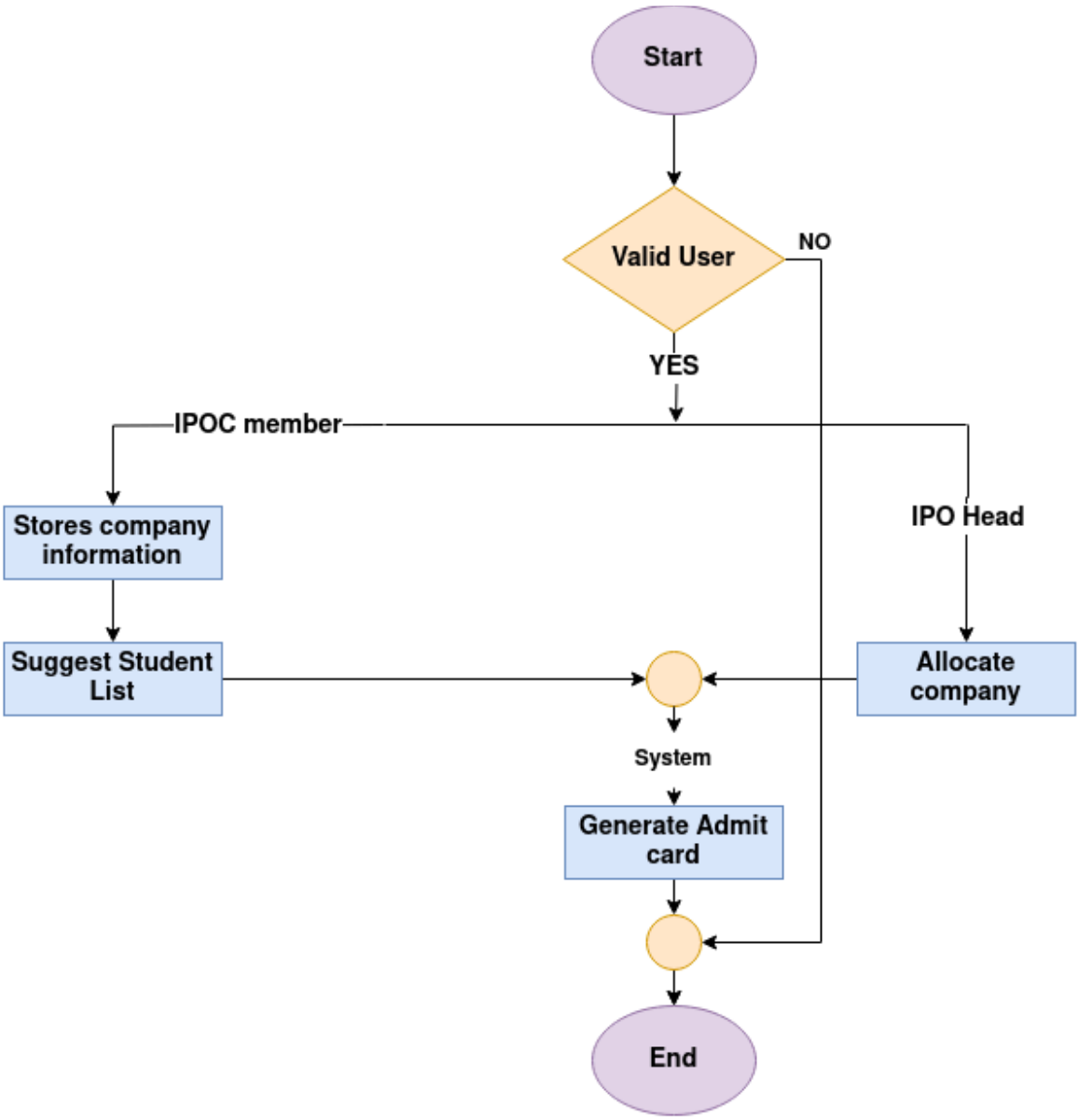
Reference: **Use Case Diagram Level – 1.2**



Level: 1.3

Name: **Company Management**

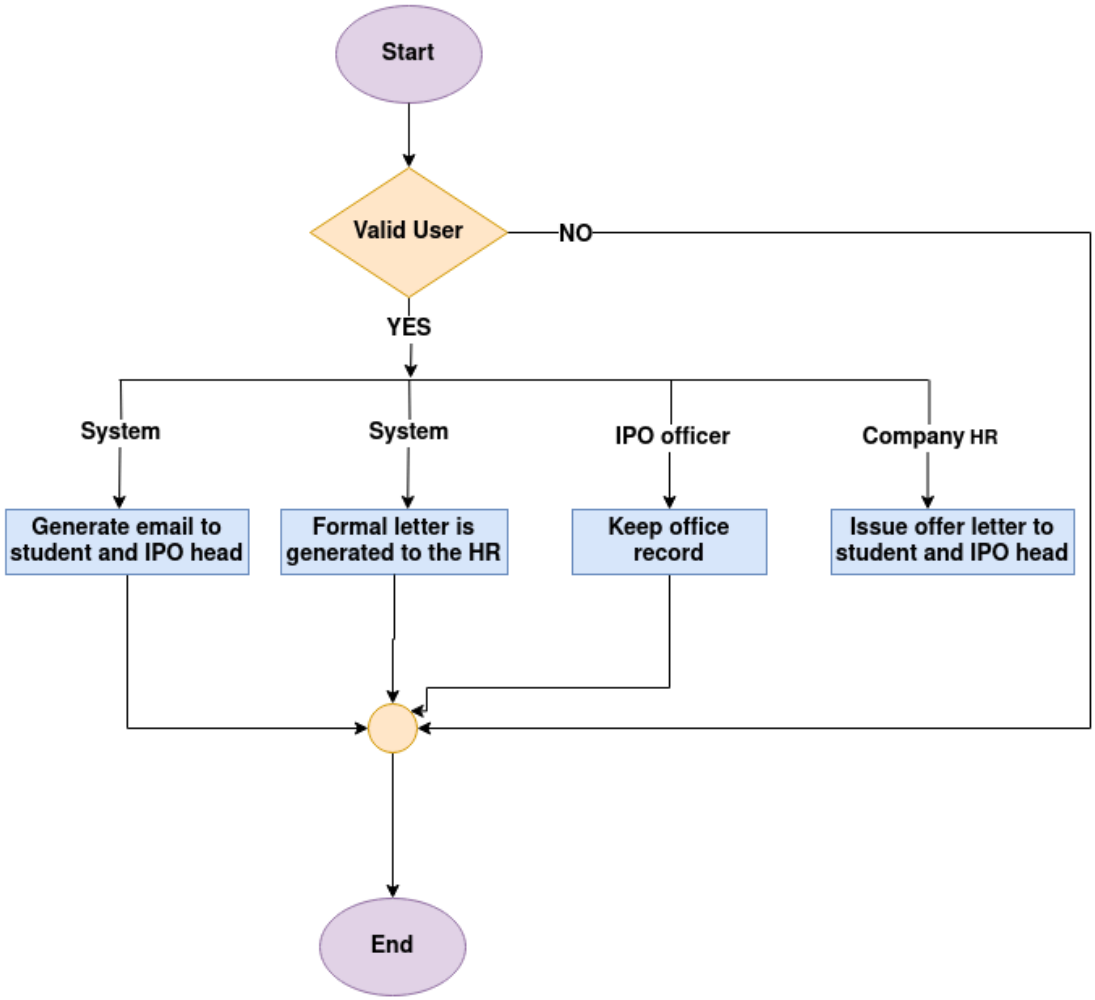
Reference: **Use Case Diagram Level – 1.3**



Level: 1.4

Name: **Confirmation Management**

Reference: **Use Case Diagram Level – 1.4**

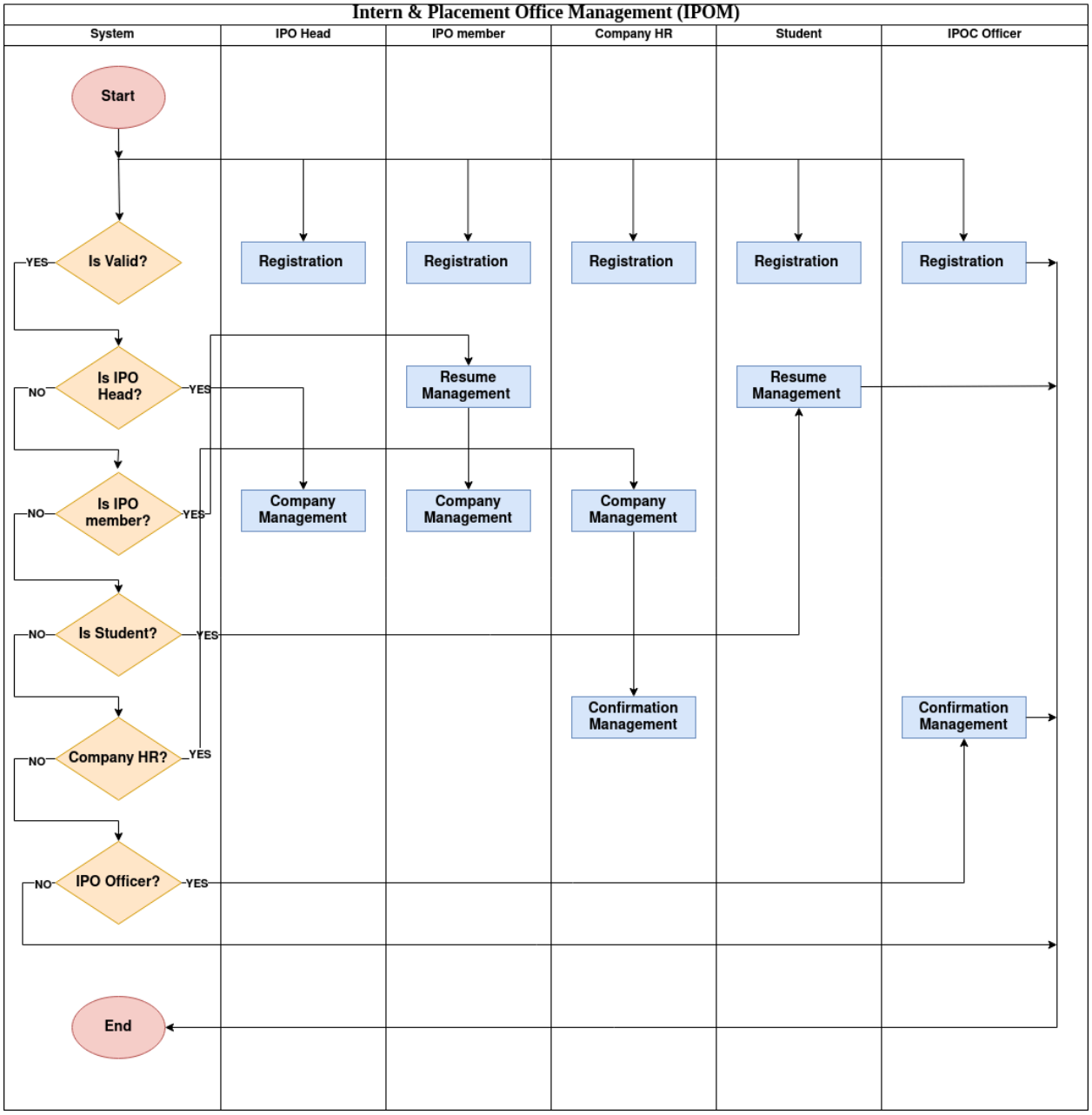


Swimlane Diagrams:

A swimlane diagram is a flowchart showing who is responsible for what throughout a flowchart that shows who is responsible for what throughout a certain procedure. Similar to a flowchart, it depicts a process from beginning to end, but it also classifies these phases to indicate which departments or individuals are in charge of each set of actions. Using a pool's lanes as an analogy, it places process stages within the vertical or vertical "swimlanes" of a specific division, team, or worker, as a result ensure accountability and clarity.

Level: 1

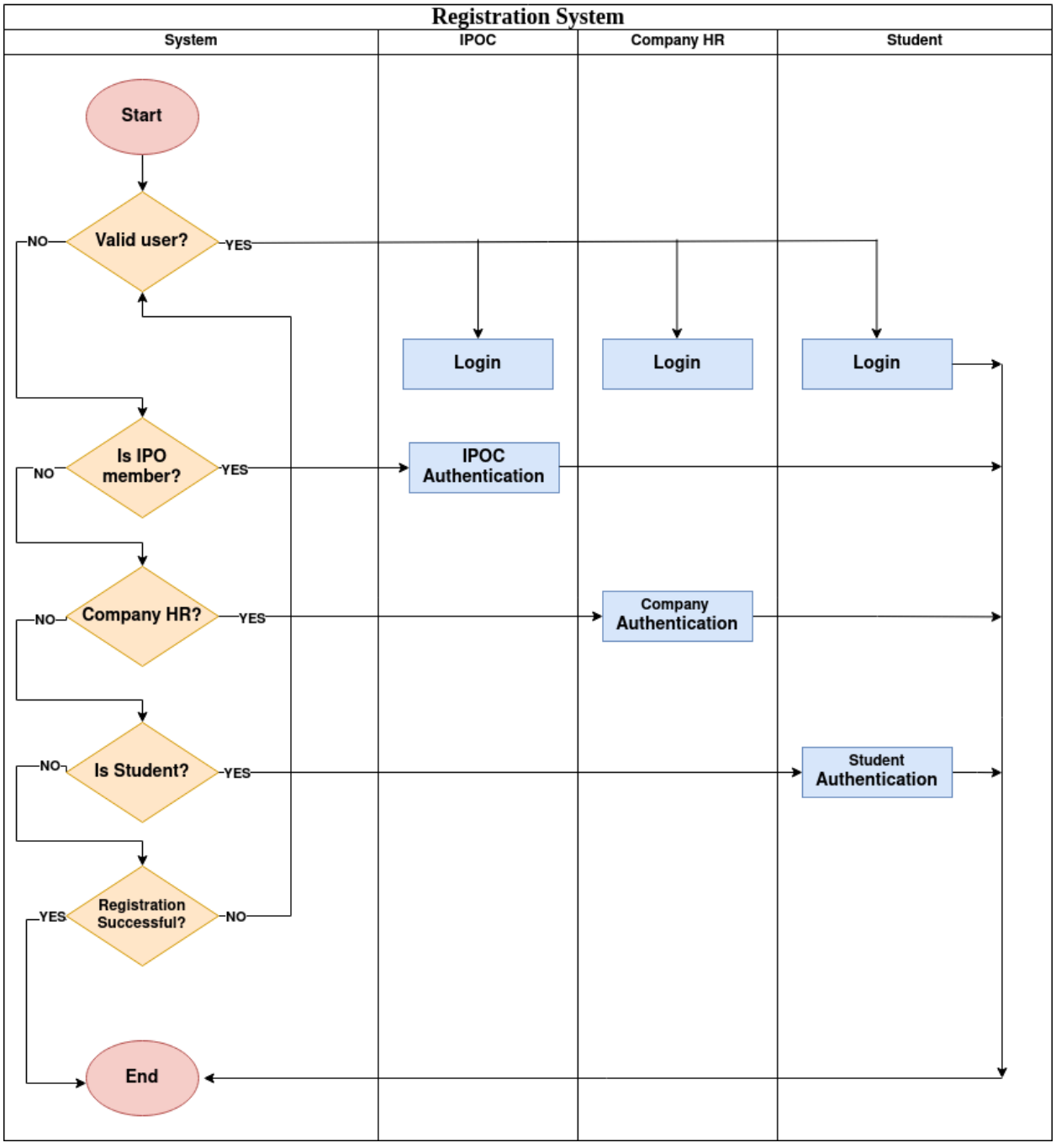
Name: **Details IPOM**
Reference: **Use Case Diagram & Activity Diagram Level – 1**



