



# POSTAL AUTOMATION SYSTEM (PAS)

SE 505: Software Project Lab II

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<b>INTRODUCTION</b>	<b>7</b>
PURPOSE	7
INTENDED AUDIENCE	8
CONCLUSION	9
<b>INCEPTION OF PAS</b>	<b>9</b>
INTRODUCTION	10
Postal Automation System(PAS) will be an automated system for the “Letter-Delivery Department” of Registrar Building,University Of Dhaka.The sole purpose of this department is to send letters to teachers and officials regarding different type of Responsibilities e.g. Question Setter,Script Setter,Member of Exam Committees(Internals and Externals),Exam Question Coordination ,Result Finalization.	10
INCEPTION OF Postal Automation System	10
IDENTIFY THE CLIENT OF OUR PROJECT	10
ICEBREAKING	11
IDENTIFYING THE STAKEHOLDERS OF THE PAS	11
IDENTIFYING THE MULTIPLE VIEWPOINTS OF THE STAKEHOLDER	11
CONCLUSION	12

<b>ELICITATION OF PAS</b>	<b>13</b>
COLLABORATIVE REQUIREMENTS GATHERING	14
Quality Function Deployment	14
Normal requirements:	14
Expected requirements	15
Exciting requirements	15
<b>Postal Automation System</b>	<b>16</b>
<b>1) Account Management:</b>	<b>17</b>
1.1) Create Account:	17
1.2) Verification:	18
1.3) Update Account:	19
1.4) Password Recovery:	19
1.5) Log in:	20
<b>2) Information Management:</b>	<b>20</b>
2.1) Faculty Database:	20
2.2) Letter Database:	21
2.3) Course Database:	21
2.4) Staff Database:	21
<b>3) Dashboard:</b>	<b>22</b>

3.1) Dashboard For Faculty:	22
3.2) Dashboard For Admin Staff:	24
3.3) Dashboard For General Staff:	26
<b>4)Automated Template of Letters:</b>	<b>27</b>
<b>5)Sending Letter:</b>	<b>28</b>
<b>6)Additional Features:</b>	<b>29</b>
<b>Use Case Diagrams:</b>	<b>29</b>
DEFINITION OF USE CASE	29
Primary Actor	30
Secondary Actor	30
Activity Diagram	38
Swimlane Diagram	50
Definition :	50
SID(Swimlane ID): 1.1	51
SID(Swimlane ID): 1.1.3	52
SID(Swimlane ID): 1.1.5	53
SID(Swimlane ID): 1.1.1	54
SID(Swimlane ID): 1.1.2	54
SID(Swimlane ID): 1.2	56
SID(Swimlane ID): 1.3	57

SID(Swimlane ID): 1.5	58
SID(Swimlane ID): 1.1.4	59
SID(Swimlane ID): 1.4	60
<b>Data-based Modeling:</b>	<b>61</b>
DATA MODELING CONCEPT :	61
DATA OBJECTS :	61
Final data objects:	71
Data Object Relationship:	72
ER Diagram:	73
Definition of ER Diagram	73
Schema Diagram:	74
<b>CLASS-BASED MODELING</b>	<b>78</b>
Attribute and Method Identification:	90
Class Cards:	96
Table: Class Card for Letter Class	96
Table: Class Card for Account Class	97
Table: Class Card for Faculty Class	98
Table: Class Card for Admin-staff Class	99
Table: Class Card for General-staff Class	100
Table: Class Card for Bulk_sms Class	101

Table: Class Card for Email Class	102
Table: Class Card for Letter info Class	102
Table: Class Card for Faculty info Class	103
Table: Class Card for Staff info Class	104
Table: Class Card for Faculty dashboard Class	105
Table: Class Card for Admin staff dashboard Class	105
Table: Class Card for General staff dashboard Class	107
Table: Class Card for PAS Class	108
CRC Diagrams:	108
Diagram ID: 1	108
Diagram ID: 2	109
Diagram ID: 3	109
Diagram ID: 4	110
Diagram ID: 5	110
Diagram ID: 6	111
Diagram ID: 7	111
Diagram ID: 8	112
Diagram ID: 9	113
Diagram ID: 10	113
Diagram ID: 11	114
Diagram ID: 12	114
Diagram ID: 13	115

Diagram ID: 14	115
<b>BEHAVIORAL MODELING</b>	<b>116</b>
STATE TRANSITION DIAGRAM :	124
Sequence Diagram:	134

# INTRODUCTION

This chapter is a part of our software requirement specification for the project “Postal Automation System”. In this chapter we will focus on the intended audience for this project.

## PURPOSE

This document briefly describes the Software Requirement Analysis of Postal Automation System. It contains the functional, non-functional and the supporting requirements and establishes a requirement’s baseline for the development of the system. The requirements contained in the SRS are independent, uniquely numbered and organized by topics. The SRS serves

as an official means of communicating user requirements to the developer and provides a common reference point for both the developer team and the stakeholder community. The SRS will evolve over time as users and developers work together to validate, clarify and expand its contents.

## **INTENDED AUDIENCE**

- This SRS report is intended for several audiences including the users(Staff & Faculties) , admin, project managers, developers and testers.
- The users and admin will use this SRS to verify that the developer team has created a product that is acceptable to the customer.
- The project managers of the developer team will use this SRS to plan milestones and a delivery date, and ensure that the developing team is on track during development of the system.
- The designers will use this SRS as a basis for creating the system's design.The designers will continually refer back to this SRS to ensure that the system they are designing will fulfill the customer's needs.
- The developers will use this SRS as a basis for developing the system's functionality. The developers will link the requirements defined in this SRS to the software they create to ensure that they have created a software that will fulfill all of the customer's documented requirements.
- The testers will use this SRS to derive test plans and test cases for each documented requirement. When portions of the software are complete, the testers will run their tests on that software to ensure that the software fulfills the requirements documented in this SRS. The testers will again run their tests on the entire system when it is complete and ensure that all requirements documented in this SRS have been fulfilled.



# **CONCLUSION**

This analysis of the audience helped us to focus on the users who will be using our analysis. This overall document will help each and every person related to this project to have a better idea about the project.

## **INCEPTION OF PAS**

In this chapter, the Inception part of the SRS will be discussed briefly.

## **INTRODUCTION**

Postal Automation System(PAS) will be an automated system for the “Letter-Delivery Department” of Registrar Building,University Of Dhaka.The sole purpose of this department is to send letters to teachers and officials regarding different type of Responsibilities e.g. Question Setter,Script Setter,Member of Exam Committees(Internals and Externals),Exam Question Coordination ,Result Finalization.

## **INCEPTION OF Postal Automation System**

At the beginning of our project, we entered the inception stage. This stage includes, how the project will be started and their scope and limitations. The main goal of this phase is to identify the requirements, demand and establish some sort of mutual understanding between the software team and the stakeholders of the Letter Delivery Department. In order to make this phase effective we took the following steps:

- Identifying the client of our project
- Icebreaking
- Identifying the stakeholders of the Letter Delivery System
- Identifying the multiple viewpoints of stakeholders

## **IDENTIFY THE CLIENT OF OUR PROJECT**

Administration of Registrar Building,Room no 305, can be identified as a client of our project.Faculties and Staffs can be viewed as stakeholders.

## **ICEBREAKING**

Icebreaking refers to the fact that to diminish the communication barrier between two persons. It is a crucial part since it denotes the acceptance of our proposal. We started this phase by talking with the stakeholders with context free languages. Their behavior, responding to our question, impacted the whole system.

## **IDENTIFYING THE STAKEHOLDERS OF THE PAS**

Stakeholder refers to any person or group who will be affected directly or indirectly by the system. Stakeholders include end-users who interact with the system and everyone else in an organization who may be affected by its installation. The PAS Ecosystem have limited number of stakeholders. They are:

- Faculties
- Staffs

## **IDENTIFYING THE MULTIPLE VIEWPOINTS OF THE STAKEHOLDER**

Different stakeholders expect different benefits from the system as every person has his own point of view. So, we have to recognize the requirements from multiple viewpoints. Different viewpoints of the stakeholders about the expected software are given below:

**Letter Department's Viewpoint:**

- First and foremost, a really friendly user interface
- Desktop platform based software if affordable
- Provide alerts when any letter reaches deadline
- Storing info about the letters and the faculties
- Easy input of letter templates
- Automated letter templates with the option of automated data entry.
- Lightweight and easy to use.

### **Users' Viewpoint:**

- Easy and Fast Interface
- Desktop Platform Based Software
- Swift account management system
- Dashboard for every stakeholders registered in the system
- Statistical illustration of certain times
- Managing databases swiftly
- Scope to add new faculties information
- Automated letter sending through email
- Alert through bulk sms

## **CONCLUSION**

The primary goal of this project is to model and design a software for the Staff of Letter Department and Faculties of the University to automate the

official letter sending process to lessen the hassle and burden. For these reasons, The software will be as simple as a faculty can easily be able to use this and the Staff can maintain it without any annoyance. The software will be designed in such a way as it takes very little time to manage. To make this software project successful, collaboration with stakeholders was a main priority that what they want, how the software will work, how it can be more convenient, how it will save time and energy, etc.

## **ELICITATION OF PAS**

We have seen Question and Answer (Q&A) approach in the previous chapter, where the inception phase of requirement engineering has been described. The main task of this phase is to combine the elements of problem solving, elaboration, negotiation and specification. The collaborative working approach of the stakeholders is required to elicit the requirements. We have finished the following tasks for eliciting requirements-

- Collaborative Requirements Gathering

- Quality Function Deployment
- Usage Scenarios(Story)

## **COLLABORATIVE REQUIREMENTS GATHERING**

We have met with many stakeholders in the Inception phase such as the staff and faculties. These meetings created an indecisive state for us to elicit the requirements. To solve this problem, we have met with the stakeholders (who are acting a vital role in the whole process) few times to elicit the requirements.

### **Quality Function Deployment**

Quality Function Deployment (QFD) is a technique that translates the needs of the customer into technical requirements for software. Ultimately the goal of QFD is to translate subjective quality criteria into objective ones that can be quantified and measured and which can then be used to design and manufacture the product. It is a methodology that concentrates on maximizing customer satisfaction from the software engineering process. So, we have followed this methodology to identify the requirements for the project. The requirements, which are given below, are identified successfully by the QFD.

#### **Normal requirements:**

Normal requirements are generally the objectives and goals that are stated for a product or system during meetings with the customer. The presence of these requirements fulfills customers' satisfaction. These are the normal requirements for our project.

- Faculties will create an account by providing their credentials.

- A predefined account will be given to the system admin.
- Admin will verify the faculties' user credentials.
- Admin will create account for general staff
- Users can recover their password if forgotten.
- Users must be logged in before doing any operation.
- General staff can send letters online
- Automated templates will be provided to the Staff through Dashboard.
- Letter info will be maintained in database and shown through dashboard
- Distinct databases will be maintained for staff and faculties

### **Expected requirements**

These requirements are intrinsic to the product or system and may be so elementary that the customer does not explicitly state them. Their absence will be a cause for significant dissatisfaction. Below the expected requirements for our project are briefly described-

- The system will be secured.
- Letter will be sent through email protocol
- Sent letters record will have to be stored
- Templates should have input field suggestions from database

### **Exciting requirements**

These requirements are for features that go beyond the customer's expectations and prove to be very satisfying when present. Following are some exciting requirements of our project:-

- All the letters statistics of last seven days will be shown in the homepage of dashboard by several pie chart and bar chart and progress bars.
- If any letters have reached deadline or passed deadline, alert will be given.
- Bulk sms will be sent to faculties' phone number when a letter is sent.
- Letters can be seen and sorted by deadline or sending date and searched by name, ref no.

## Usage Scenario:

### **Postal Automation System**

Postal Automation System (PAS) will be an automated system for the “Letter-Delivery Department” of the Registrar Building, University Of Dhaka. The



sole purpose of this department is to send letters to teachers and officials regarding different type of Responsibilities e.g. Question Setter, Script Setter, Member of Exam Committees (Internals and Externals), Exam Question Coordination, Result Finalization. The letters include Marks Distribution, Brochures, Curriculum, Demo Questions etc. This system will automate a part of the process.

## **1) Account Management:**

### **1.1) Create Account:**

**Faculty Perspective:** Faculties will be needed to create accounts in order to enter into the System.S/he will be needed to give following information to create account:

- Full Name
- Mobile Number
- Email Address(du.ac.bd needed)
- Department / Institution Name
- Password

After providing these information, faculty will be verified by the provided credentials.After the verification is done, the account will be created.

**Admin-Staff Perspective:** An account for the Admin-Staff will be given to him with a predefined username and password.S/he will be able to update password if needed.

**General Staff Perspective:** Admin-Staff will create accounts for the general staff with a username and password.S/he will be able to update password if needed.

## **1.2)Verification:**

**Faculty Perspective:** Admin-Staff will verify if any faculty creates a new account manually via phone call.

**Admin-Staff Perspective:** Super-Admin will verify and assign Admin-Staff before giving admin account.

**General-Staff Perspective:** Admin-Staff will verify the general staff before creating a new account for him/her.

### **1.3) Update Account:**

Admin-Staff, General-Staff and Faculties will be able to update their password if S/he wants to.