Level: 1.1

Name: Registration System

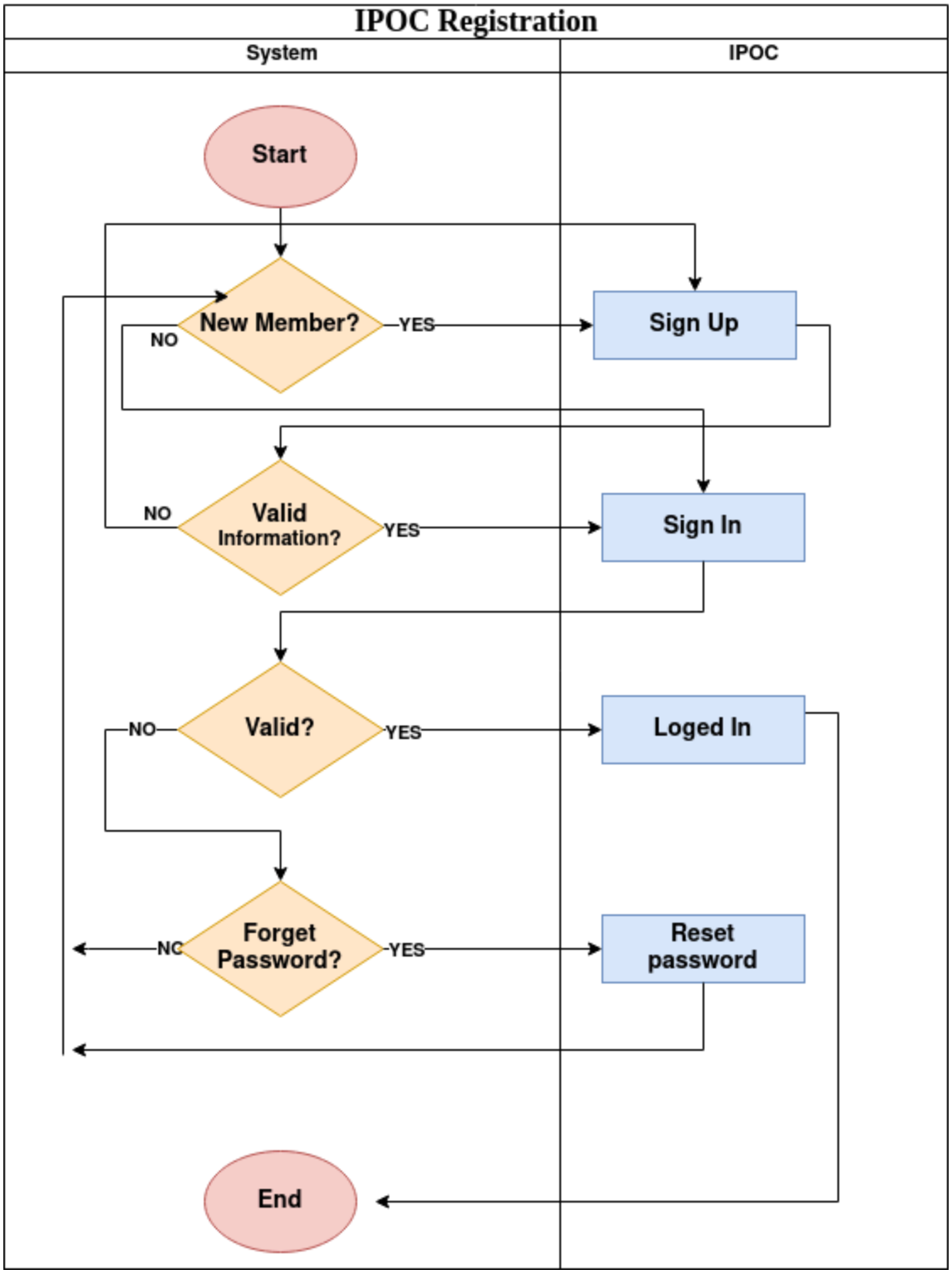
Reference: Use Case Diagram & Activity Diagram Level – 1.1



Level: 1.1.1

Name: IPOC Registration

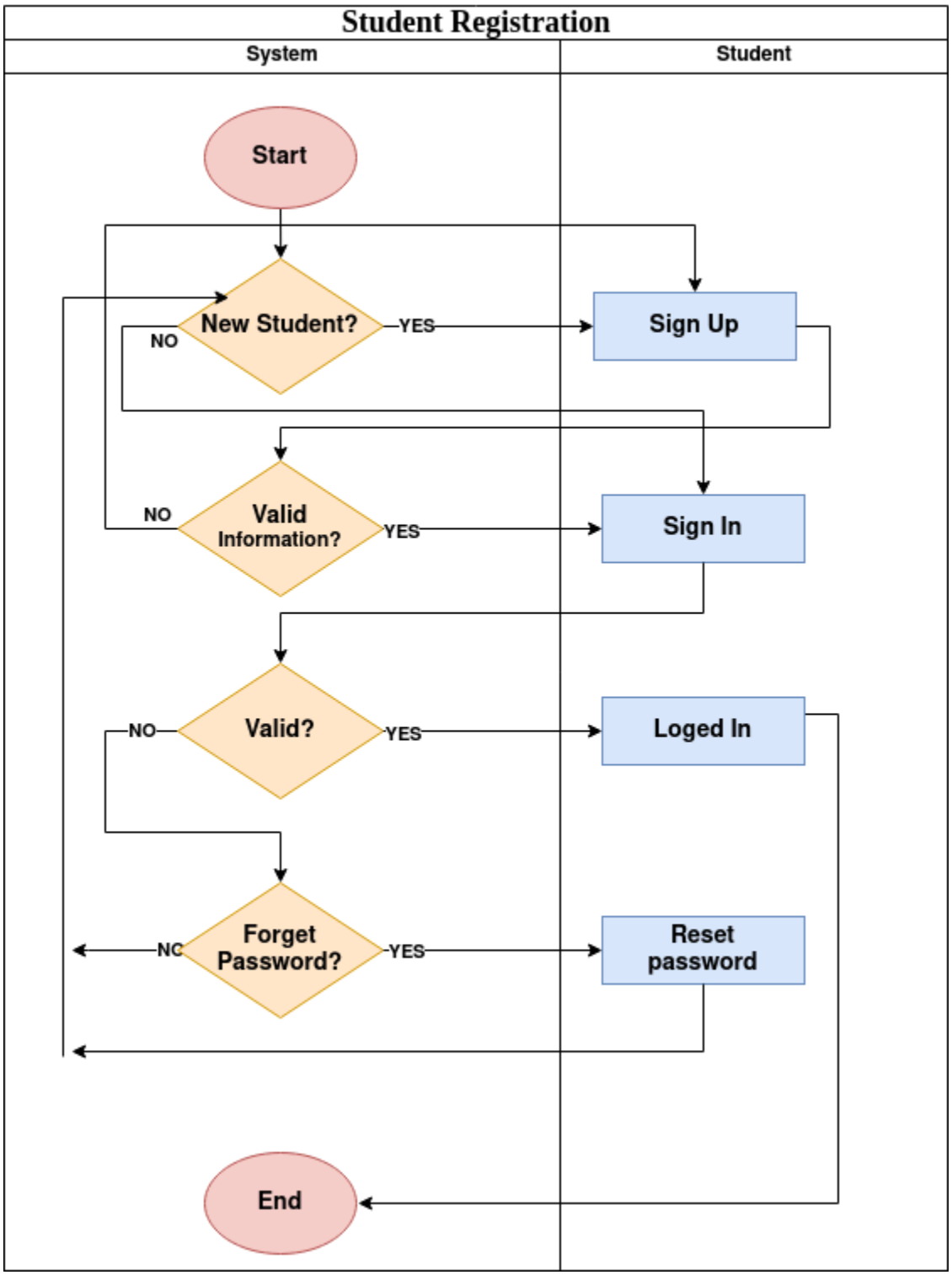
Reference: Use Case Diagram & Activity Diagram Level – 1.1.1



Level: 1.1.2

Name: Student Registration

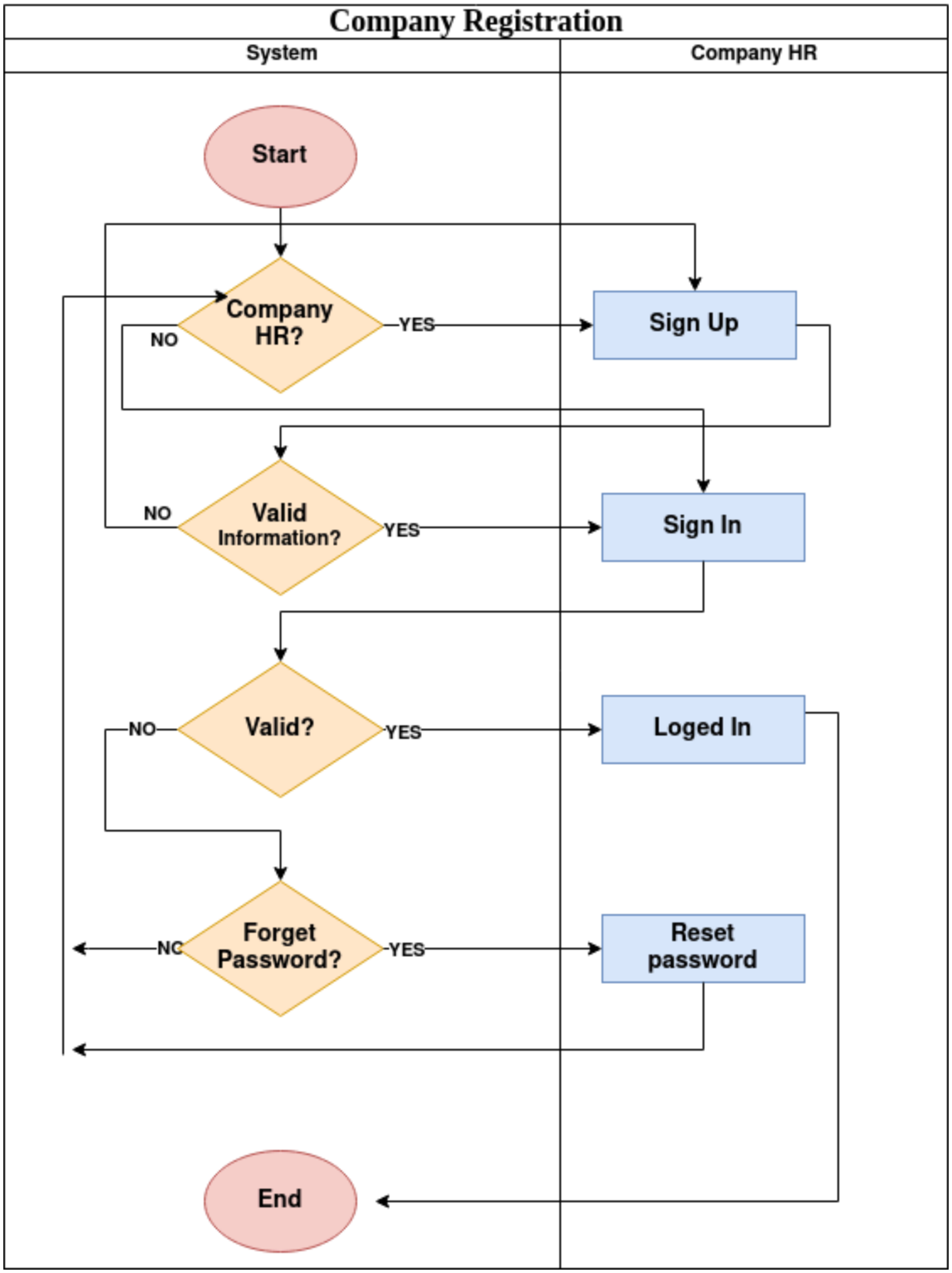
Reference: Use Case Diagram & Activity Diagram Level – 1.1.2



Level: 1.1.3

Name: **Company Registration**

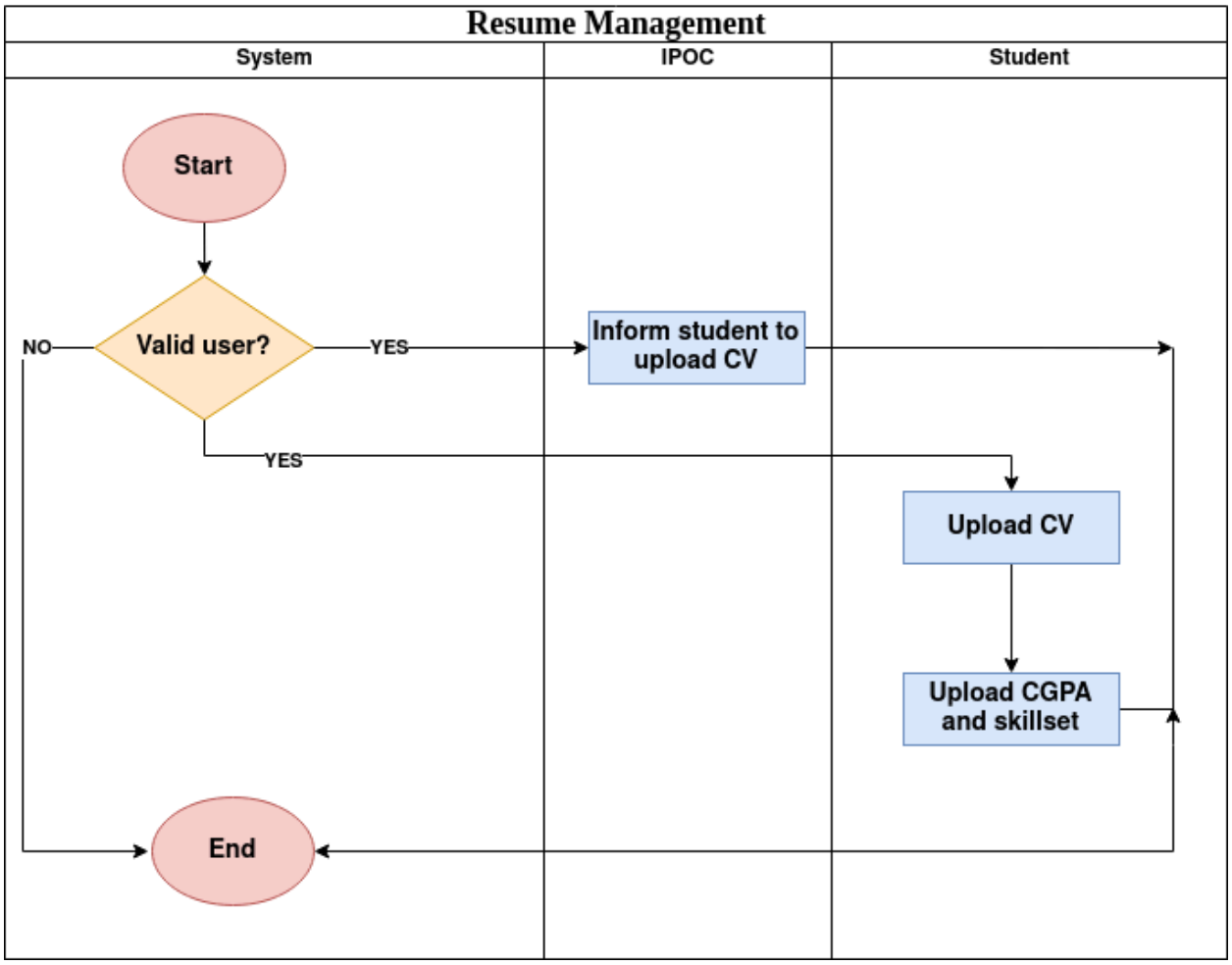
Reference: **Use Case Diagram & Activity Diagram Level – 1.1.3**


Company Registration
System
Company HR
Start
Company HR?
NO
YES
Sign Up
Valid Information?
NO
YES
Sign In
Valid?
NO
YES
Loged In
Forget Password?
NO
YES
Reset password
End

Level: 1.2

Name: Resume Management

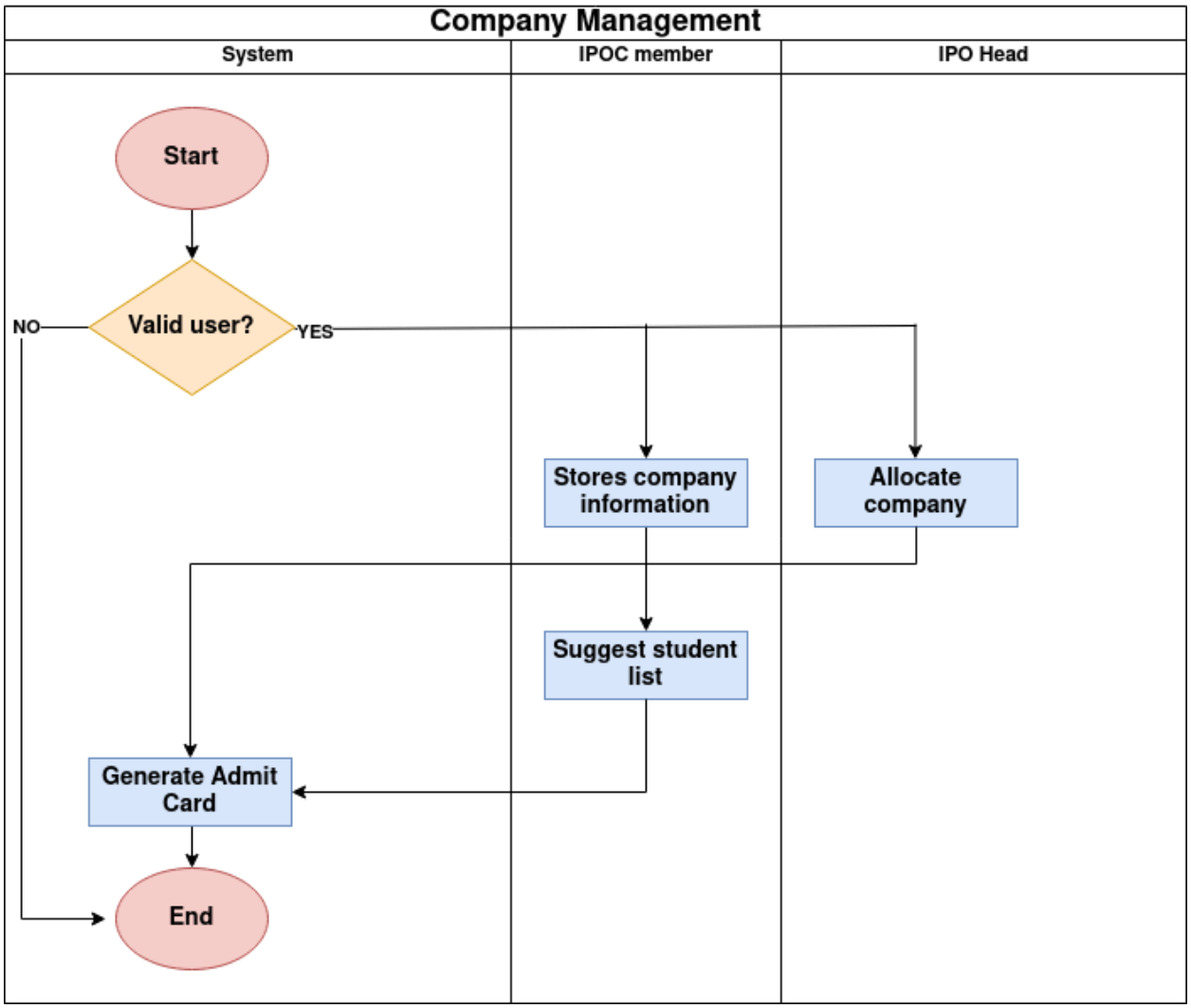
Reference: Use Case Diagram & Activity Diagram Level – 1.2



Level: 1.3

Name: Company Management

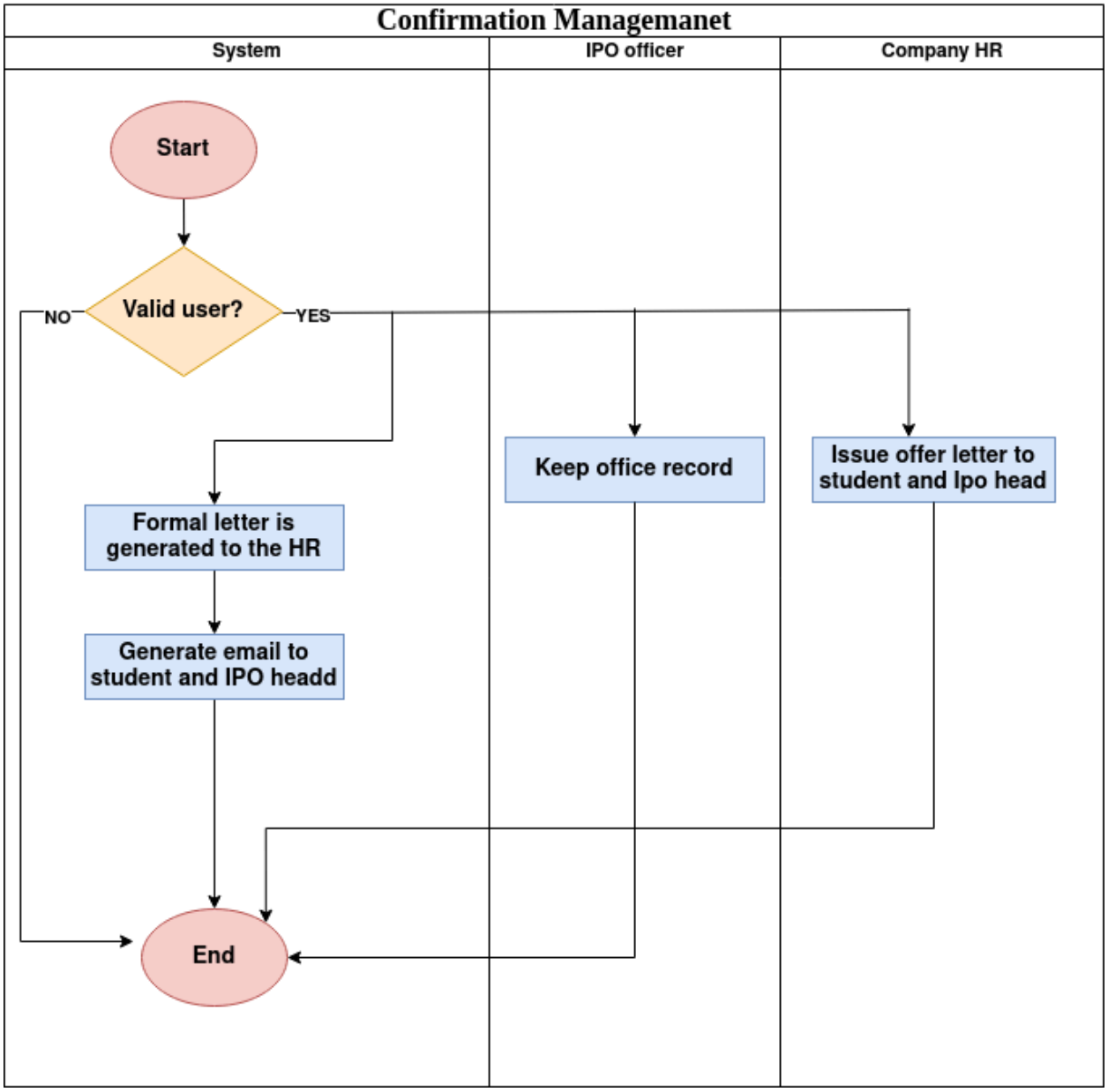
Reference: Use Case Diagram & Activity Diagram Level – 1.3



Level: 1.4

Name: Confirmation Management

Reference: Use Case Diagram & Activity Diagram Level – 1.4



Data Modeling

List of Nouns :

Serial No	Name	P/S	Attribute

1	Intern and Placement Office (IPO)	S	2, 9,10,11,19, 39
2	IIT	S	
3	BSSE 4th Year	S	
4	Company	S	5,12,13,14,,15,16,17,30, 31,37
5	Intern	S	
6	Internship semester	P	
7	January	P	
8	June	P	
9	IPO Committee (IPOC)	S	1,2,10,11,24,29,39
10	Members	S	
11	IPO Head	S	26,27,29,33,38
12	Interest	P	
13	Company Name	S	
14	Intern positions	S	
15	Job Responsibilities	S	
16	Company address	S	
17	HR’s email address	S	
18	Information	P	
19	Student	S	3,20,21,22,23,25,28,33, 34
20	CV	S	
21	Skill Sets	S	
22	CGPA	S	

23	List	S	
24	Suggestion	S	
25	Interview	S	
26	Authority	S	
27	Allocation	S	
28	Admit card	S	
29	Dashboard	S	4,9,11,19
30	Selection	S	
31	Rejection	S	
32	System	S	28,36,33,38
33	Email	S	
34	Status	S	
35	Stage	P	
36	Formal letter	S	
37	Company HR	S	17,30,31
38	Offer letters	S	
39	IPOC Officer	S	33,38,40
40	Office record	S	

List of Data Objects :

1. Company :

Attributes :

Intern, Interest, Company name, Job position, Responsibilities, Company address, HR's Mail address, Selection, Rejection, HR

2. IPOC

Attributes :

IPO, IIT, Member, IPO Head, Suggestion, Dashboard, IPOC Officer

3. IPO Head

Attributes :

Authority, Allocation, Dashboard, Email, Offer letter

4. Student

Attributes :

BSSE 4th Year, CV, Skill Sets, CGPA, List, Interview, Admit card, Email, Status

5. Dashboard

Attributes :

Company, IPOC, IPO Head, Student

6. System

Attributes :

Admit card, Email, Formal Letter, Offer Letter

7. Company HR

Attributes :

HR's email address, Selection, Rejection

8. IPOC Officer

Attributes :

Offer letters, Email, Office Records

9. IPO

Attributes :

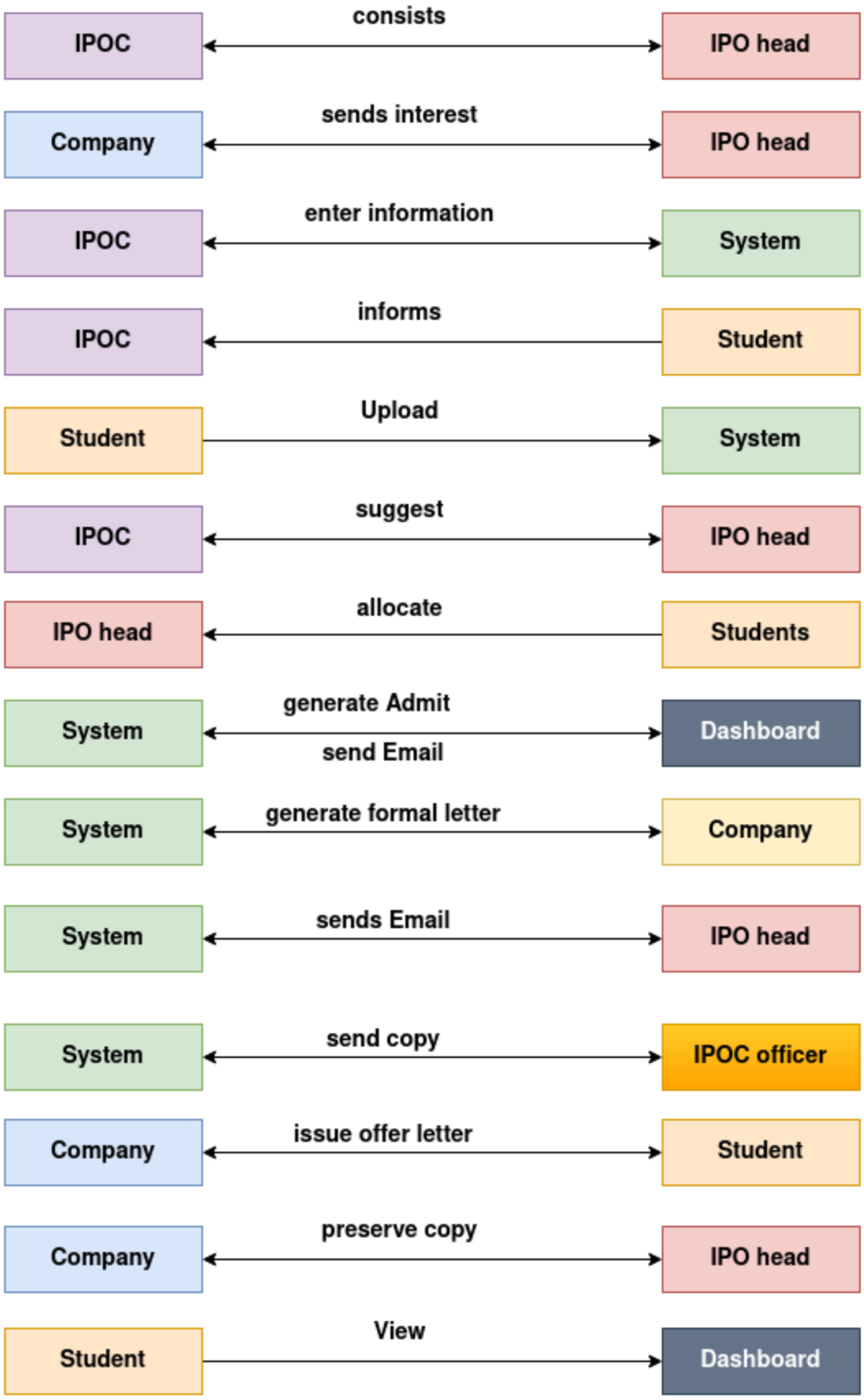
IIT, IPOC, IPO Member, IPO Head, Student, IPO Officer