### **1.4) Password Recovery:**

**Faculty Perspective:** If any faculty forgets the password she will be able to recover the password through Email.

A recovery link will be sent to the Faculty's email, if S/he clicks on the “Recover

Password” button. After going to the specific link,S/he will then input a new

password and his/her password will be updated in Database.

**Admin-Staff Perspective:** If admin staff forgets password,the S/he will report it to the Super-admin and his/her password will be updated.

**General-Staff Perspective:** If a general staff forgets his/her password,S/he will report it to the admin staff and his/her password will be updated.

### **1.5) Log in:**

Faculties will be able to log in to the system with their registered email and password.

Staff will log into the system with their predefined username and password.

## **2) Information Management:**

Three Independent Database will be maintained for the whole System :

### **2.1)Faculty Database:**

A database will be maintained as “Faculty Database” having following information:

- Faculty Name(English)
- Faculty Name(Bangla)
- E-mail
- Mobile Number
- Department/ Institutions
- Designation
- Phone Number
- Password
- Generated ID

## **2.2)Letter Database:**

A database will be maintained as “Letter Database” having followings:

- Reference Number
- Sending Date
- Letter’s Subject
- Letter’s Body

## **2.3)Course Database:**

A database will be maintained as “Course Database” having followings:

- Course Name
- Course Code
- Course Syllabus Link

## **2.4)Staff Database:**

A database will be maintained as “ Staff Database” having followings:

- Staff ID
- Staff Name
- Staff Phone Number
- Password

Super-admin of the System will initially give entry records to the Databases. But if any new faculty is enrolled or if someone gets his/her designation updated, then Admin-Staff will be able to update information from the dashboard which will automatically be updated into the database by system.

### **3)Dashboard:**

Three Distinct Dashboard will be created for :

- Faculty
- Admin-Staff
- General Staff

#### **3.1) Dashboard For Faculty:**

A Dashboard will be created for faculties. This will have the followings:

- Letters stats: All of the letters he received in last seven days and not sent replied yet will be shown. Also the percentages of letter he

replied will be shown to with a progress bar. Also bar charts will show number of letters he received each day for last seven days.

- A green alert box to remind faculty about the repliable letter's deadline. The pop-up message will be:

*“ You have some letters to reply in time! Please Check the Deadlines and tick the checkbox after giving a reply.”*

The color of the green alert box will turn red if the deadline of any letter is in two days.

- The letters S/he got from the “ Letter Sending Department” through email.
- The sending date of the Emails.
- A checkbox to notify the System that S/he has replied to that
- letter. If S/he ticks the checkbox of the repliable emails ,the alert box will disappear.
- “Change Password” Button will be there if S/he wants to change his/her password.

### 3.2) Dashboard For Admin Staff:

A Dashboard will be created for Admin Staff. This will have the followings:

- Overall letters statistics will be shown in the main home of Dashboard for last seven days. It will have:

i) Number of signed faculties

ii) Number of Non verified faculties

iii) Number of letters sent in last seven days

iv) Percentage of replies got

v) Letters sent in each day for last seven days

vi) Letter overview with a pie chart having the full statistical view of how many letters have been sent, how much replies have been got, how many have passed deadline and how many letters need replies.

- A green alert box to remind staff about the repliable letter's deadline. The pop-up message will be:

*“ You have some letters which you haven't got a reply yet. Tick the checkbox after getting replies.”*



The color of the green alert box will turn red if the deadline of any letter is in two days.

- Sent Letters will be shown in the dashboard which will have :

- ❖ Name of the Recipient
- ❖ Reference Number
- ❖ Sending Date
- ❖ Body of the letter
- ❖ Checkbox
- ❖ Search Bar- i)Search By Reference Number

ii)Search By Faculty Name

- “Change Password” button if S/he wants to change his/her predefined password.
- “Create Staff Account” button to create an account for the General Staff.
- “Reset Staff Account ” button in case any of the Staff forgets password.
- “Update Faculty List” button to update information if any new faculty is enrolled or if any faculty’s designation is updated.
- “Verify Faculty” button,By clicking this,Staff will get a view of the registered faculties who are needed to be verified.Staff will contact them through Mobile and mark S/he verified by ticking the checkboxes.

### 3.3) Dashboard For General Staff:

A Dashboard will be created for Admin Staff. This will have the followings:

- Overall letters statistics will be shown in the main home of Dashboard for last seven days. It will have:

i) Number of signed faculties

ii) Number of Non verified faculties

iii) Number of letters sent in last seven days

iv) Percentage of replies got

v) Letters sent in each day for last seven days

vi) Letter overview with a pie chart having the full statistical view of how many letters have been sent, how much replies have been got, how many have passed deadline and how many letters need replies.

- A green alert box to remind staff about the repliable letter's deadline. The pop-up message will be:

*“ You have some letters which you haven't got a reply yet. Tick the checkbox after getting replies.”*

The color of the green alert box will turn red if the deadline of any letter is in two days.

- Sent Letters will be shown in the dashboard which will have :
  - ❖ Name of the Recipient
  - ❖ Reference Number
  - ❖ Sending Date
  - ❖ Body of the letter
  - ❖ Checkbox
  - ❖ Search Bar- i)Search By Reference Number  
ii)Search By Faculty Name
- “Change Password” button if S/he wants to change his/her predefined password.

#### **4)Automated Template of Letters:**

Automated template of different types of letter will be provided by the System. There are five types of letters:

i)Letter for Question Setter & Script Scrutinizer

- ii)Letter for only Script Scrutinizer
- iii)Letter for External and Internal Viva Board Members
- iv)Letter for members of the Exam Committee
- v)Letter for Question Coordinator & Result Finaliser.

These five different letters have five different templates.The templates will be generated automatically upon selection.Any kind of inclusion of new letter type will be maintained by Super-User.

## **5)Sending Letter:**

General Staff will be able to send letters to the faculties. For this, a staff must be logged in to his account . After being logged in, he will have access to his dashboard and will choose which type of letter template he wants to send. After choosing letter templates he will fill the blanks of the templates from dropdown boxes. After finishing filling up, he will click send which will automatically send the letter to the respective faculty's email and a copy of the letter will be printed simultaneously and an automated sms will be to sent to the specific phone number of the faculty. These letters will be then shown in the dashboard of General Staff and Admin,also in the dashboard of the respective faculty.

## **6)Additional Features:**

- Showing all the letters info in dashboard
- Showing letter sent,reached deadline,reply got and overall letter statistics in every dashboard
- Sending bulk sms automatically as an alert to the faculties phone number.
- Sending pdf of the letter to the respective faculty.
- Updating letter status in every dashboard real time.
- Scope of adding new faculties info by Admin Staff.

## **Use Case Diagrams:**

# **DEFINITION OF USE CASE**

A Use Case captures a contract that describes the system behavior under various conditions as the system responds to a request from one of its stakeholders. In essence, a Use Case tells a stylized story about how an end user interacts with the system under a specific set of circumstances. A Use Case diagram simply describes a story using corresponding actors who perform important roles in the story and makes the story understandable for the users. The first step in writing a Use Case is to define that set of “actors” that will be involved in the story. Actors are the different people that use the system or product within the context of the function and behavior that is to be described. Actors represent the roles that people play as the system operators. Every user has one or more goals when using the system.

# Primary Actor

Primary actors interact directly to achieve required system function and derive the intended benefit from the system. They work directly and frequently with the software.

# Secondary Actor

Secondary actors support the system so that primary actors can do their work. They either produce or consume information.

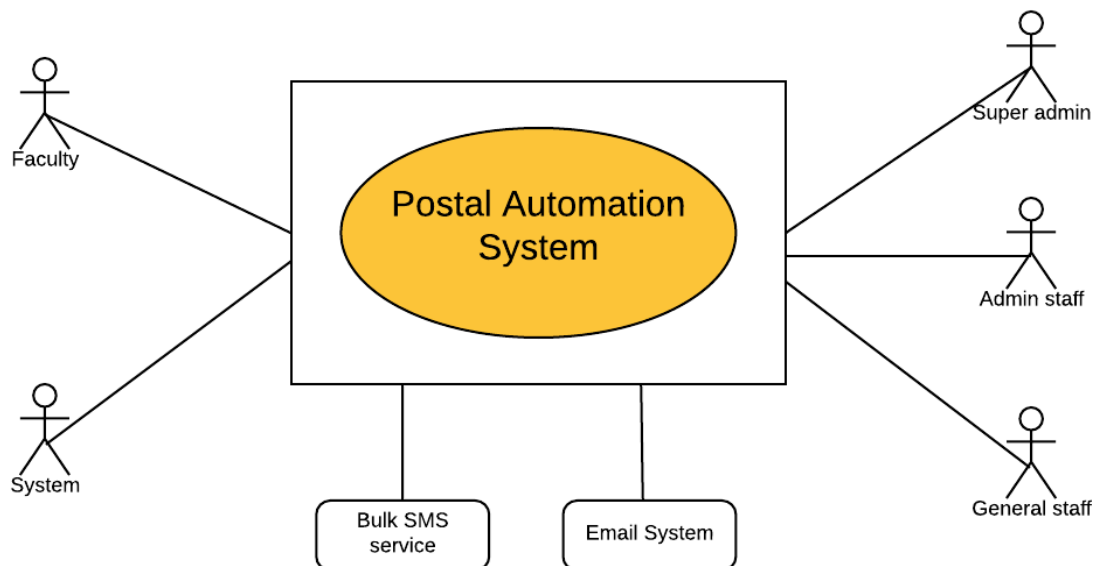
Use Case diagrams to give the non-technical view of the overall system.

**Level :0**

**Name:**Postal Automation system

**Primary actor:**Faculty, System, Super admin, Admin staff, General staff

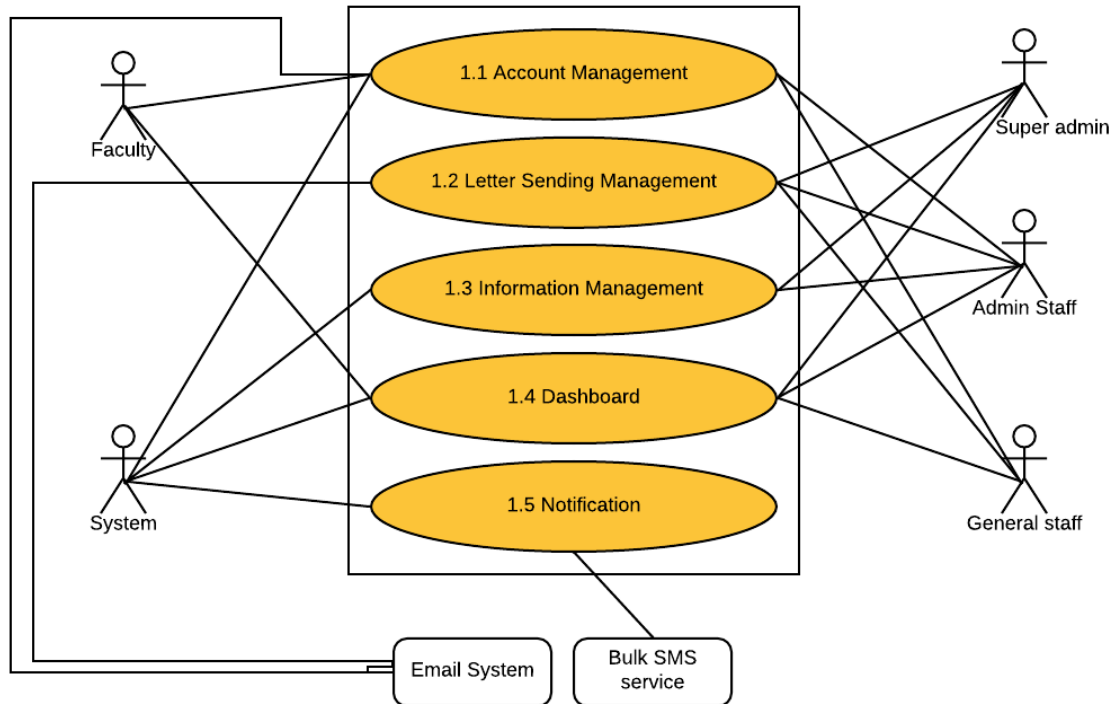
**Secondary actor:**Bulk SMS service ,Email System