Analysis

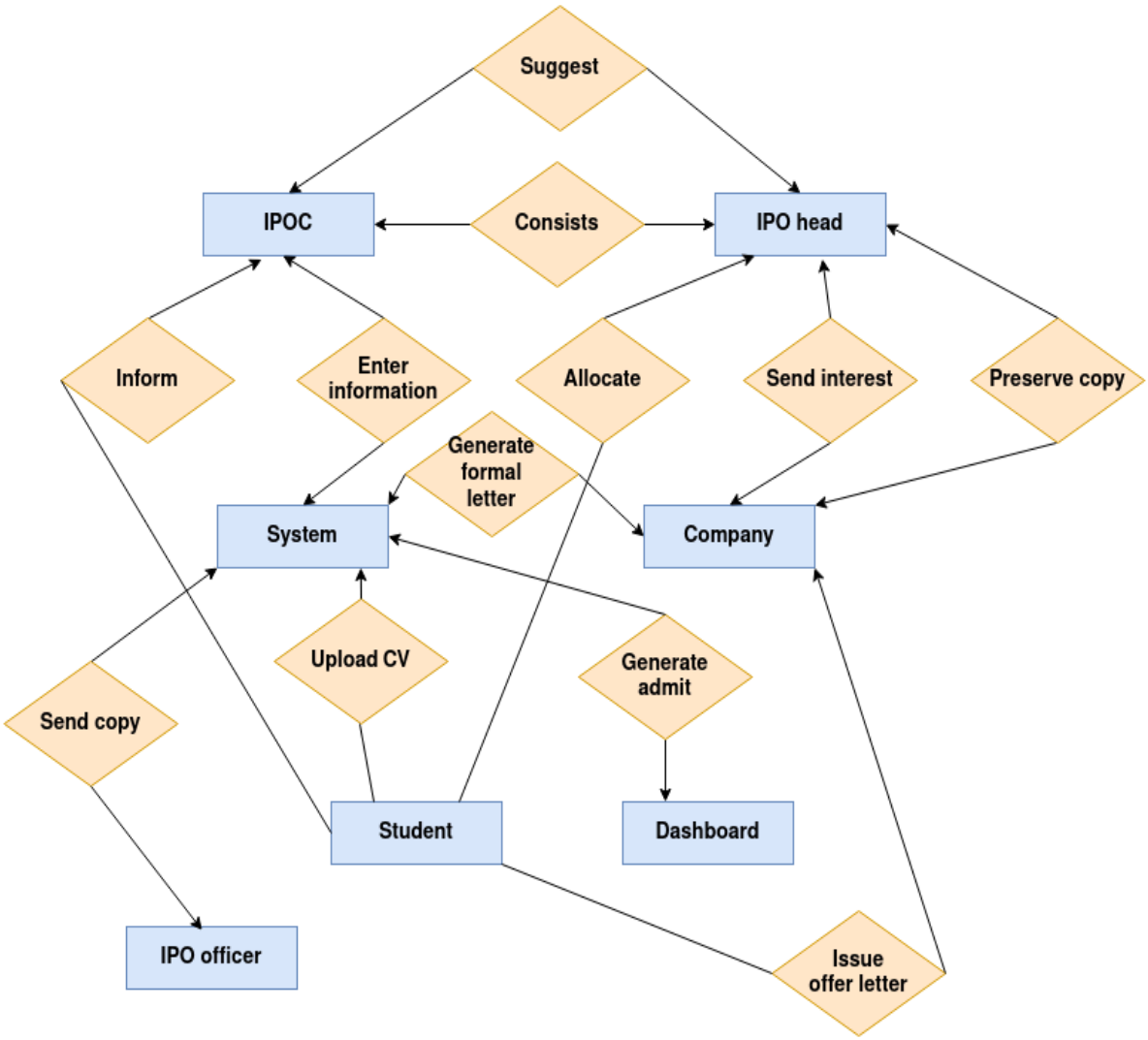
Before proceeding to finalize class cards, we need to analyze our list of objects based on their attributes and methods. Depending on their attributes & operations we may need to remove objects and make a superclass / abstract class or interface. This discussion is now delineated as follows:

➢ We can merge **IPOC** and **IPO** classes as they share similar attributes and methods.
➢ We can merge **Company** and **Company HR** classes as they share almost similar attributes and methods.

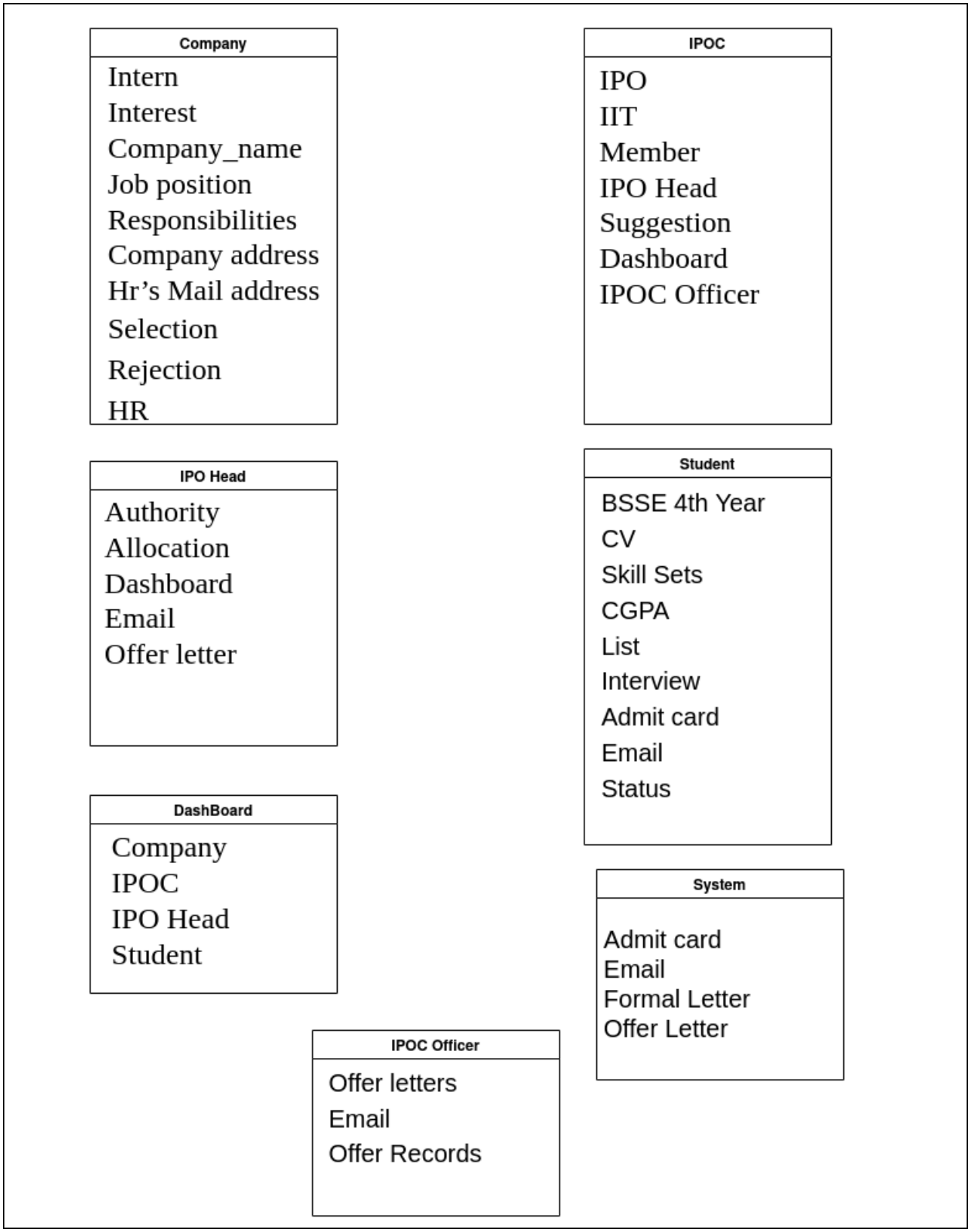
Relational Schema:


IPOC
consists
IPO head
Company
sends interest
IPO head
IPOC
enter information
System
IPOC
informs
Student
Student
Upload
System
IPOC
suggest
IPO head
IPO head
allocate
Students
System
generate Admit
send Email
Dashboard
System
generate formal letter
Company
System
sends Email
IPO head
System
send copy
IPOC officer
Company
issue offer letter
Student
Company
preserve copy
IPO head
Student
View
Dashboard

ER diagram:


Suggest
IPOC
Consists
IPO head
Inform
Enter information
Allocate
Send interest
Preserve copy
Generate formal letter
System
Company
Upload CV
Generate admit
Send copy
Student
Dashboard
IPO officer
Issue offer letter

Schema of ER diagram:



Class-Based Modeling

Class-based modeling defines the structure of the entire system by identifying the static structure of objects in that system. A class model defines attributes and operations for the objects of each class and also the relationship between the objects, and the collaborations that occur between the classes of the systems. The elements of a class-based model include classes and objects, attributes, operations, class-responsibility-collaborator (CRC) models, collaboration diagrams, and packages.

Verb List:

Serial No	Name
1	designated
2	starts
3	ends
4	consists
5	presided
6	sends
7	enters
8	stores
9	informs
10	upload

11	mention
12	suggests
13	allocates
14	has
15	place
16	generated
17	ensures
18	selected
19	rejected
20	can
21	view
22	is
23	generated
24	issued
25	given
26	preserve
27	record
28	receive
29	keep
30	show

General Classification:

In this section we'll include those classes that are in the solution space. These candidate classes are categorized based on the seven general

classifications. The analysis classes manifest themselves in one of the following ways:

1. External entities
2. Things
3. Events
4. Roles
5. Organizational units
6. Places
7. Structures

A candidate class is selected for special classification if it fulfills three or more Characteristics.

Serial No	Name	General Classification
1	Intern and Placement Office (IPO)	1,5,6,7
2	IIT	1,5,6,7
3	BSSE 4th Year	2
4	Company	1,5,6,7
5	Intern	2
6	Internship semester	2
7	January	
8	June	
9	IPO Committee (IPOC)	1,4,5,7
10	Members	1,4,5,7
11	IPO Head	1,4,5,7

12	Interest	2,3
13	Company Name	2
14	Intern positions	2,3
15	Job Responsibilities	2
16	Company address	6
17	HR’s email address	2
18	Information	2
19	Student	1,4,5,7
20	CV	2,3
21	Skill Sets	2,3
22	CGPA	2,3
23	List	3
24	Suggestion	1,2
25	Interview	3,7
26	Authority	2
27	Allocation	2,3
28	Admit card	1,3
29	Dashboard	1,2,5,7
30	Selection	2,3
31	Rejection	2,3
32	System	2,5,7
33	Email	1,7
34	Status	2,3
35	Stage	2,3
36	Formal letter	2,3

37	Company HR	1,4,5,7
38	Offer letters	2,3
39	IPOC Officer	1,4,5,7
40	Office record	2,3

We have 10 potential classes for further analysis.

Selection Criteria:

In this section, we'll include those classes selected in general classification. These candidate classes are then selected as classes by six Selection Criteria. The criterias are

1. Retain information
2. Needed services
3. Multiple attributes
4. Common attributes
5. Common operations
6. Essential requirements

A candidate class generally becomes a class when it fulfills around four characteristics.

Serial No	Name	Selection Criteria
1	Intern and Placement Office (IPO)	3,4
2	IPOC	1,2,3,4,5,6

3	Company	1,2,3,4,6
4	IPO head	1,2,3,4,6
5	Student	1,2,3,4,6
6	Dashboard	1,2,3,6
7	System	1,2,3,6
8	IPOC Officer	1,2,3,4,6
9	Company HR	1,4
10	Email	2

Final List of Class

After analyzing the list of objects we have merged or altered several classes, the final classes remaining are

SL	Selected Class
1	IPOC
2	Company
3	IPO Head
4	Student
5	Dashboard
6	System
7	IPOC Officer

Class Cards:

Table 1: Class Card for IPOC

Class: IPOC	
Attributes	**Methods**
IPO IIT Member IPO Head Suggestion IPOC Officer	consists() enter_information() inform() suggest() stores()
Responsibilities	**Collaboration**
1. IPOC consists of three members	IPO Head IPOC Officer
2. IPOC member enters company information	System
3. IPOC member informs students to upload CV	Student
4. IPOC member suggest student list to IPO Head	IPO Head
5. IPOC member stores information	

Table 2: Class Card for Company

Class: Company	
Attributes	**Methods**
Intern Interest Company_name Job position Responsibilities HR's Mail Company address Selection rejection HR	send interest() issue offer letter() preserve copy() select/reject() given()
Responsibilities	**Collaboration**
1. Company sends interest to IPO Head	IPO Head
2. Select or reject the student	Student
3. Company HR will issue offer letter to interns	Student
4. An offer letter is given to IPO Head to preserve	IPO Head

Table 3: Class Card for IPO Head

Class: IPO Head

Attributes	Methods
Authority Allocation Dashboard Email Offer Letter	allocate()
Responsibilities	**Collaboration**
1. Allocate the students	Students

Table 4: Class Card for Student

Class: Student	
Attributes	**Methods**
BSSE 4th Year CV Skill Set Email CGPA List Interview Admit card Status	upload() view() mention() can()
Responsibilities	**Collaboration**
1. Student upload their CV	System
2. Mention their skill sets	System
3. Can view their	Dashboard

status	

Table 5: Class Card for System

Class: System	
Attributes	**Methods**
Admit card Email Offer letter Formal letter	generate() send()
Responsibilities	**Collaboration**
1. Generate admit card	Students
2. Generate a formal letter	Company
3. Send email	IPO Head
4. Sends copy to IPOC Officer	IPOC Officer