**Level :1**

**Primary actor:**Faculty, System, Super-admin, Admin-staff, General staff

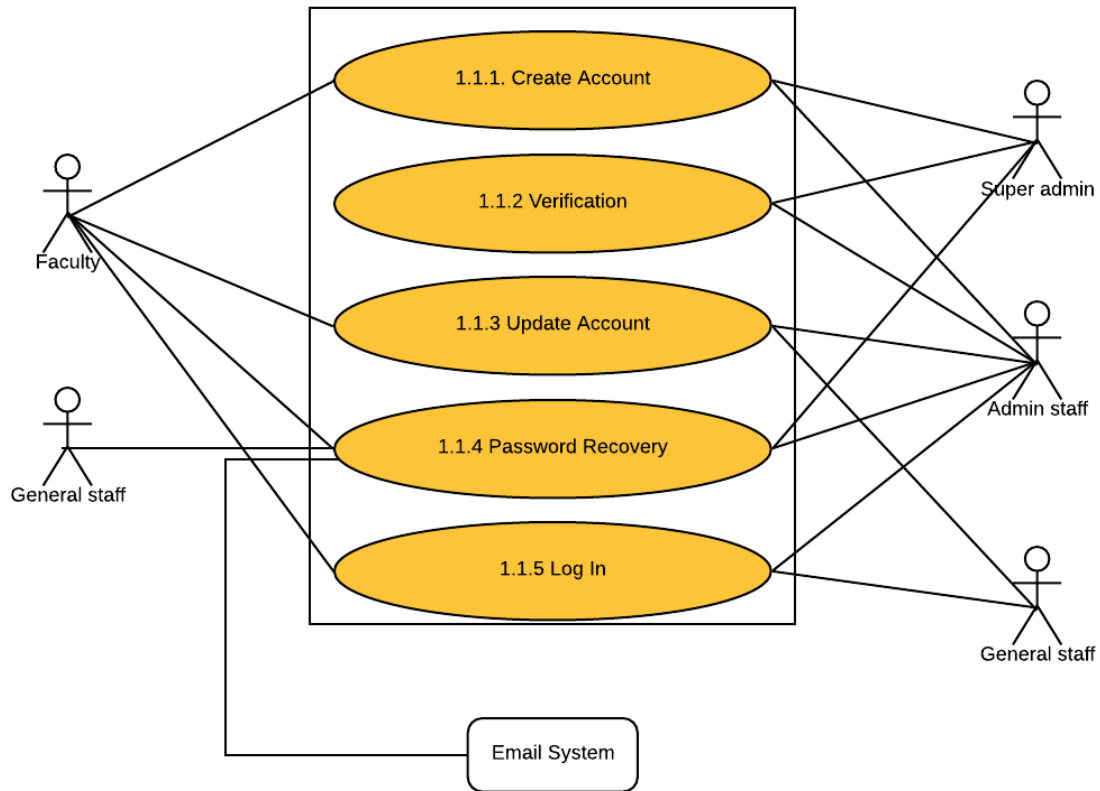
**Secondary actor:** Bulk SMS service , Email System



## Level :1.1

**Primary actor:**Faculty,General staff,Super admin,Admin staff,General staff

**Secondary actor:**Email System

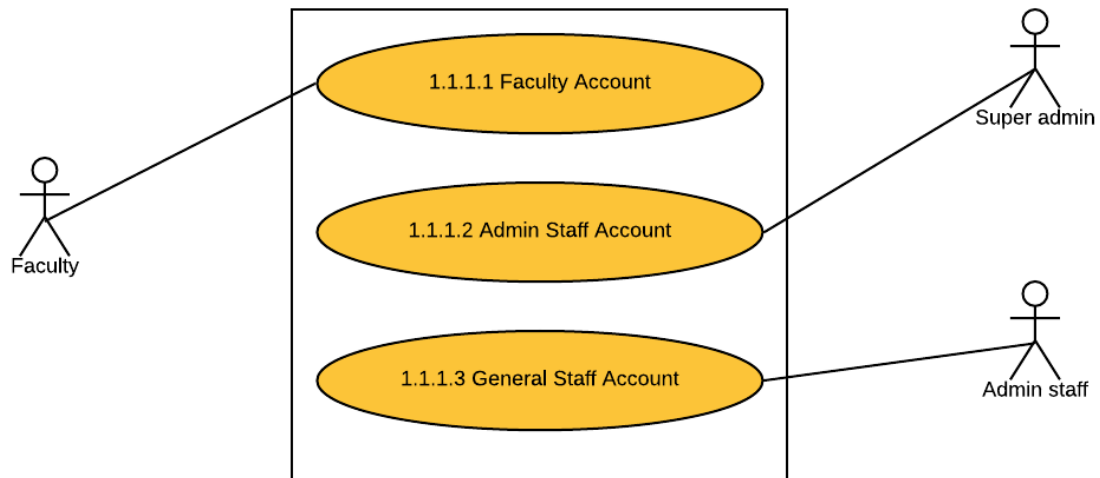


## Level :1.1.1

**Primary actor:**Faculty,Super admin,Admin-staff



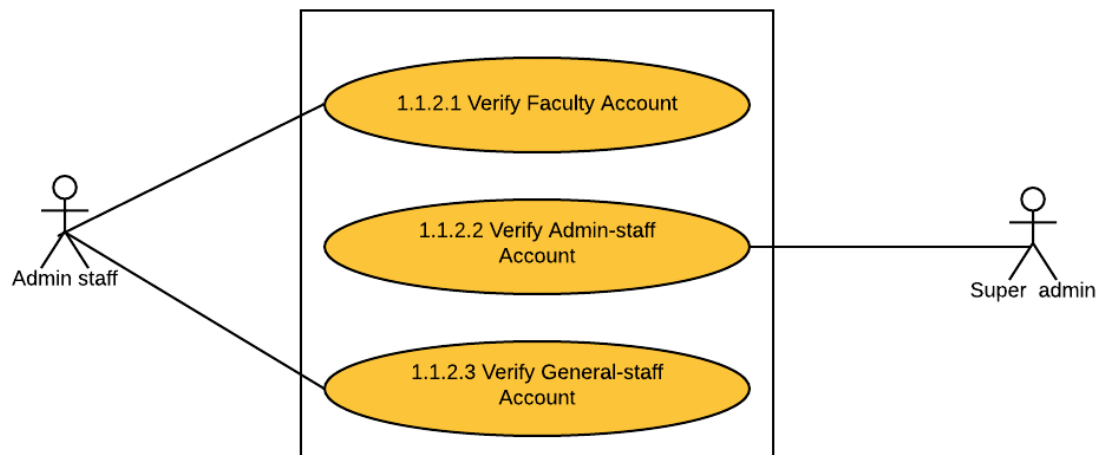
**Secondary actor:**



**Level :1.1.2**

**Primary actor:Admin staff,Super admin**

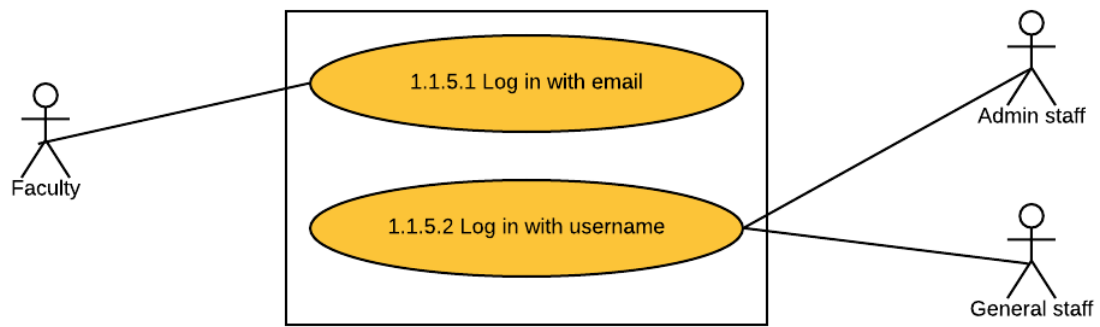
**Secondary actor:**



**Level :1.1.5**

**Primary actor:Faculty,Admin-staff,General staff**

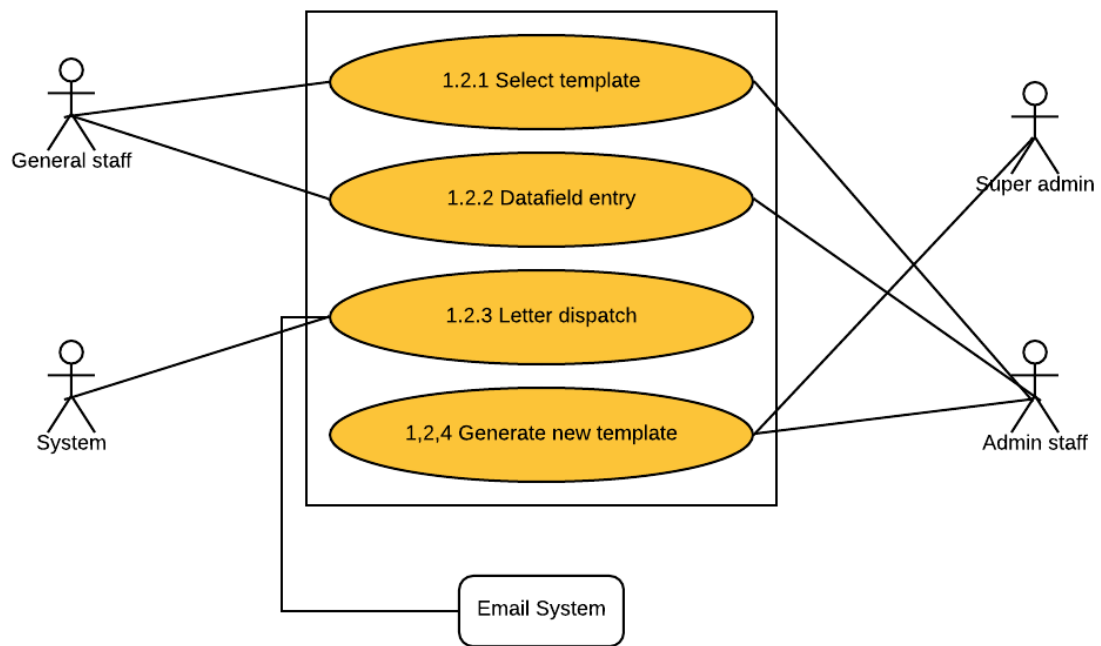
**Secondary actor:**



**Level :1.2**

**Primary actor:General staff,System,Super admin,Admin staff**

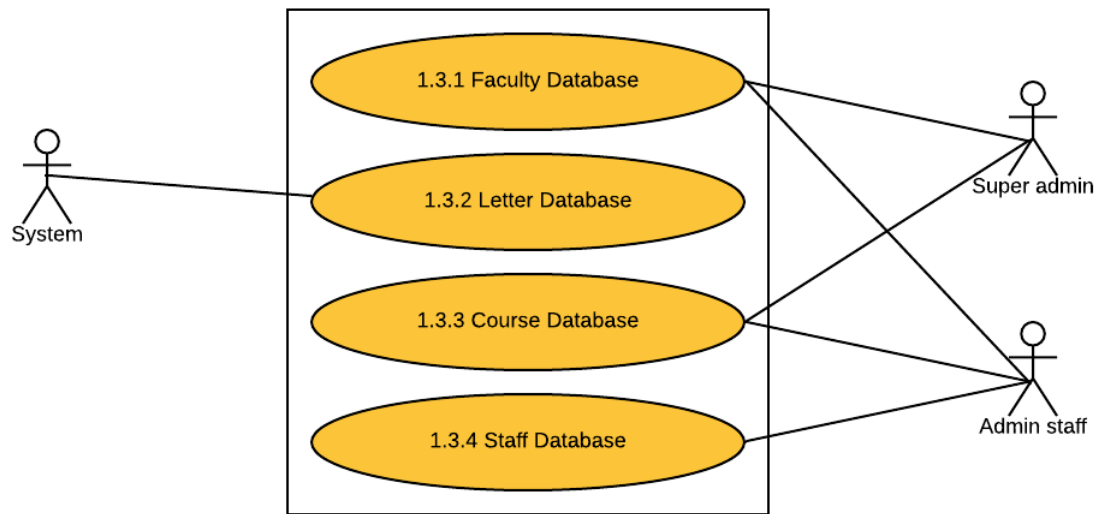
**Secondary actor:Email system**



**Level :1.3**

**Primary actor: System, Super admin, Admin staff**

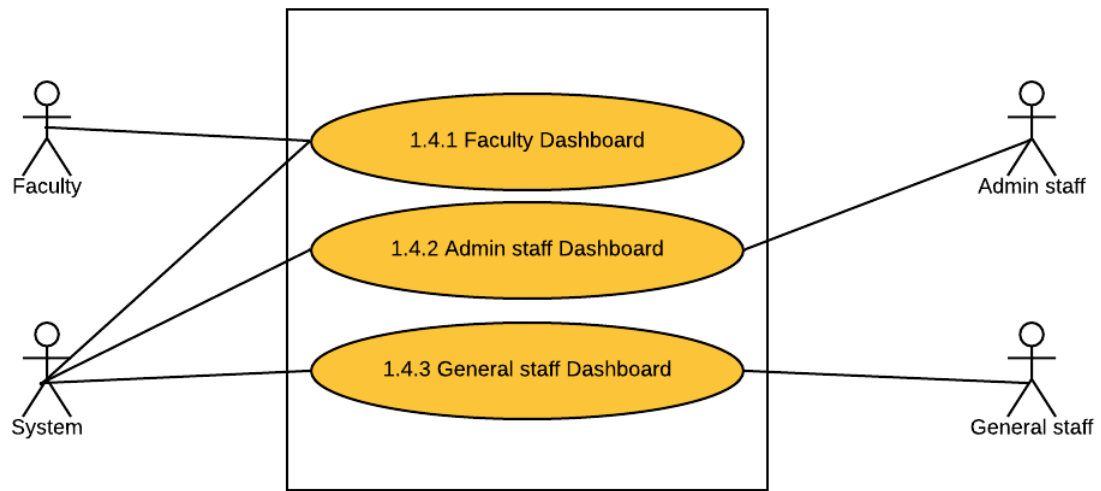