Table 6: Class Card for IPOC Officer

Class: IPOC Officer	
Attributes	**Methods**

Office records Email Offer letter	keep()
Responsibilities	**Collaboration**
1. Keep office record	System

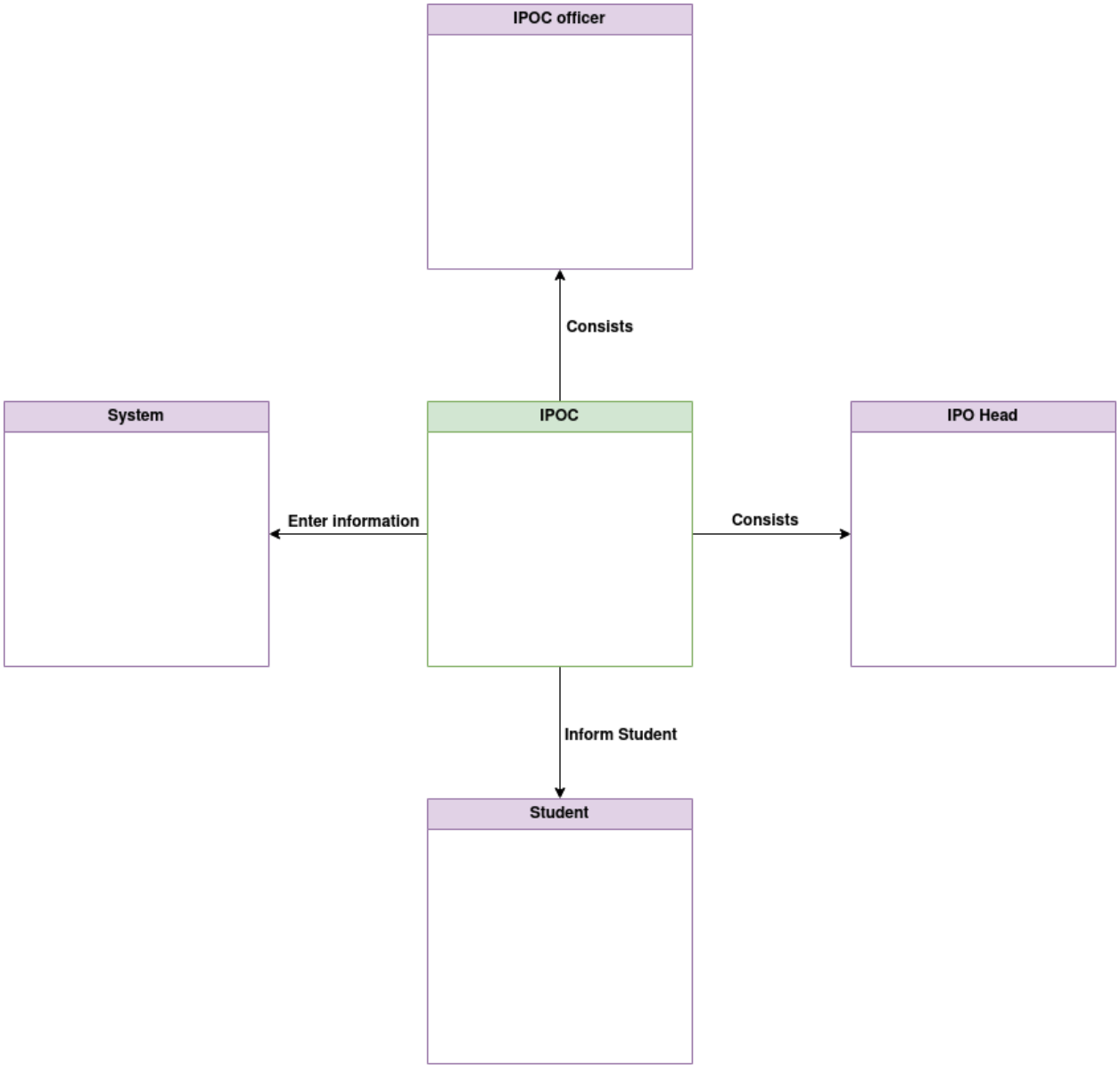
Table 7: Class Card for Dashboard

Class: Dashboard	
Attributes	**Methods**
Student IPO Head IPOC Company	show()
Responsibilities	**Collaboration**
1. The dashboard shows the student's status	Students
2. Dashboard shows the status of IPOC	IPOC

Class Responsibility Collaboration Modeling:

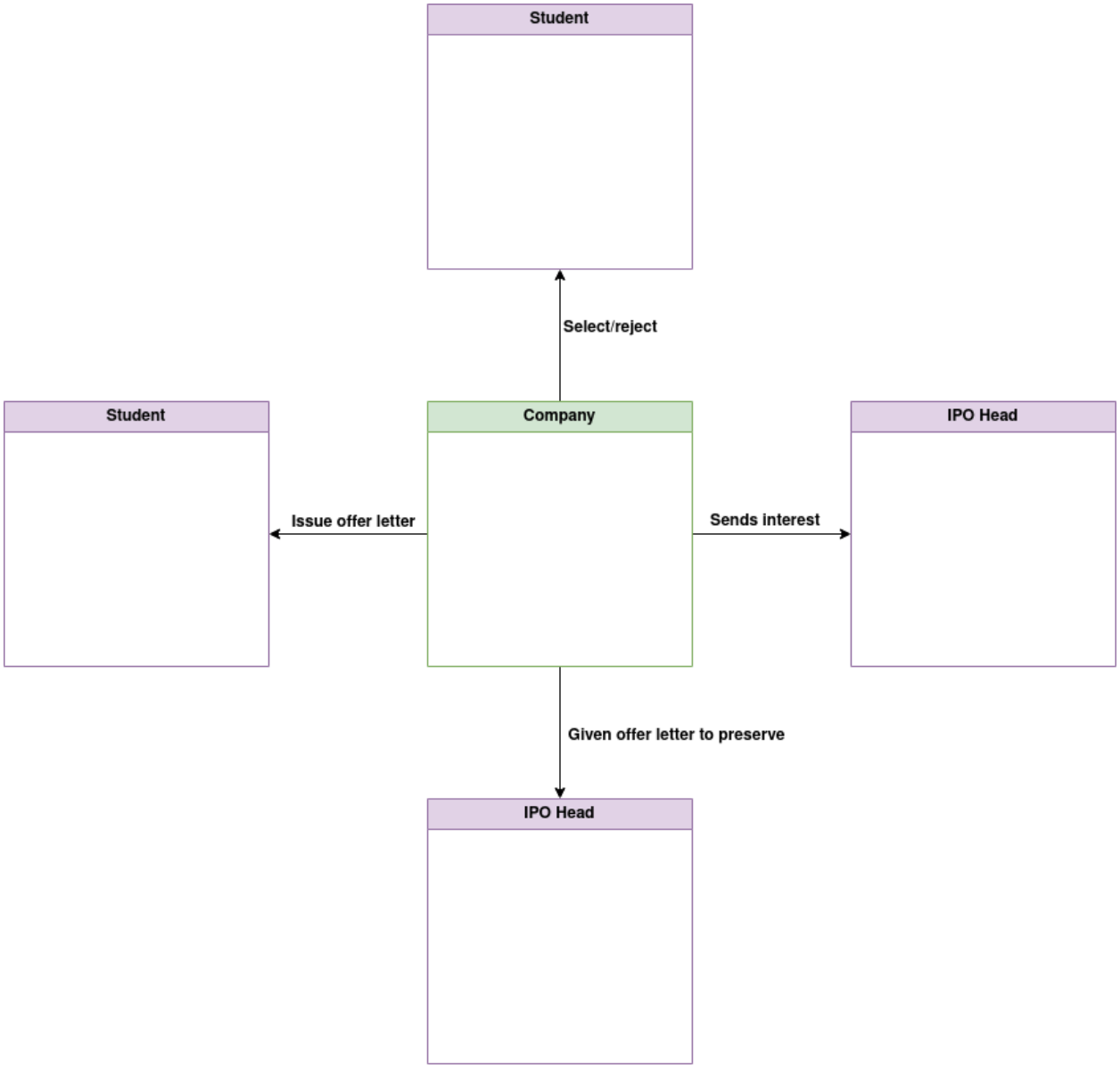
ID: 1

Name: IPOC



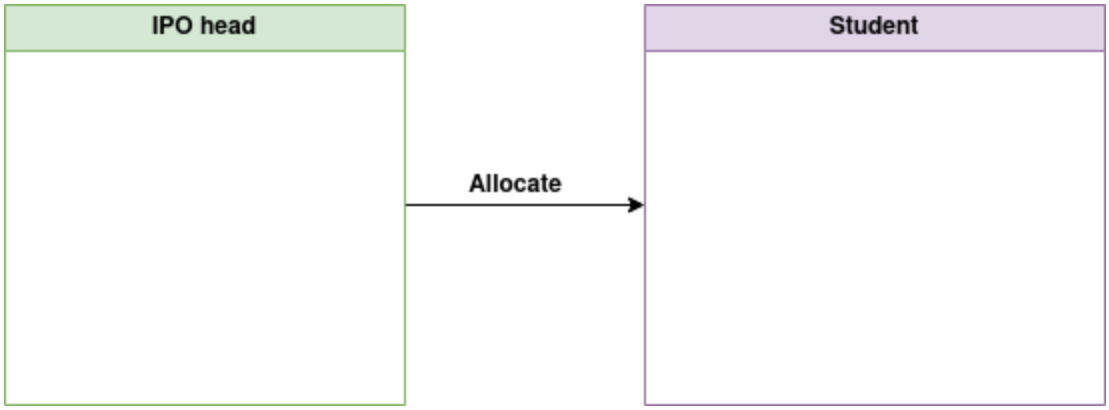
ID: 2

Name: Company



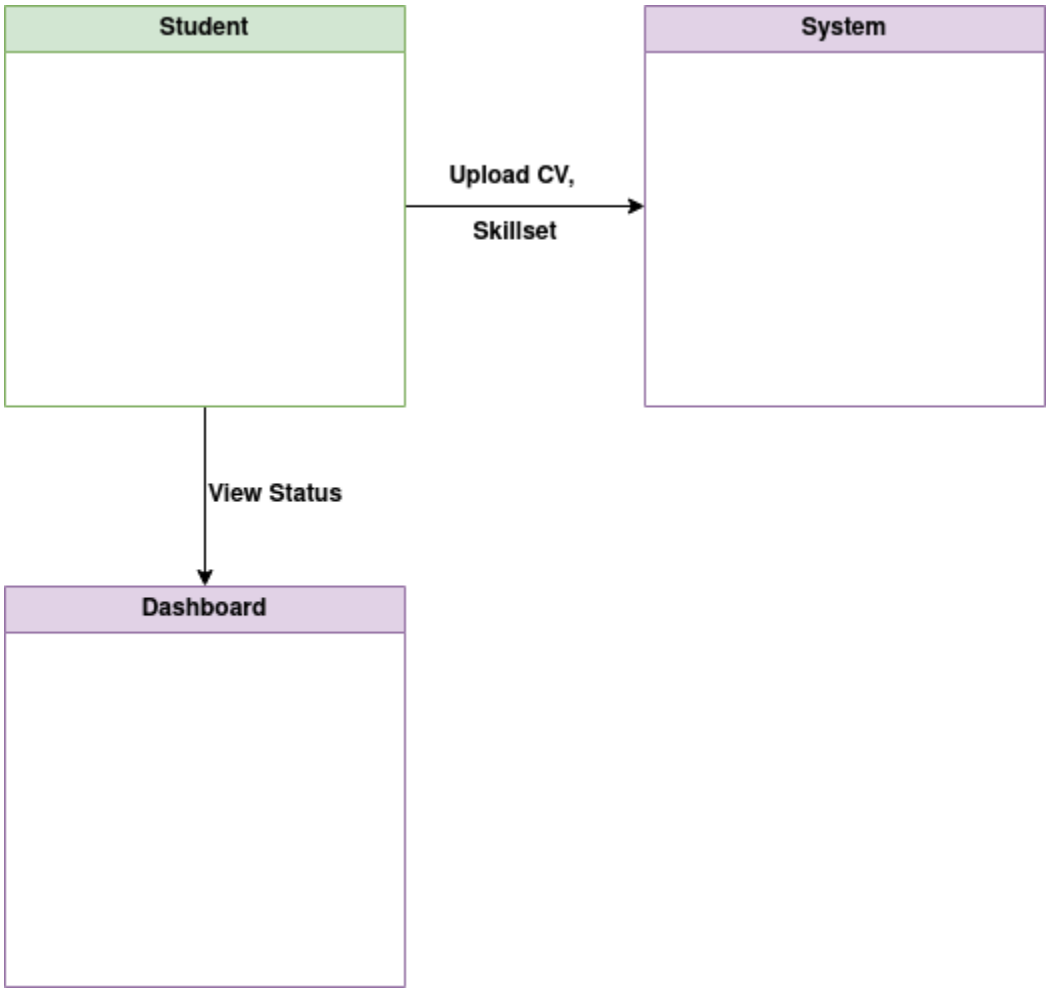
ID: 3

Name: IPO Head



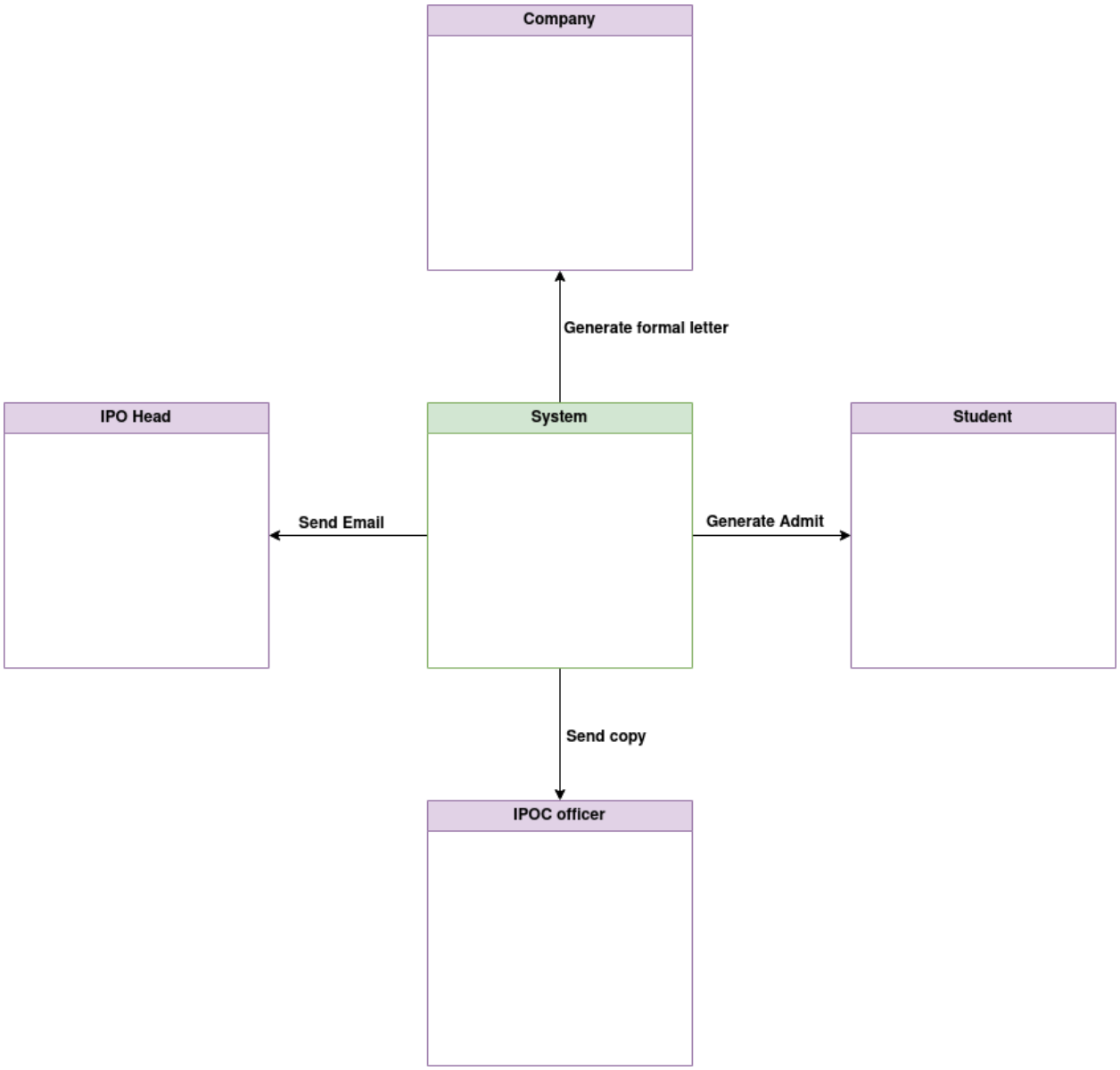
ID: 4

Name: Student



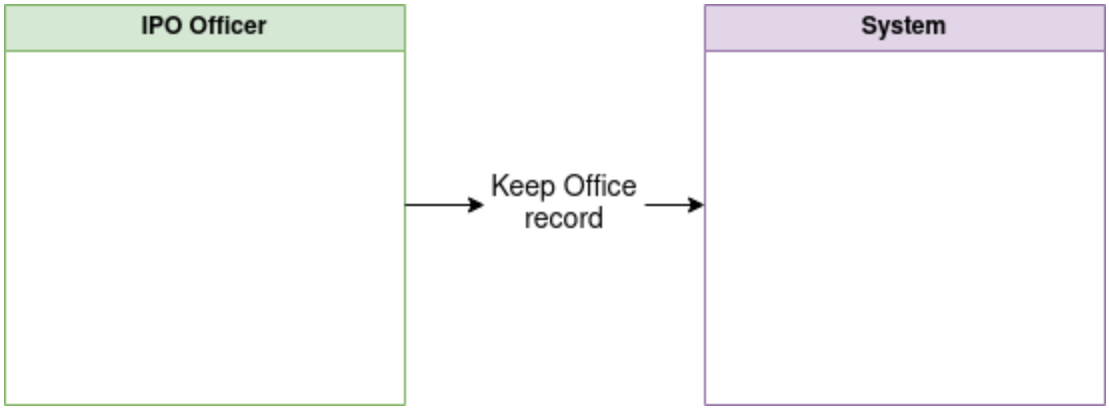
ID: 5

Name: System



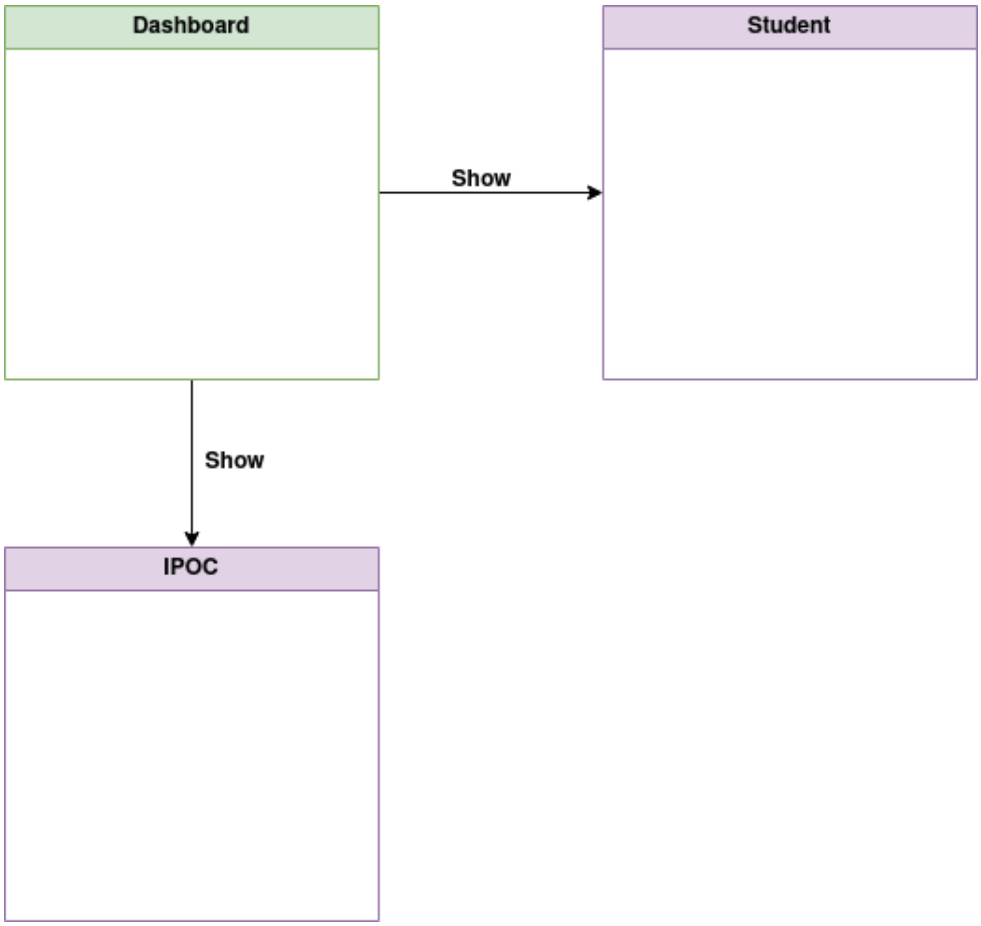
ID: 6

Name: IPOC Officer



ID: 7

Name: Dashboard

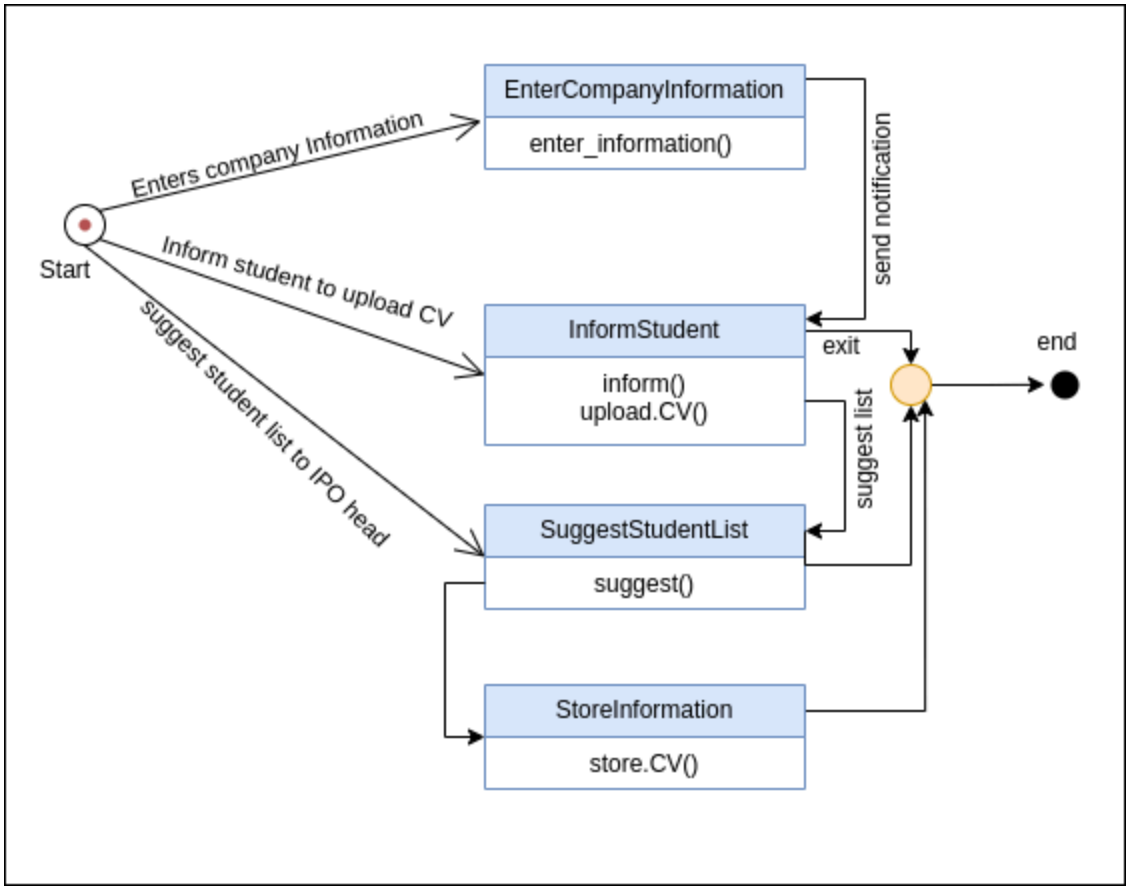


Behavioral Modeling:

Initiator	Events	Collaborator
IPOC	Consists IPO Head	IPO Head
IPOC	Consists IPOC Officer	IPOC Officer
IPOC	Enter company information	Company
IPOC	Inform student to upload CV	Student
Company	Sends interest	IPO Head
Company	select/reject	Student
Company	issue offer letter	Student
Company	Given offer letter to preserve	IPO Head
IPO Head	Allocate the students	Student
Student	Upload CV & skill sets	System
Student	Can view their status	Dashboard
System	Generate formal letter	Company
System	Generate admit card	Student
System	Sends email	IPO Head
System	Sends copy to office record	IPOC Officer
IPOC Officer	Keep office record	System
Dashboard	Show the status	Student
Dashboard	Show the status of students	IPOC