**Secondary actor:**



**Level :1.4**

**Primary actor:Faculty,System,Admin staff,General staff**

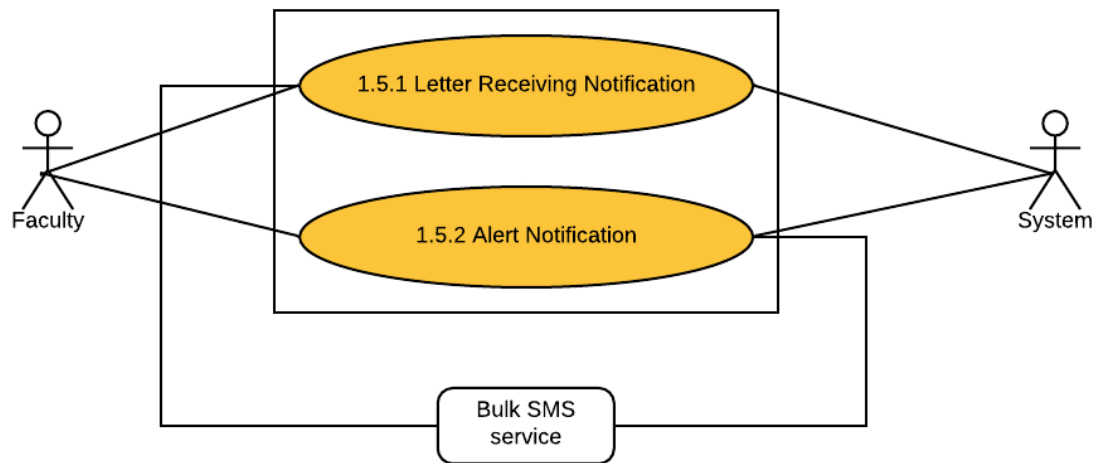
**Secondary actor:**



**Level :1.5**

**Primary actor:Faculty,System**

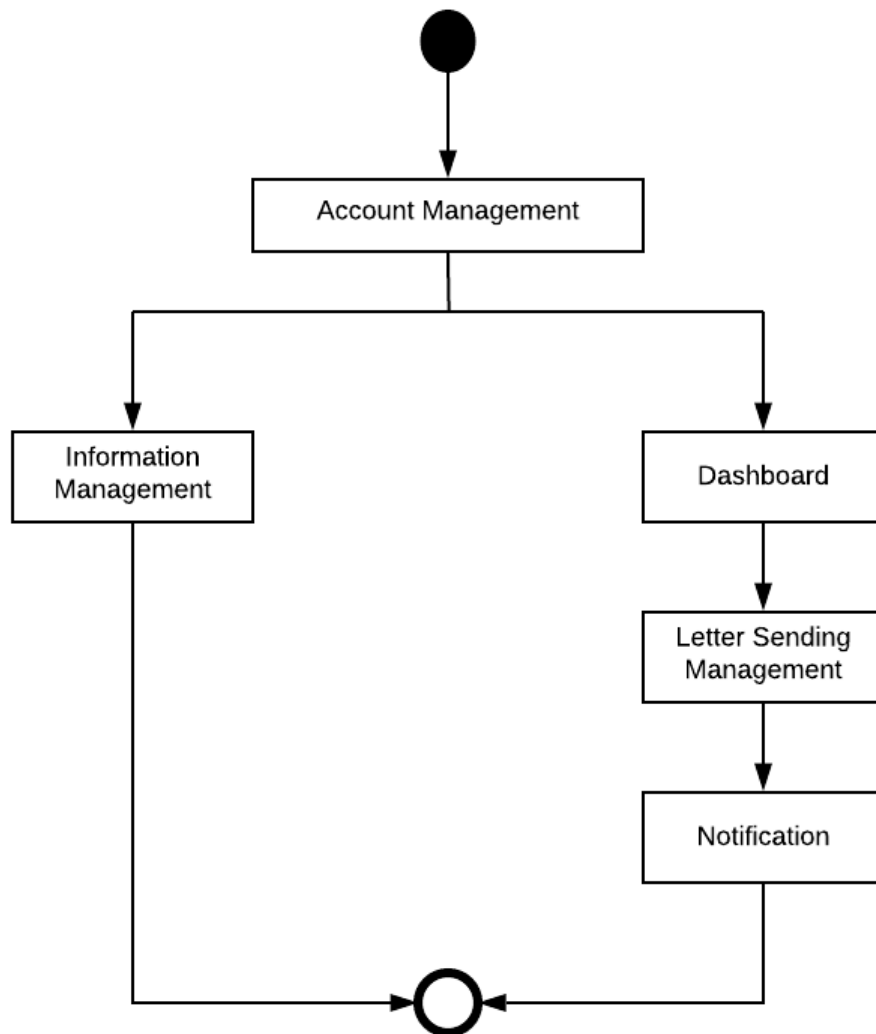
**Secondary actor:Bulk sms service**



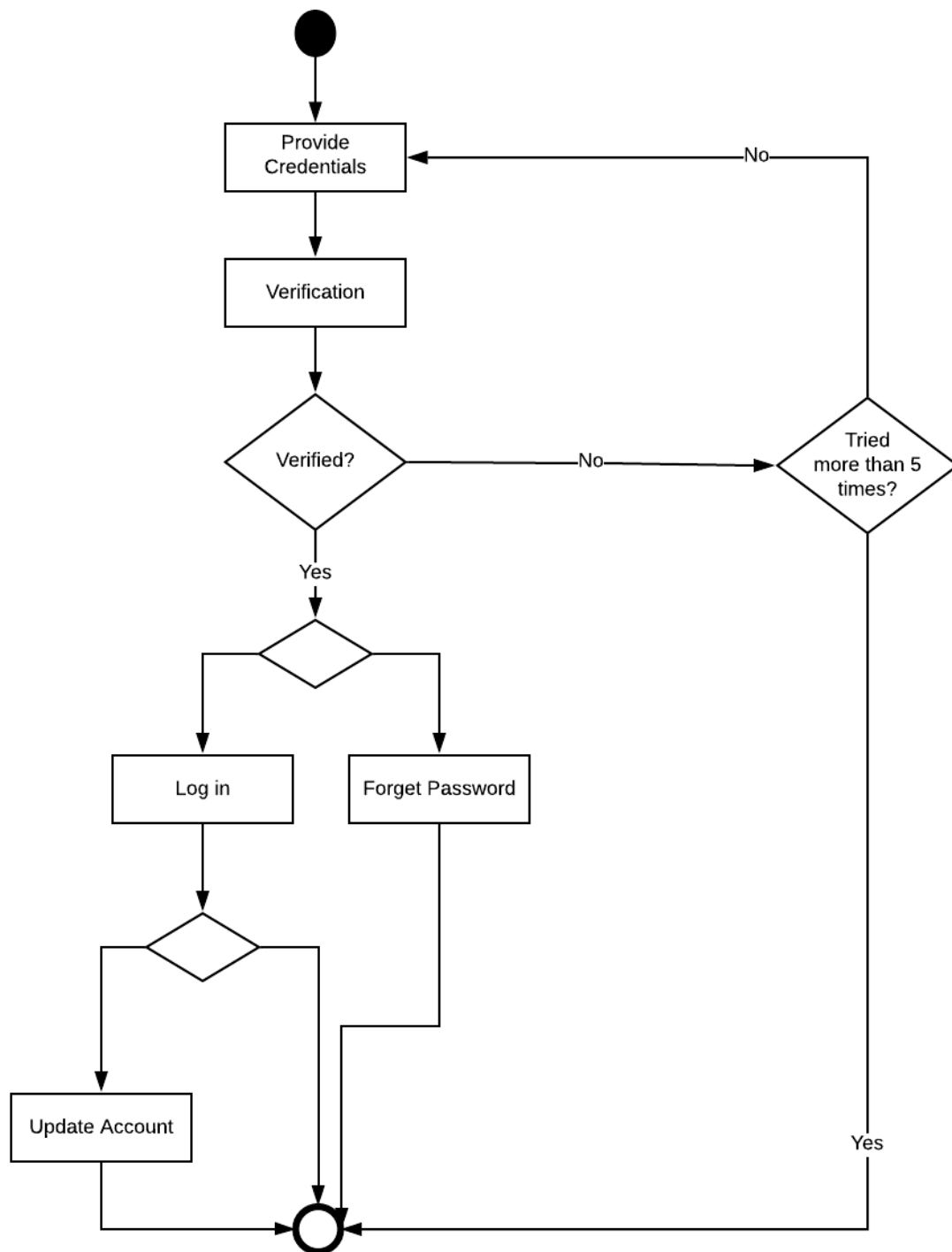
## Activity Diagram

### Definition of Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency.

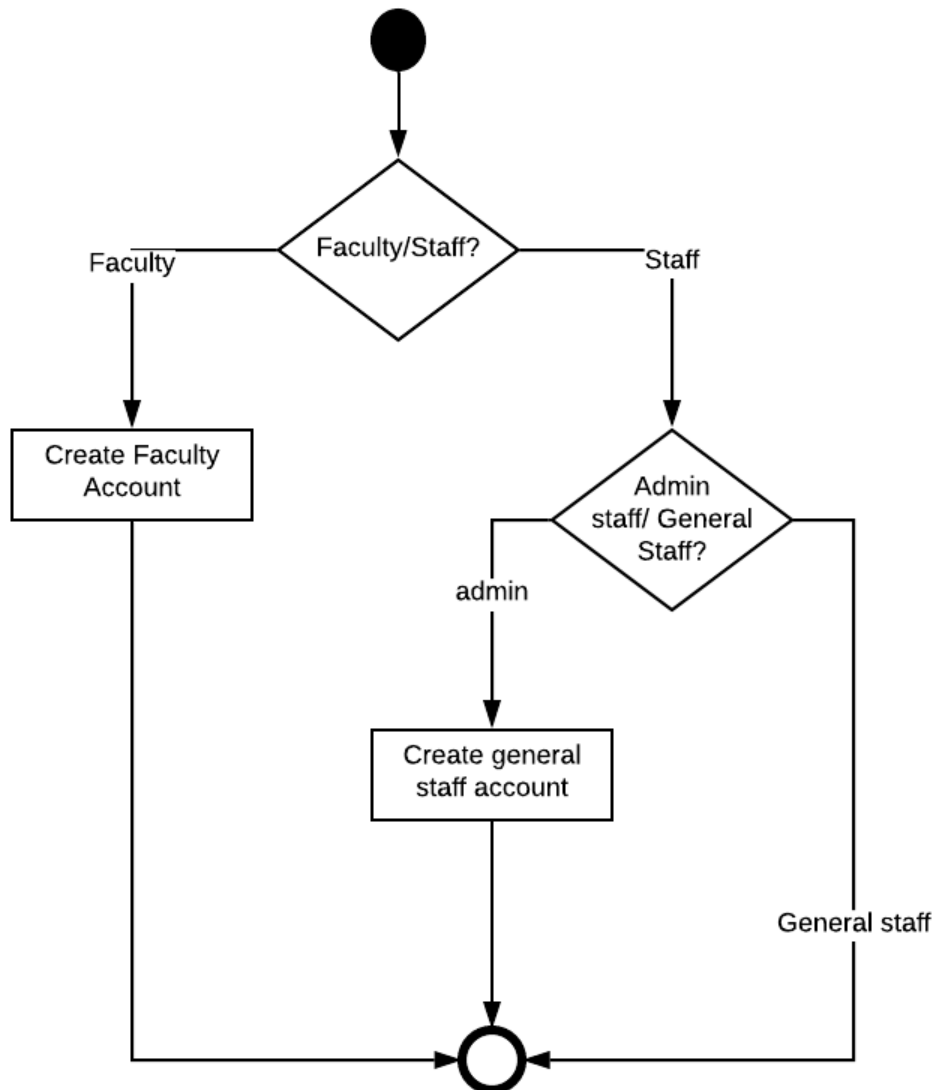


level 1



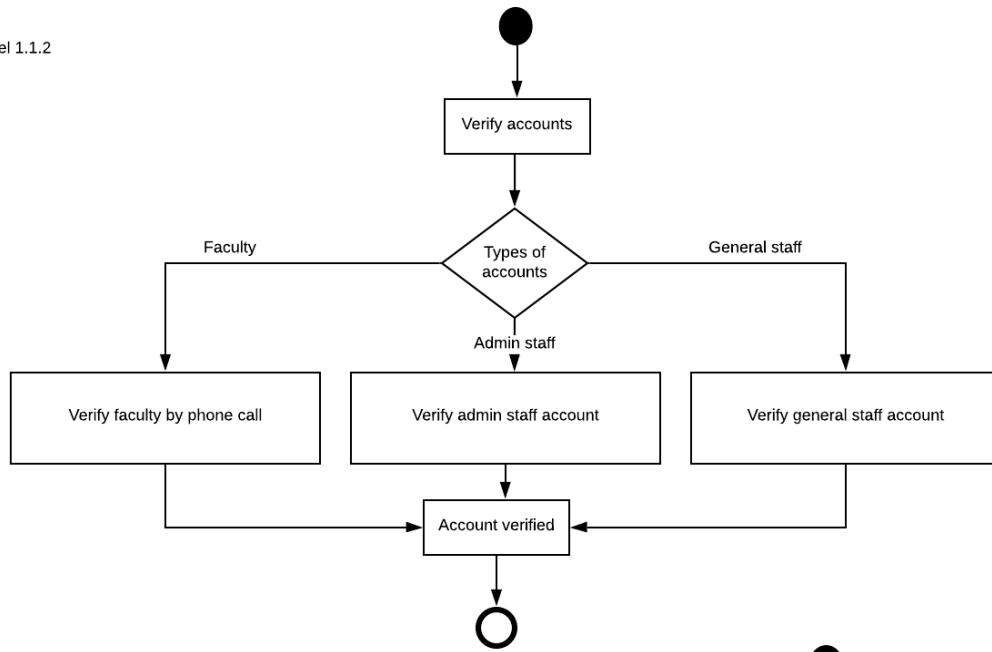
level 1.1





Level 1.1.1

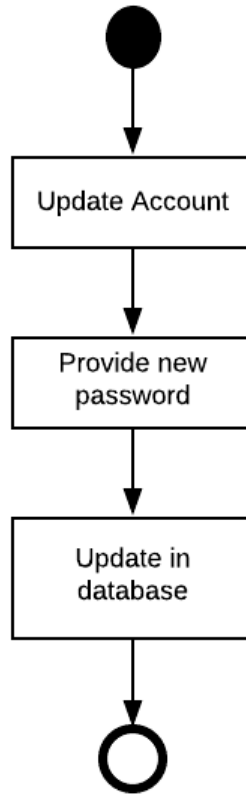
Level 1.1.2



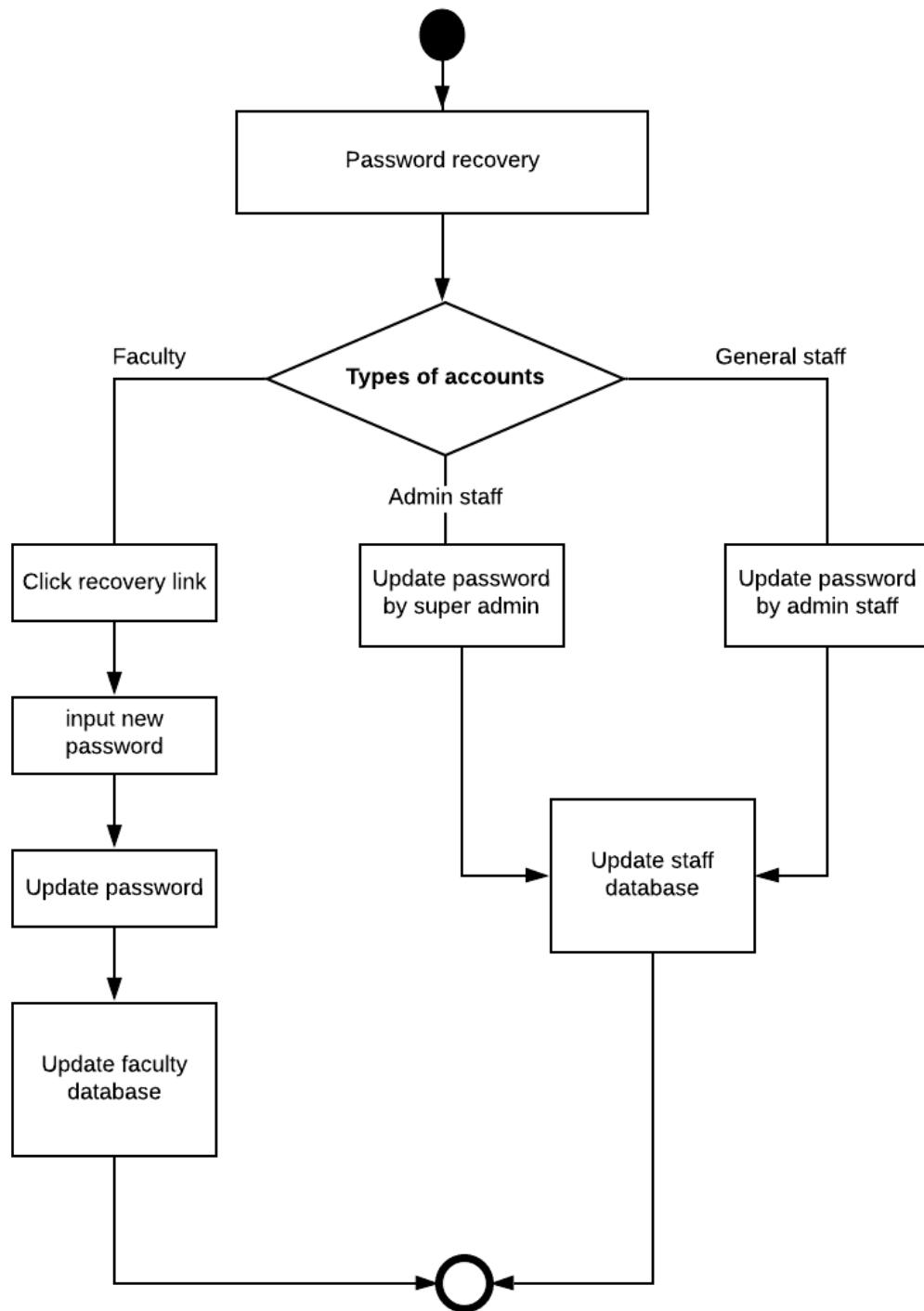
Level 1.1.2



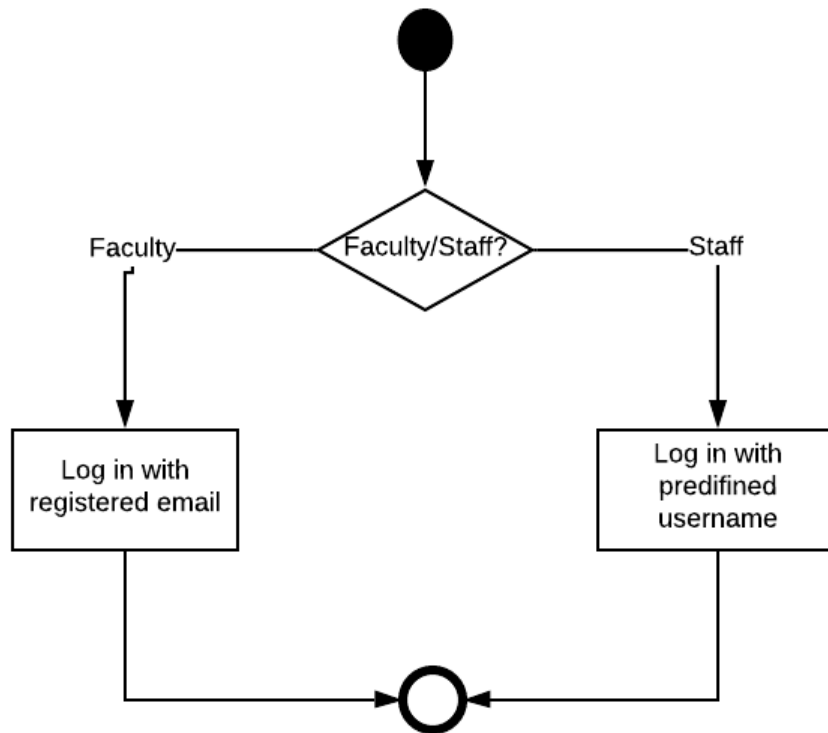
Level 1.1.3



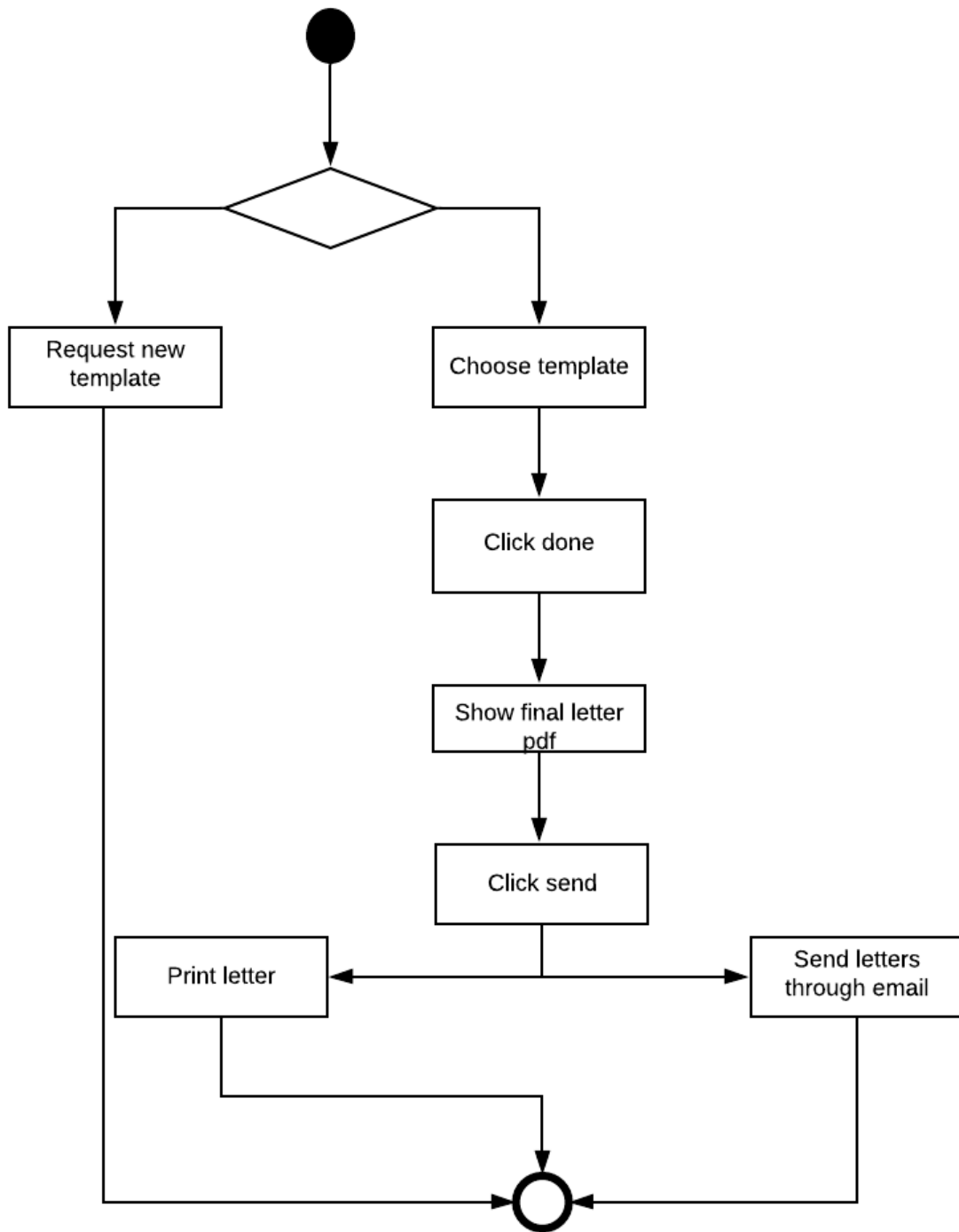
Level 1.1.3



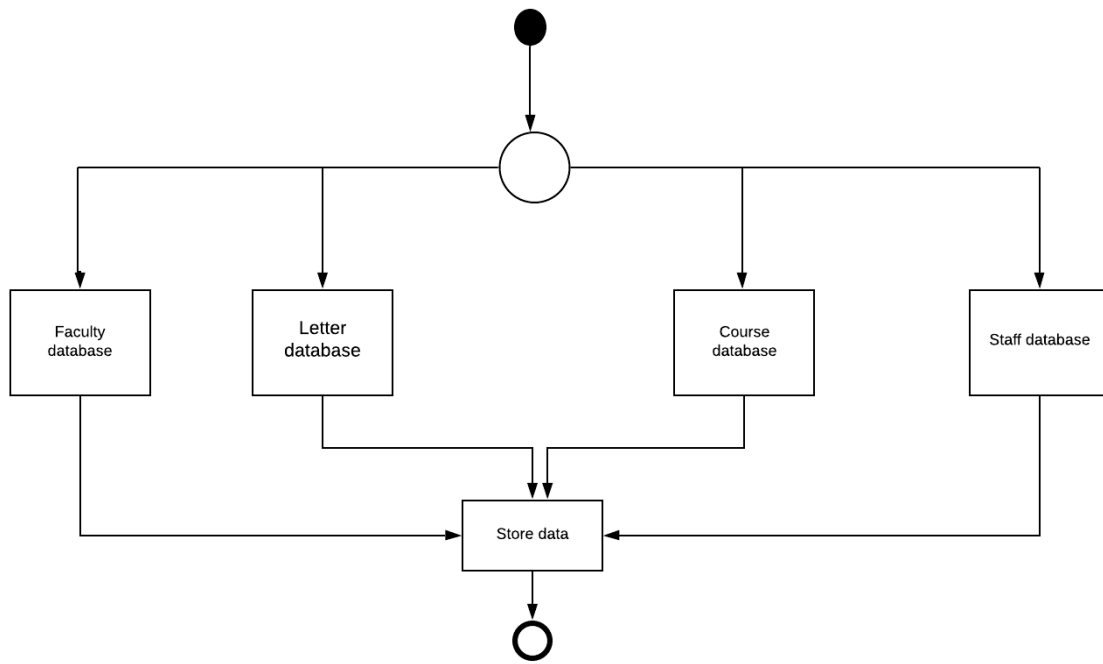
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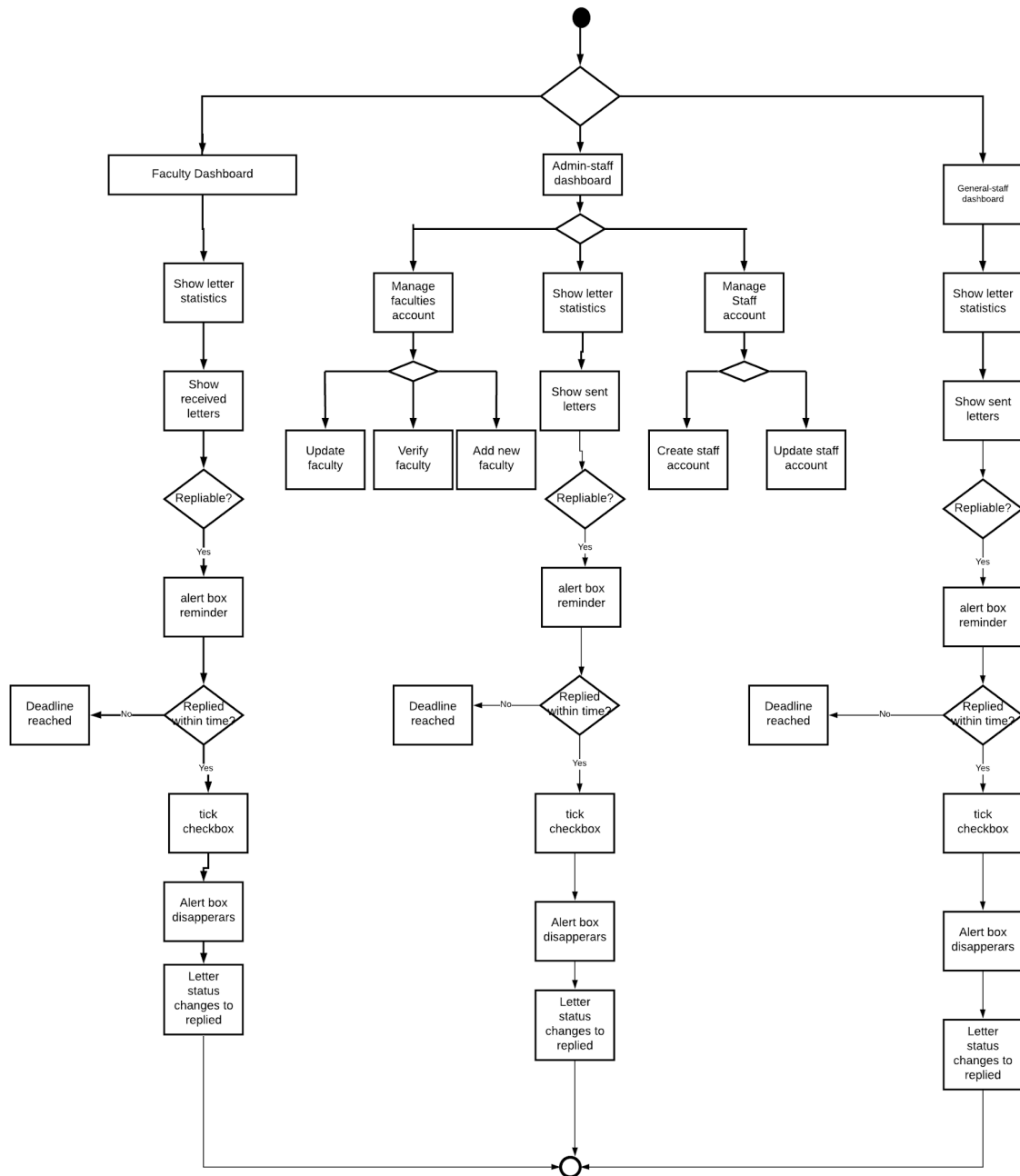