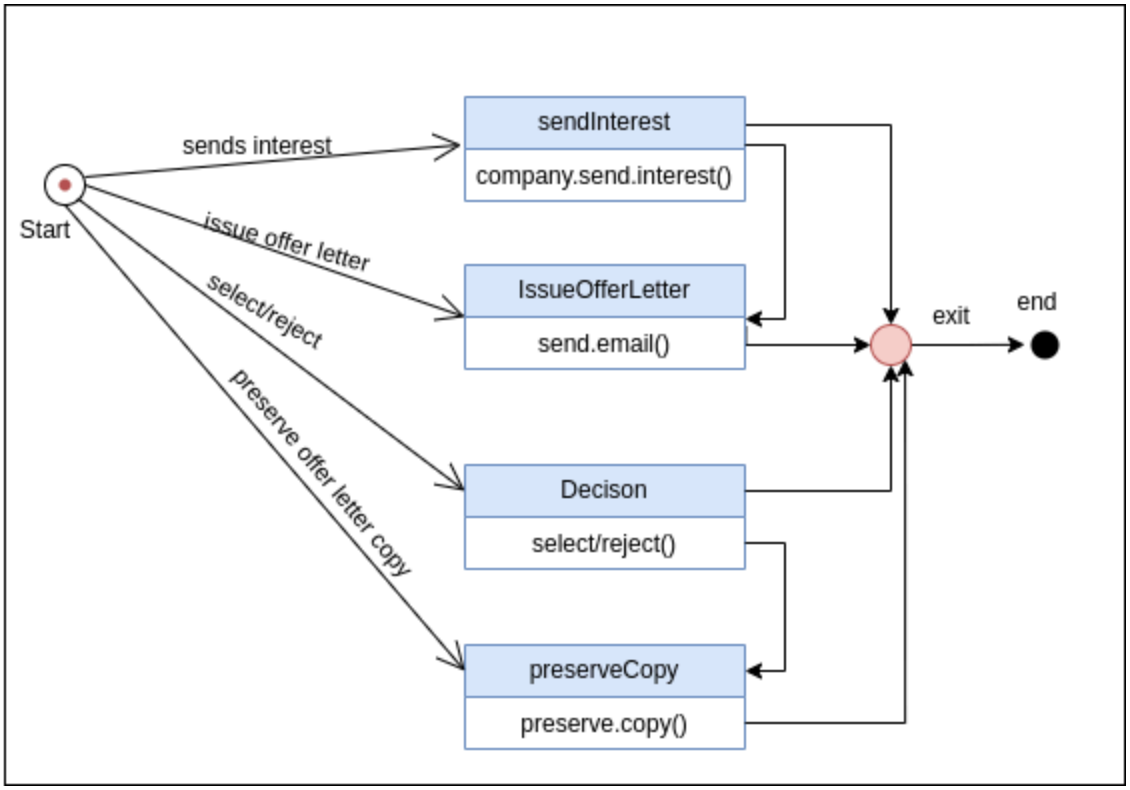
ID: 1

Name: IPOC



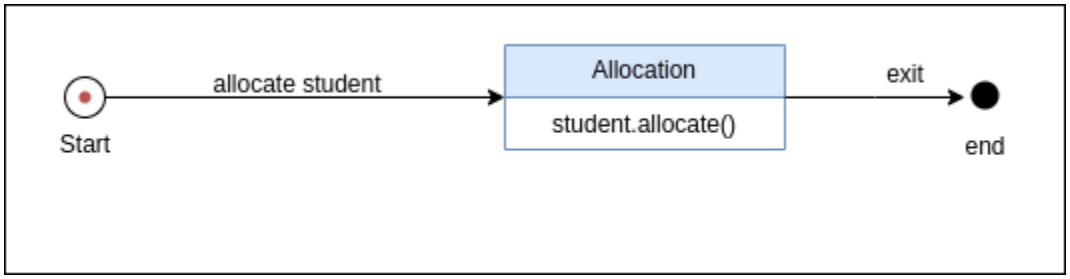
ID: 2

Name: Company



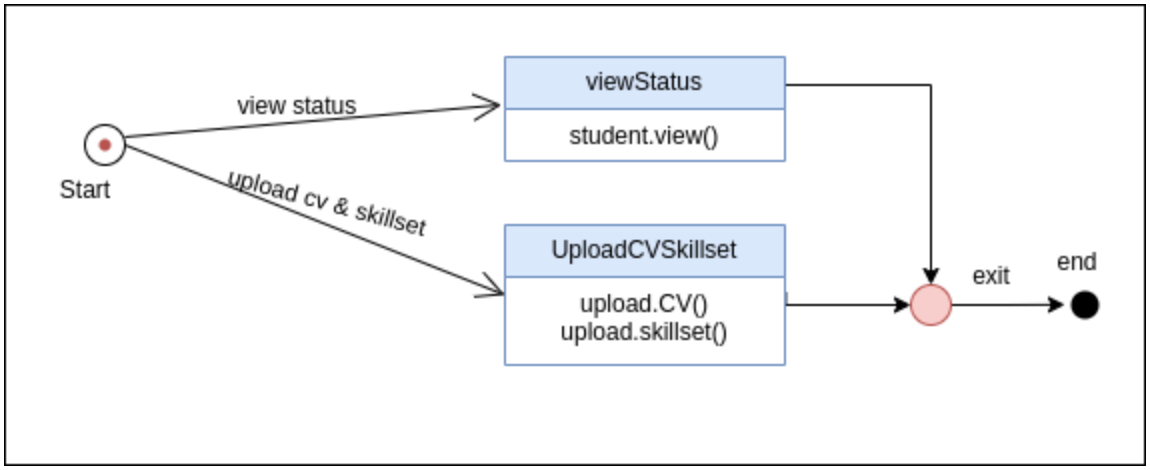
ID: 3

Name: IPO Head



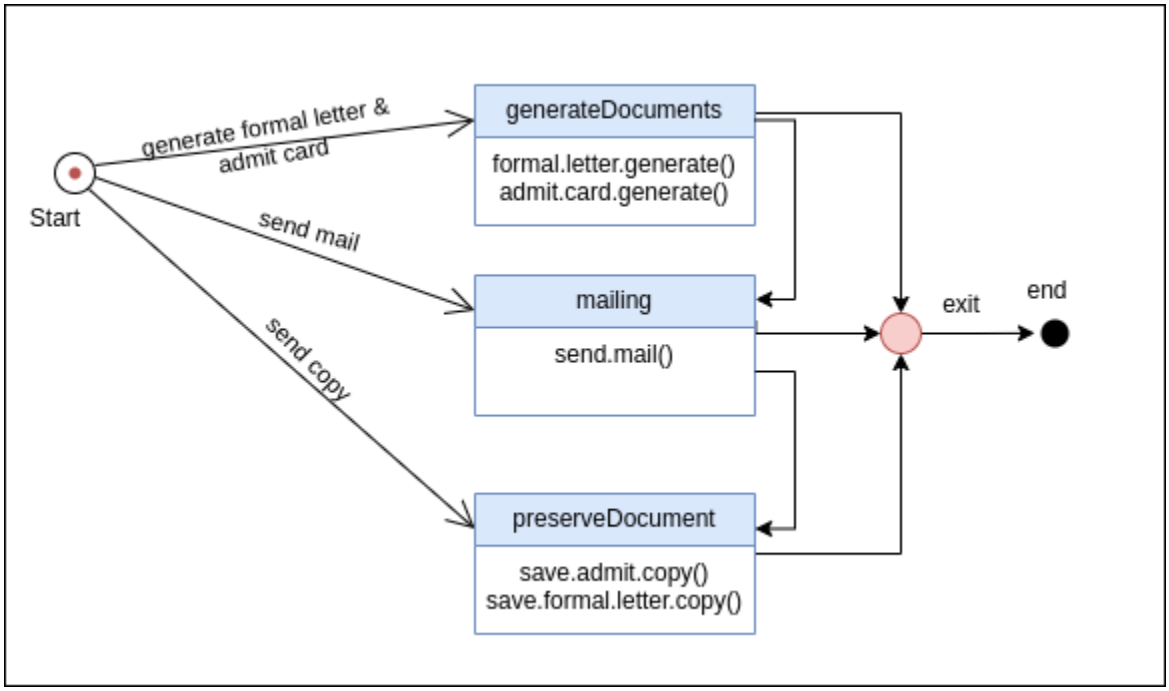
ID: 4

Name: Student



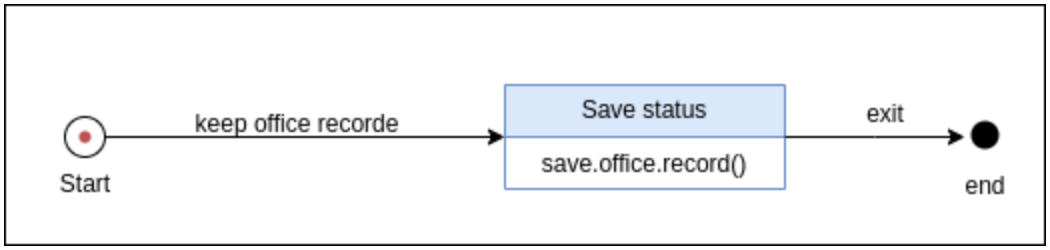
ID: 5

Name: System



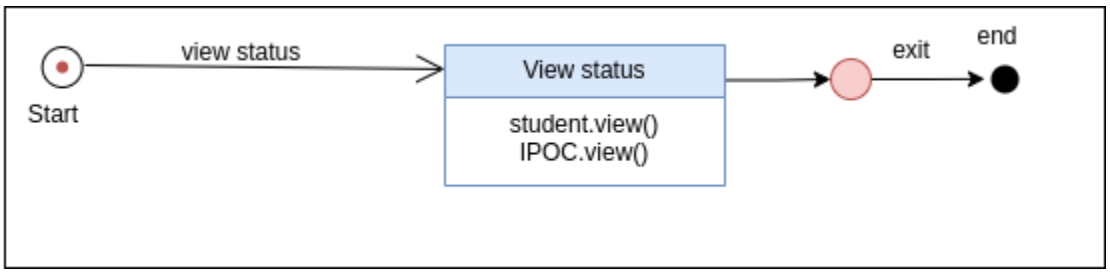
ID: 6

Name: IPOC Officer

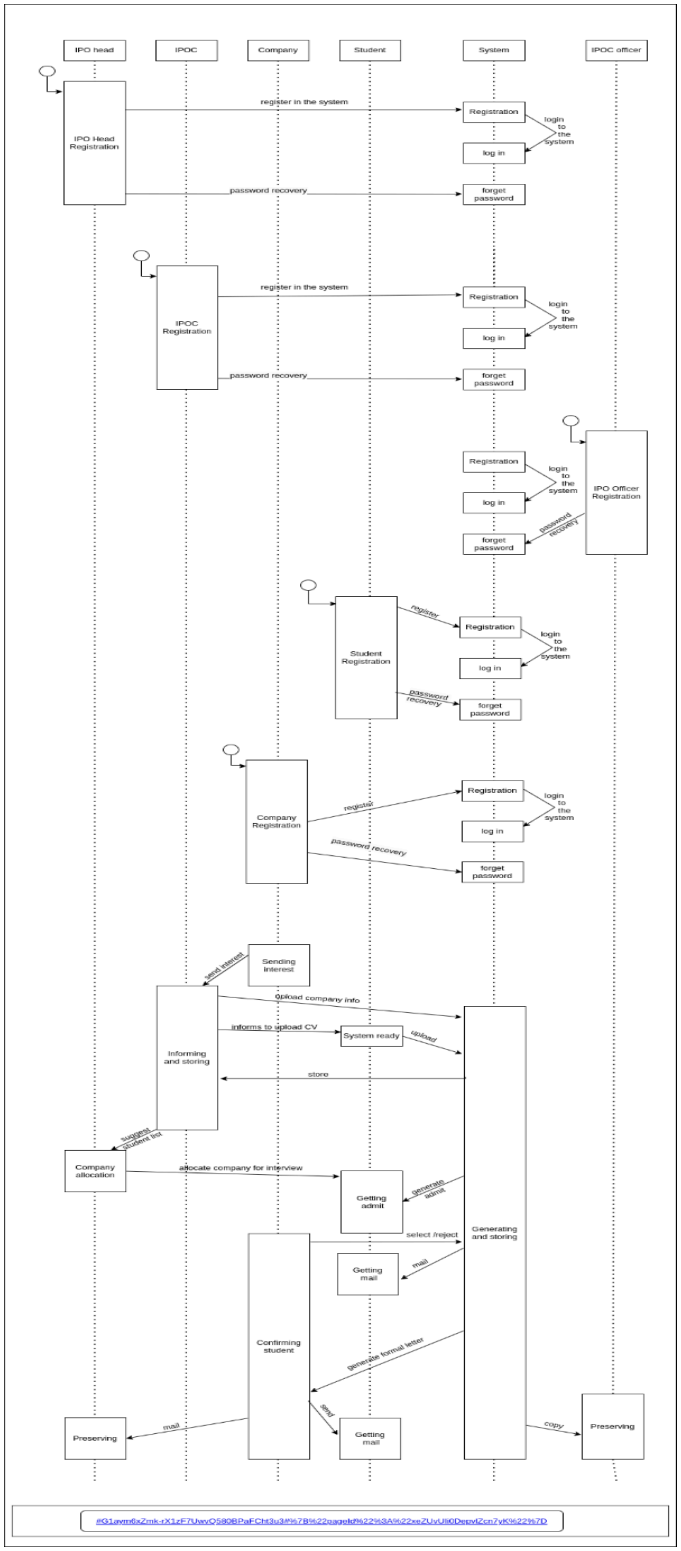


ID: 7

Name: Dashboard



Sequence Diagram:



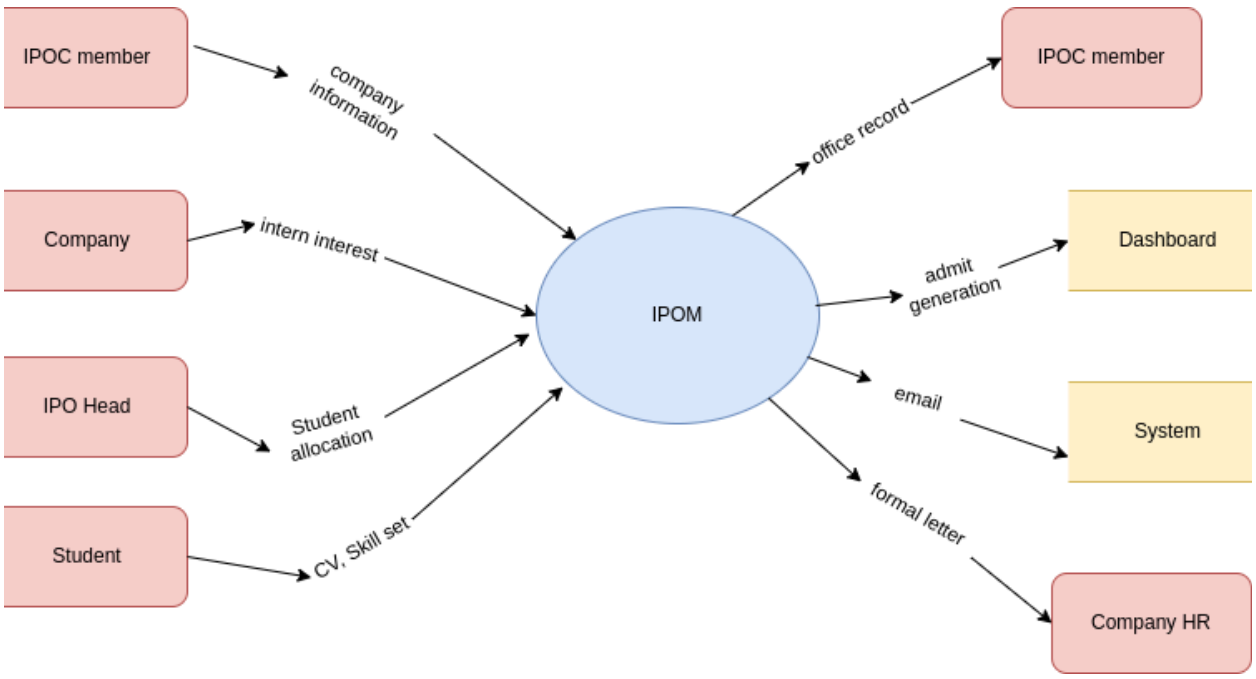
[Sequence Diagram]

Data Flow Diagram (DFD)

A data-flow diagram is a visual representation of how data moves through a system
or a process. A data flow diagram (DFD) shows how information moves through any
system or process. It displays data inputs, outputs, storage locations, and routes
between each destination using predefined symbols such as rectangles, circles, and
arrows as well as brief text labels.