Level 1.1.5



Level 1.2

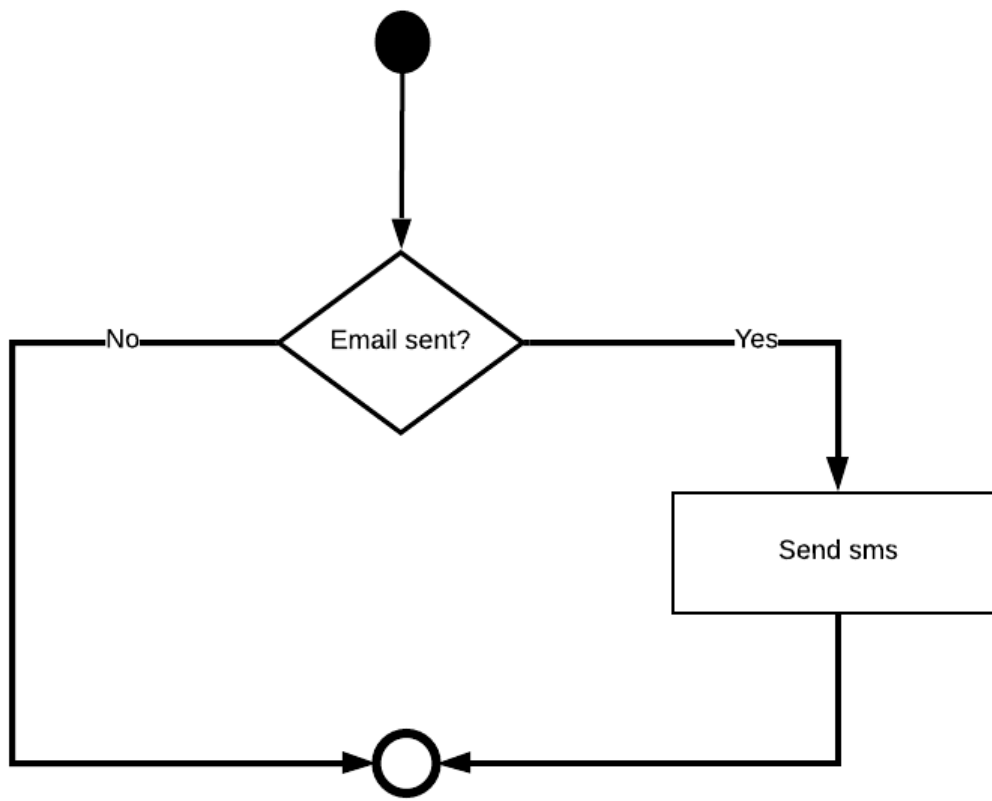


Level 1.3



Level 1.4





Level 1.5

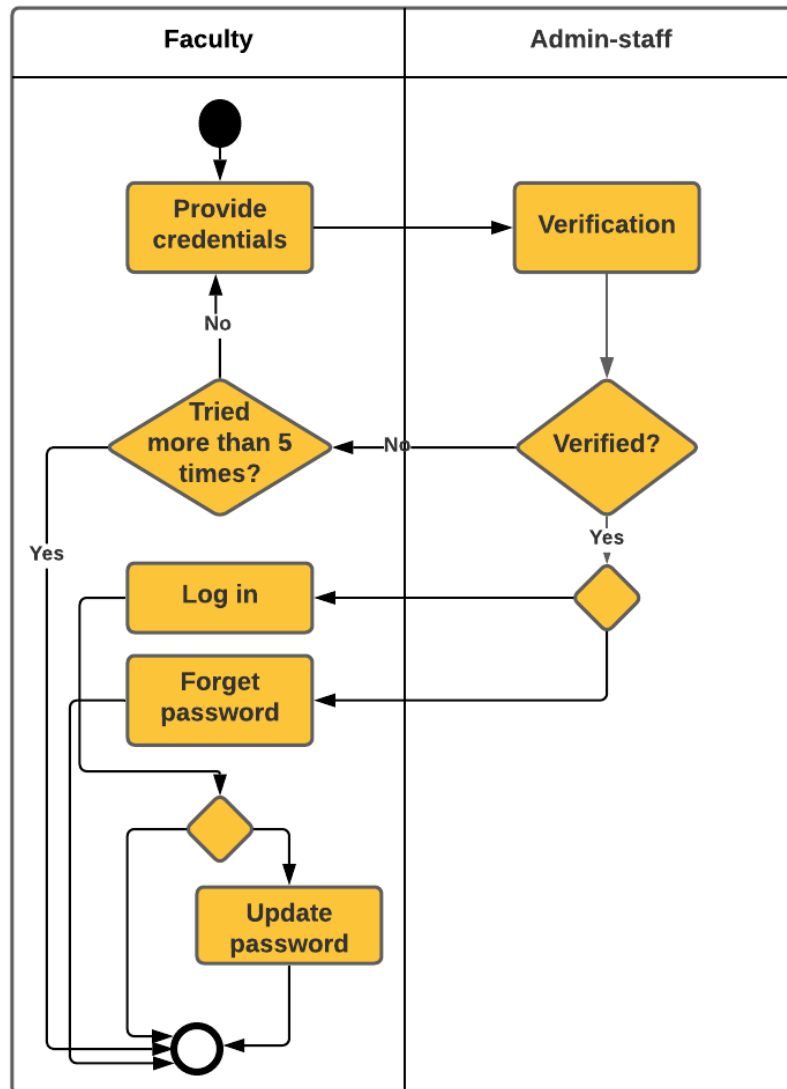
# Swimlane Diagram

## **Definition :**

A swimlane diagram is a type of flowchart that delineates who does what in a process. Using the metaphor of lanes in a pool, a swimlane diagram provides clarity and accountability by placing process steps within the horizontal or vertical “swimlanes” of a particular employee, work group or department. It shows connections, communication and handoffs between these lanes, and it can serve to highlight waste, redundancy and inefficiency in a process.

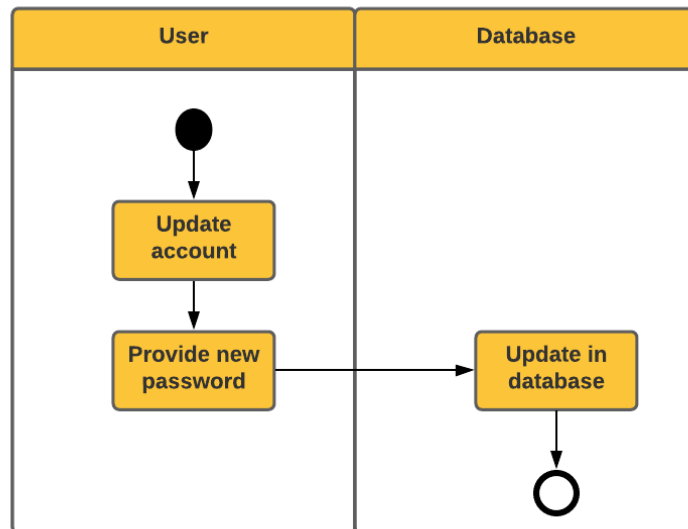
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Level 1.1



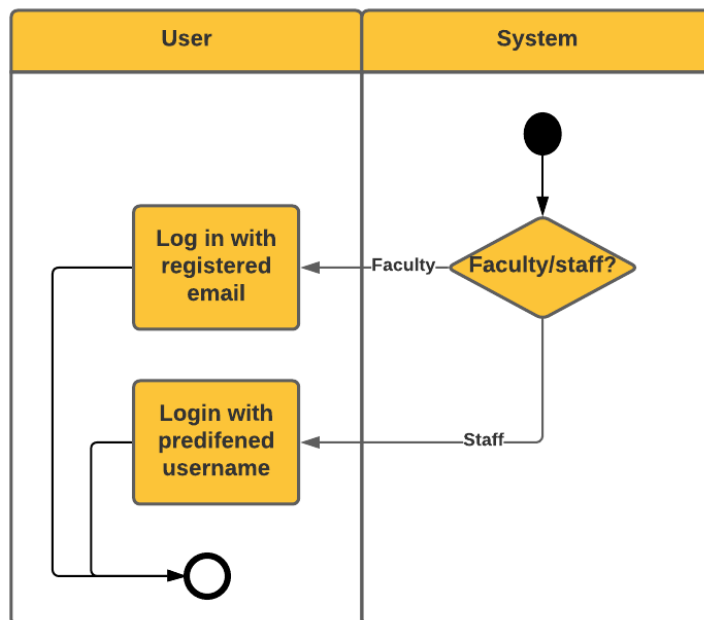
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Level 1.1.3