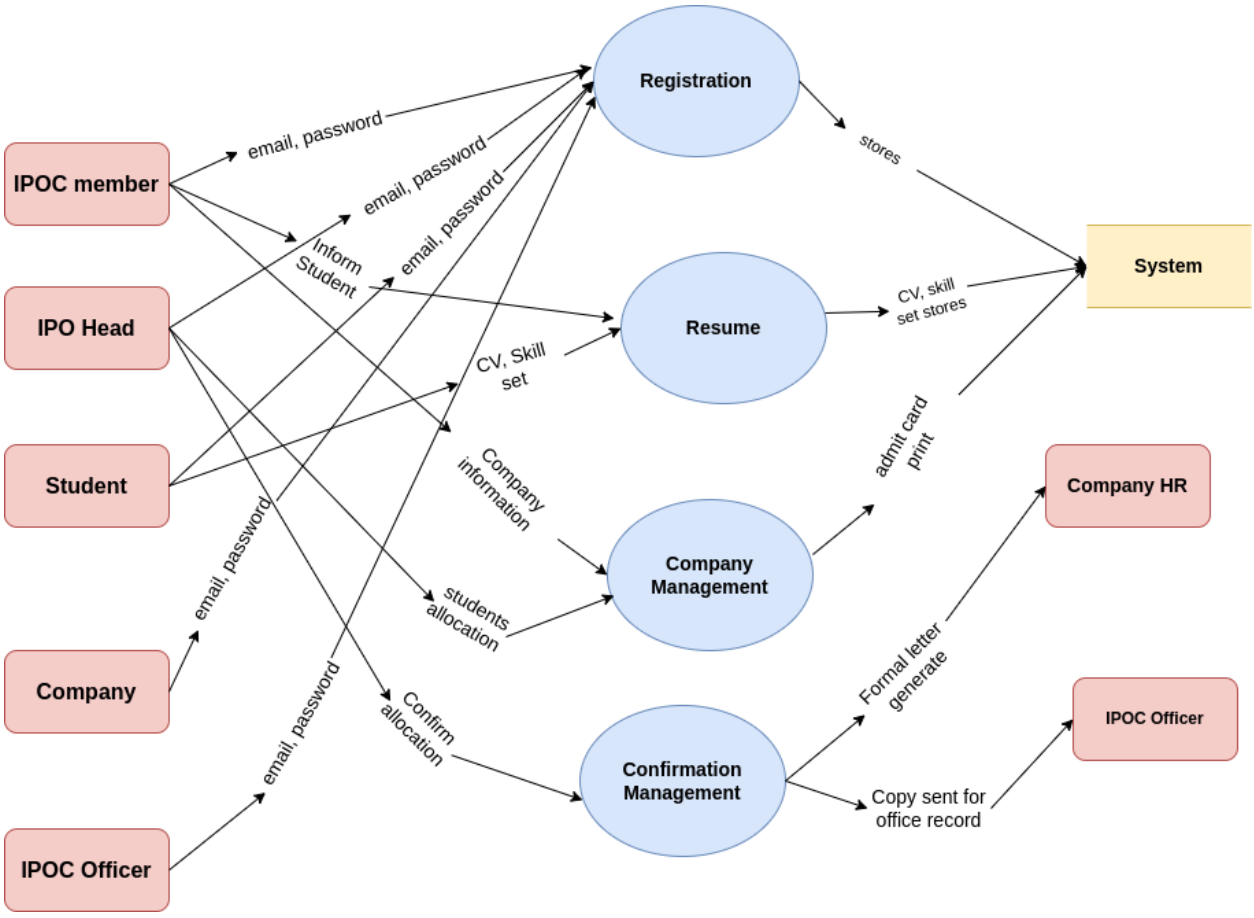
Level: 0

Name: IPOM



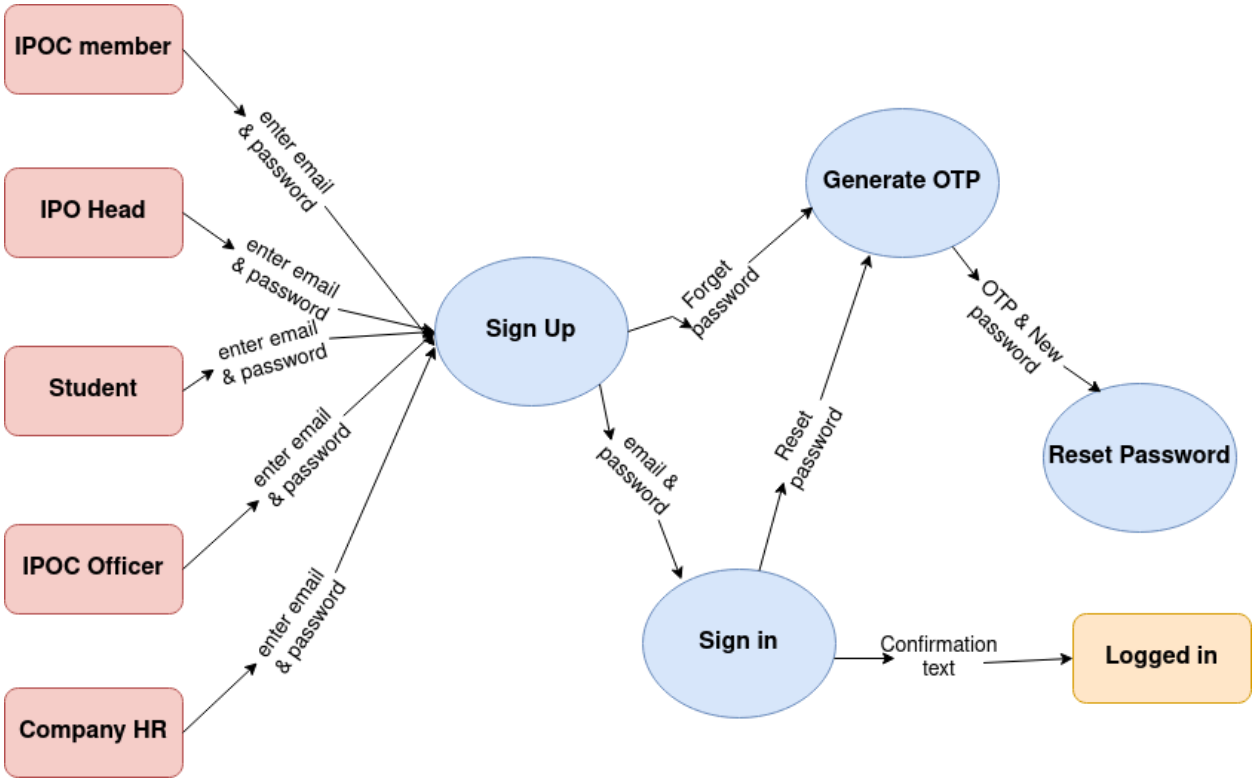
Level: 1

Name: Details IPOM



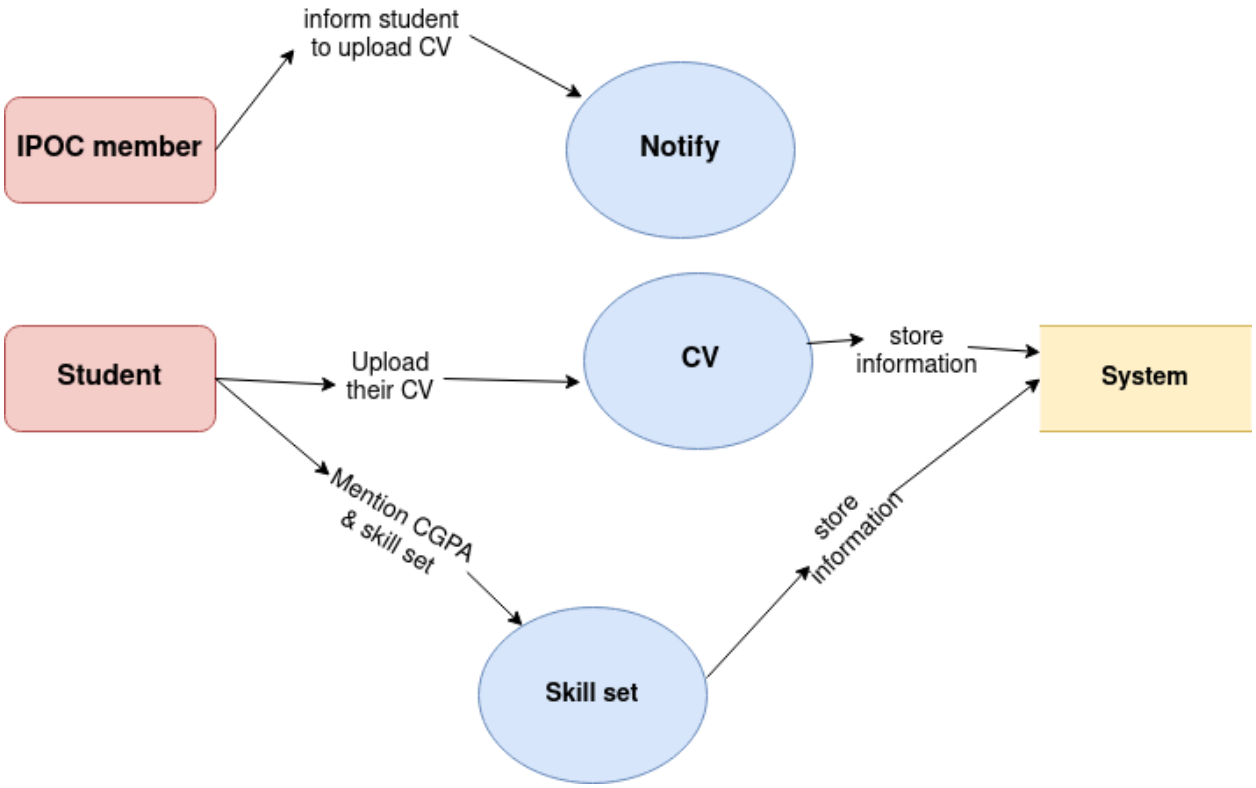
Level: 1.1

Name: Registration System



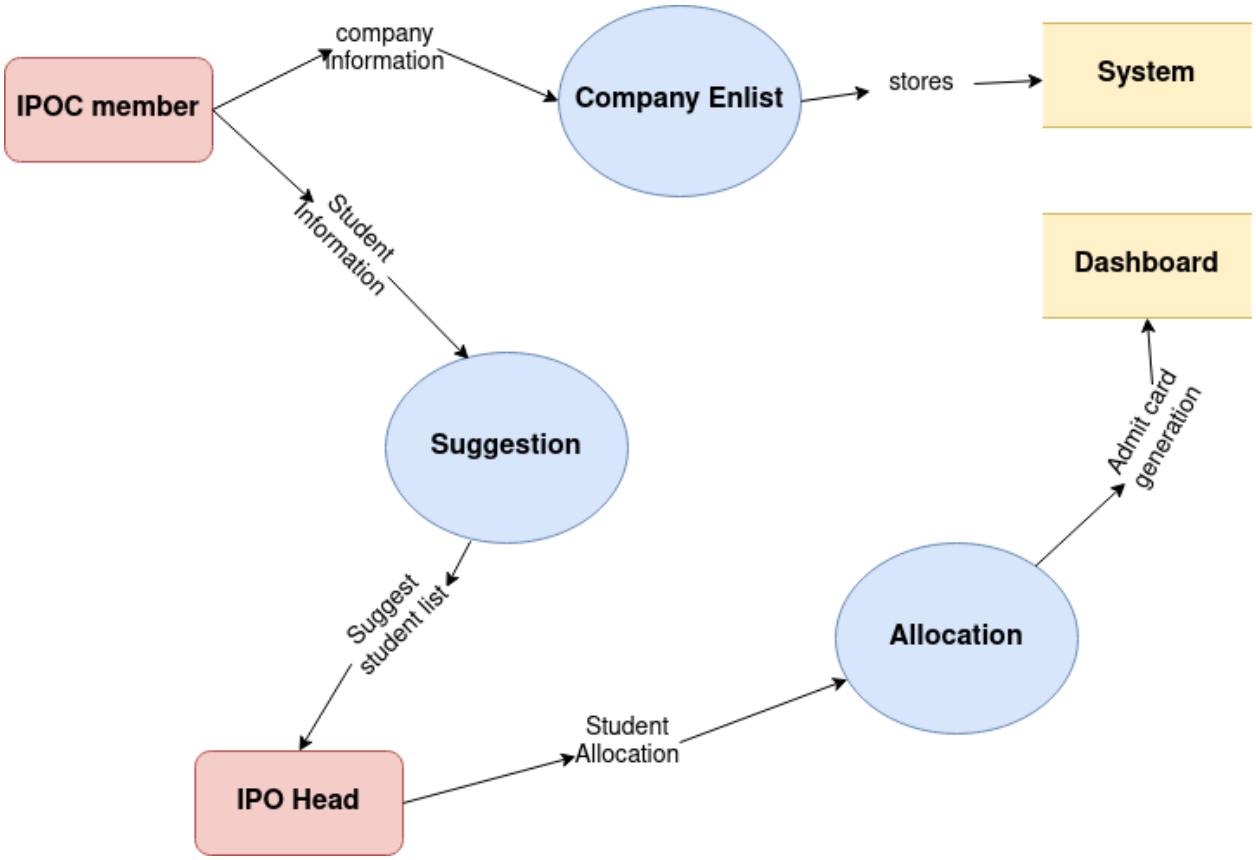
Level: 1.2

Name: Resume Management



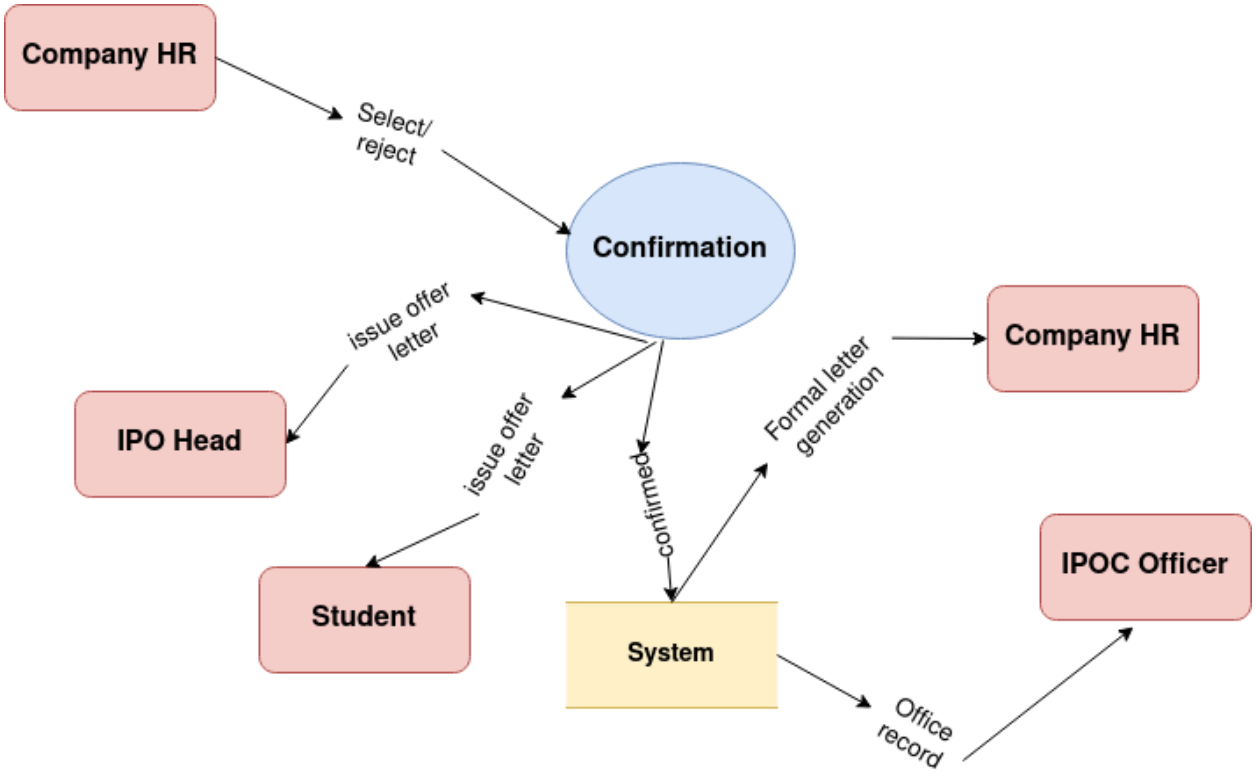
Level: 1.3

Name: Company Management



Level: 1.4

Name: Confirmation Management


Company HR
Select/ reject
Confirmation
issue offer letter
IPO Head
issue offer letter
Student
confirmed
System
Formal letter generation
Company HR
IPOC Officer
Office record