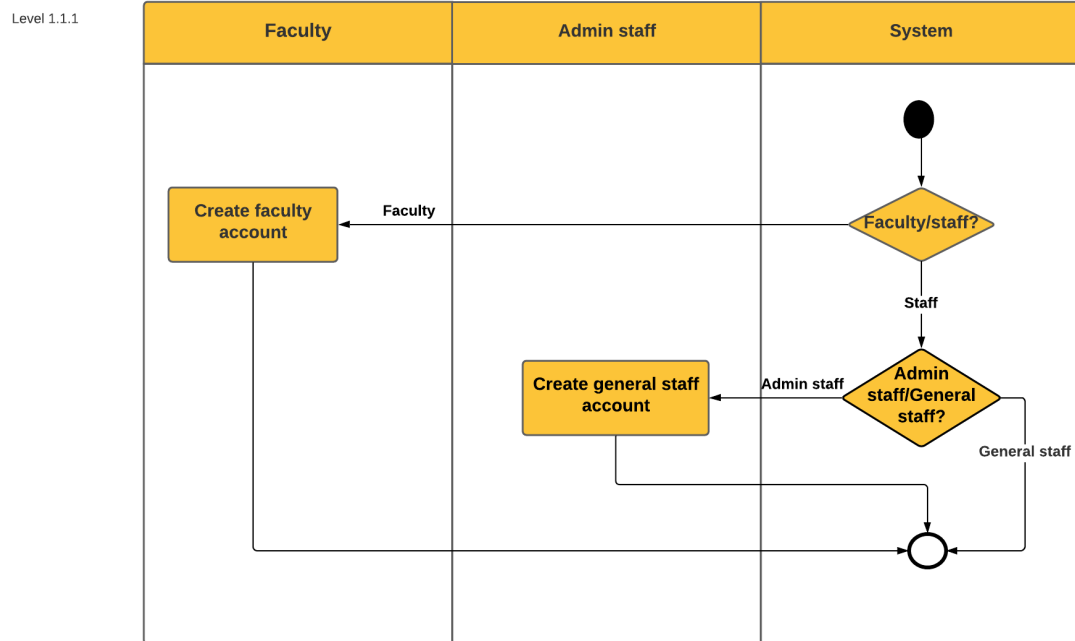


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Level 1.1.5

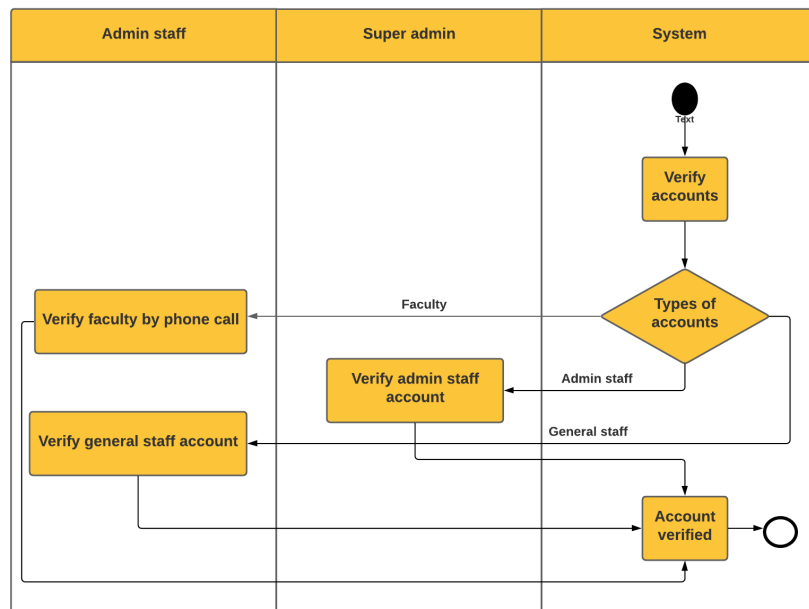


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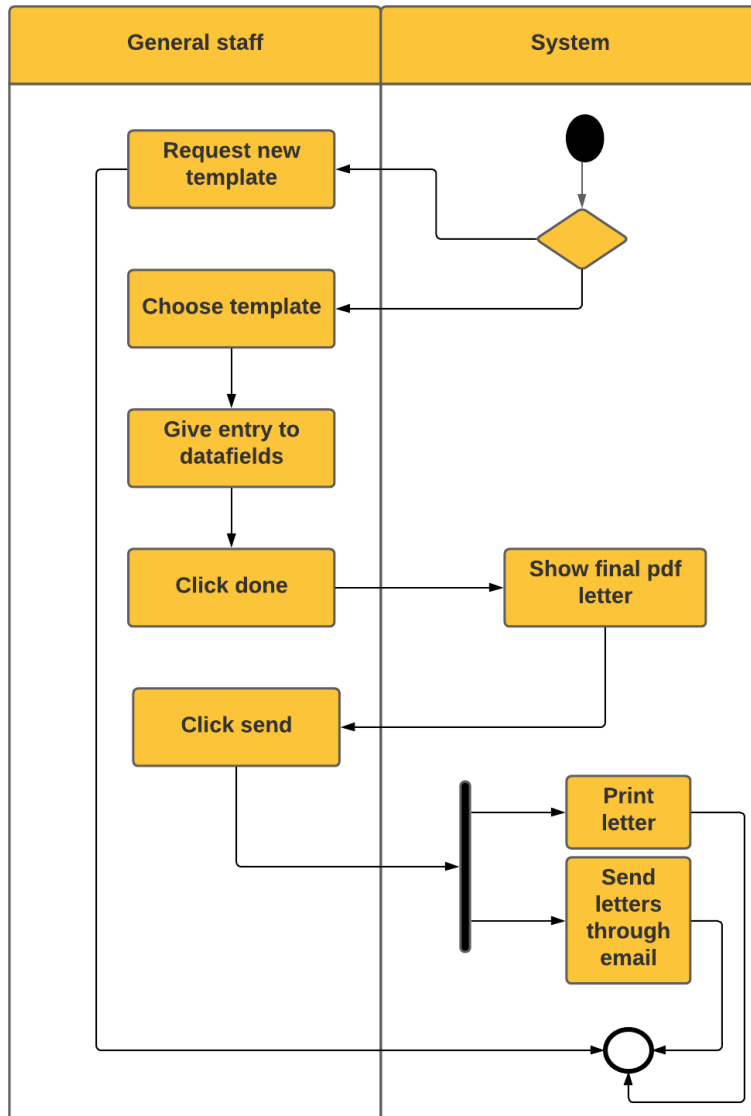
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level 1.1.2



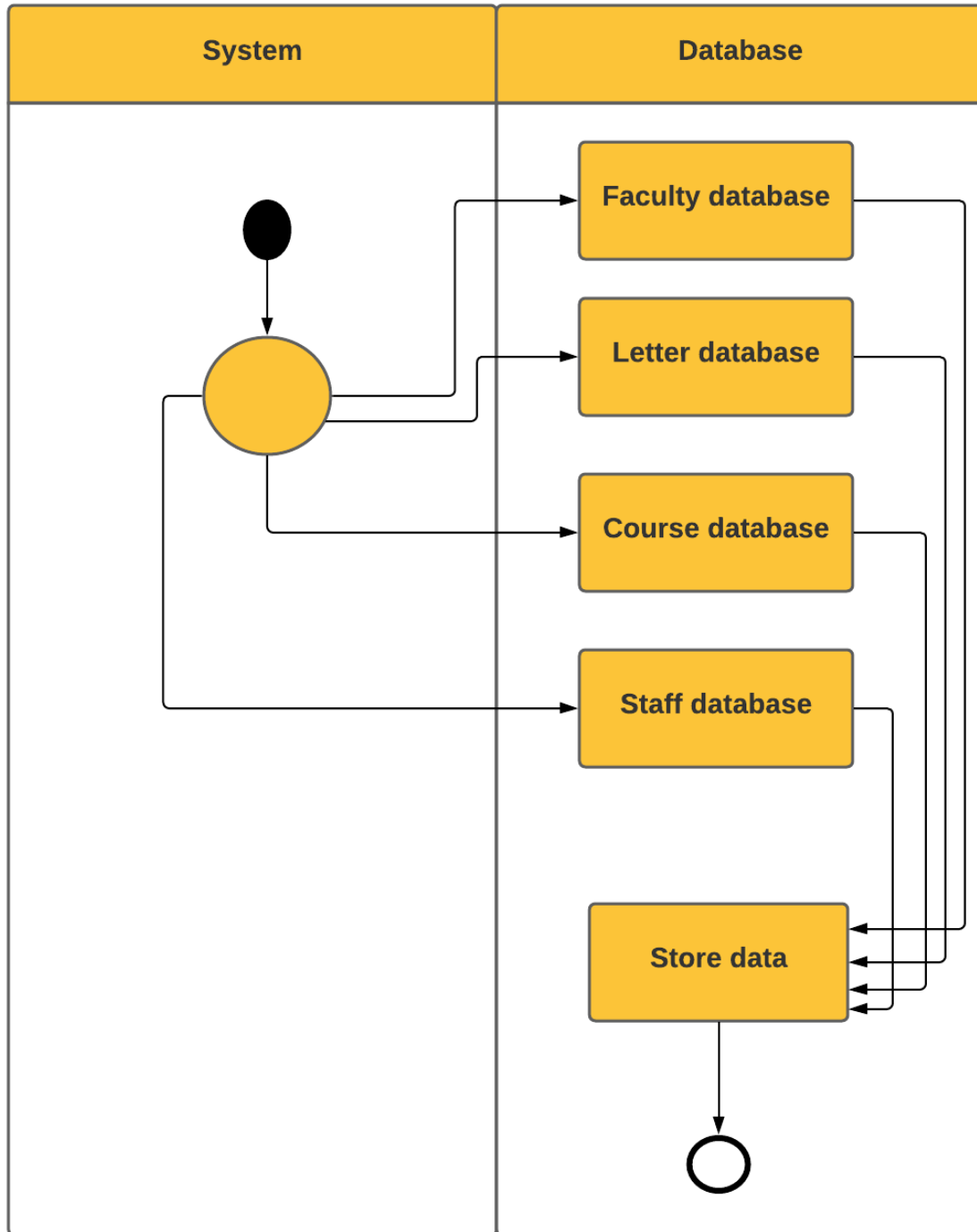
## SID(Swimlane ID): 1.2

level 1.2

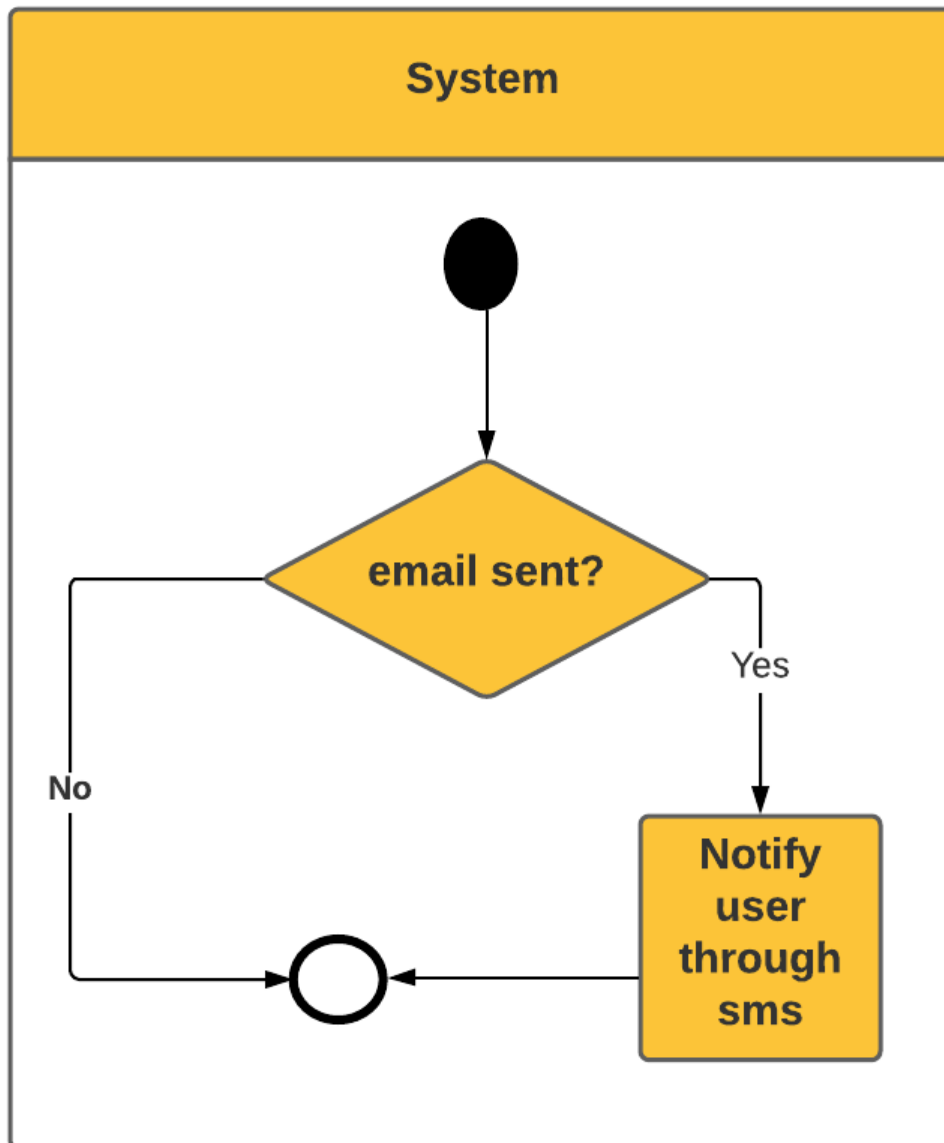




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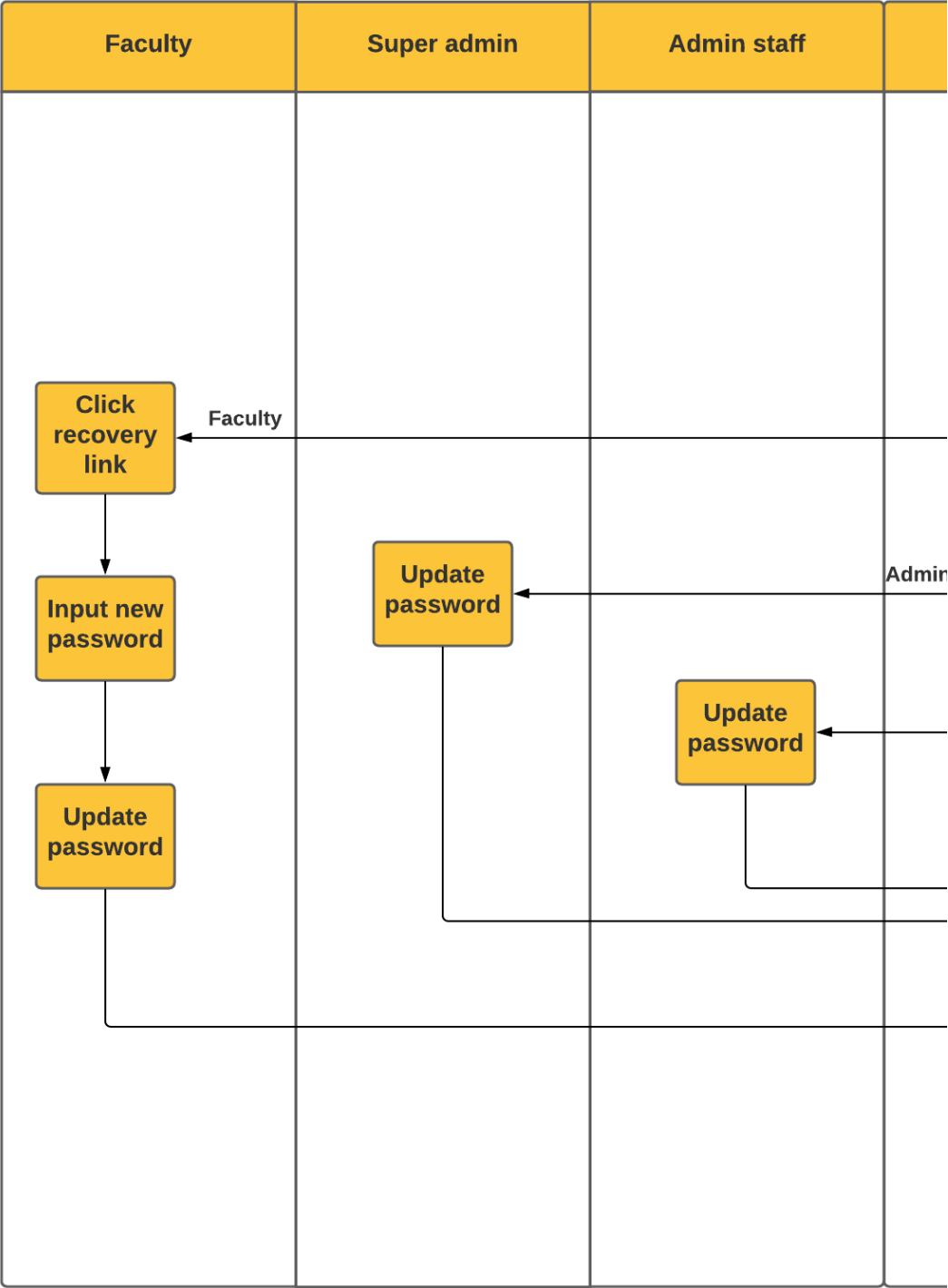


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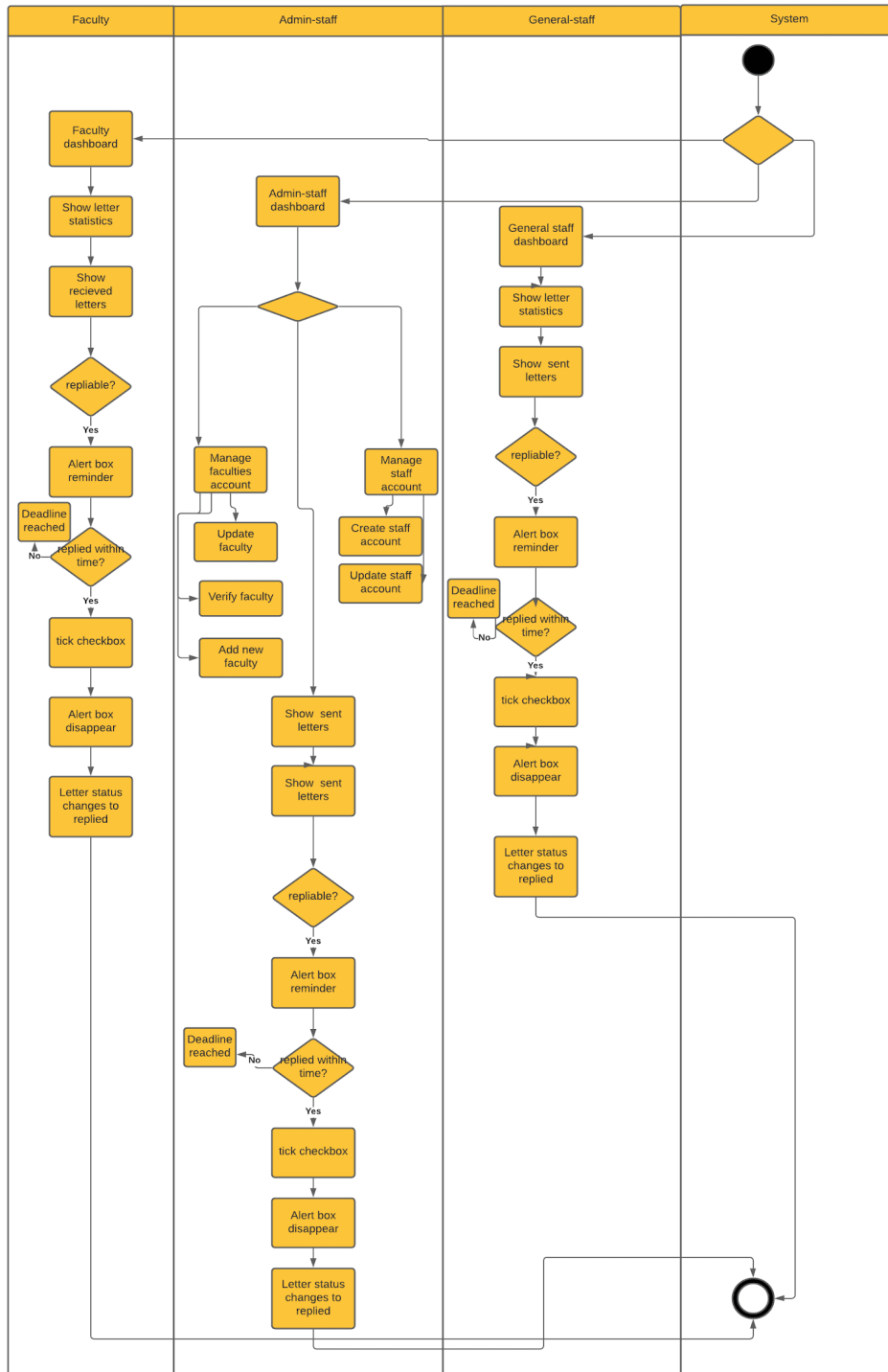


SID(Swimlane ID): 1.1.4

level1.1.4



## SID(Swimlane ID): 1.4



## **Data-based Modeling:**

### **DATA MODELING CONCEPT :**

If software requirements include the necessity to create, extend or interact with a database or complex data structures need to be constructed and manipulated, then the software team chooses to create data models as part of overall requirements modeling. The entity-relationship diagram (ERD) defines all data objects that are processed within the system, the relationships between the data objects and the information about how the data objects are entered, stored, transformed and produced within the system.

### **DATA OBJECTS :**

A data object is a representation of composite information that must be understood by the software. Here, composite information means information that has a number of different properties or attributes. A data object can be an external entity, a thing, an occurrence, a role, an organizational unit, a place or a structure.

## **Identifying Data Objects:**

<b>Serial</b>	<b>Noun(s)</b>	<b>Problem Space(p)/Solution Space(s)</b>	<b>Attribute</b>

1	Postal Automation System (PAS)	p	
2	automated system	p	
3	Letter-Delivery Department	p	
4	Registrar Building	p	
5	University Of Dhaka	p	
6	purpose	p	
7	department	p	
8	letters	s	47,48,49,50

9	teachers	p	
10	Responsibilities	p	
11	Question Setter	p	
12	Script Setter	p	
13	Exam Question Coordination	p	
14	Member of Exam Committees	p	
15	Result Finalization	p	
16	Marks Distribution	p	

17	Brochures	p	
18	Curriculum	p	
19	Demo Questions	p	
20	process	p	
21	Account Management	p	
22	Account	s	25-30,32
23	Faculty	s	26,27,29,44,45
24	Information	p	
25	Full Name	s	
26	Mobile Number	s	



27	Email Address	s	
28	Teacher ID	s	
29	Department / Institution Name	s	
30	Password	s	
31	Admin-Staff	s	57,58,59
32	Username	s	
33	General staff	s	57,58,59
34	verification	s	
35	Phone call	p	

36	Super-Admin	s	
37	Admin-staff account	s	30,32
38	Password recovery	p	
39	Recovery link	p	
40	Recover Password	p	
41	database	p	
42	Information Management	p	
43	Faculty Database	p	
44	Faculty Name	s	
45	Designation	s	
46	Letter Database	s	
47	Reference Number	s	

48	Sending Date	s	
49	Letter's Subject	s	
50	Letter's Body	s	
51	Course Database	s	52,53,54
52	Course Name	s	
53	Course Code	s	
54	Course Syllabus Link	s	
55	records	p	

56	Staff database	s	25,30,32,35
57	Staff name	s	
58	Staff Designation	s	
59	Staff phone number	s	
60	Dashboard	s	47,48,50,68,70,71, 72
61	Faculty dashboard	s	48,68
62	Admin Staff dashboard	s	47,48,50,68,70,71, 72
63	General Staff dashboard	s	47,48,50,68,70,71, 72
64	Green alert box	p	
65	Pop up message	p	
66	red	p	
67	deadline	p	
68	Checkbox	s	

69	Change Password	p	
70	Name of the recipient	s	
71	Search by Reference Number	s	
72	Search by Faculty name	s	
73	“Create Staff Account” button	p	
74	“Reset Staff Account” button	p	
75	“Update Faculty List” button	p	
76	“Verify Faculty” button	p	

77	Search Bar	p	
78	Faculty account	s	25,26,27,28,29,30
79	General staff account	s	30,32
80	Faculty database	s	25,26,27,28,29,30

#### Potential data objects:

- Letters - 47,48,49,50
- Account - 25-30,32
- Faculty - 26,27,29,44,45
- Admin-Staff - 57,58,59
- General staff - 57,58,59
- Admin-staff account - 30,32
- Dashboard - 47,48,50,68,70,71,72
- Faculty dashboard - 48,68
- Admin Staff dashboard - 47,48,50,68,70,71,72

- General Staff dashboard - 47,48,50,68,70,71,72
- Faculty account - 25,26,27,28,29,30
- General staff account - 30,32
- Faculty database-25,26,27,28,29,30
- Staff database-25,30,32,35

### **Analysis for finalizing data objects:**

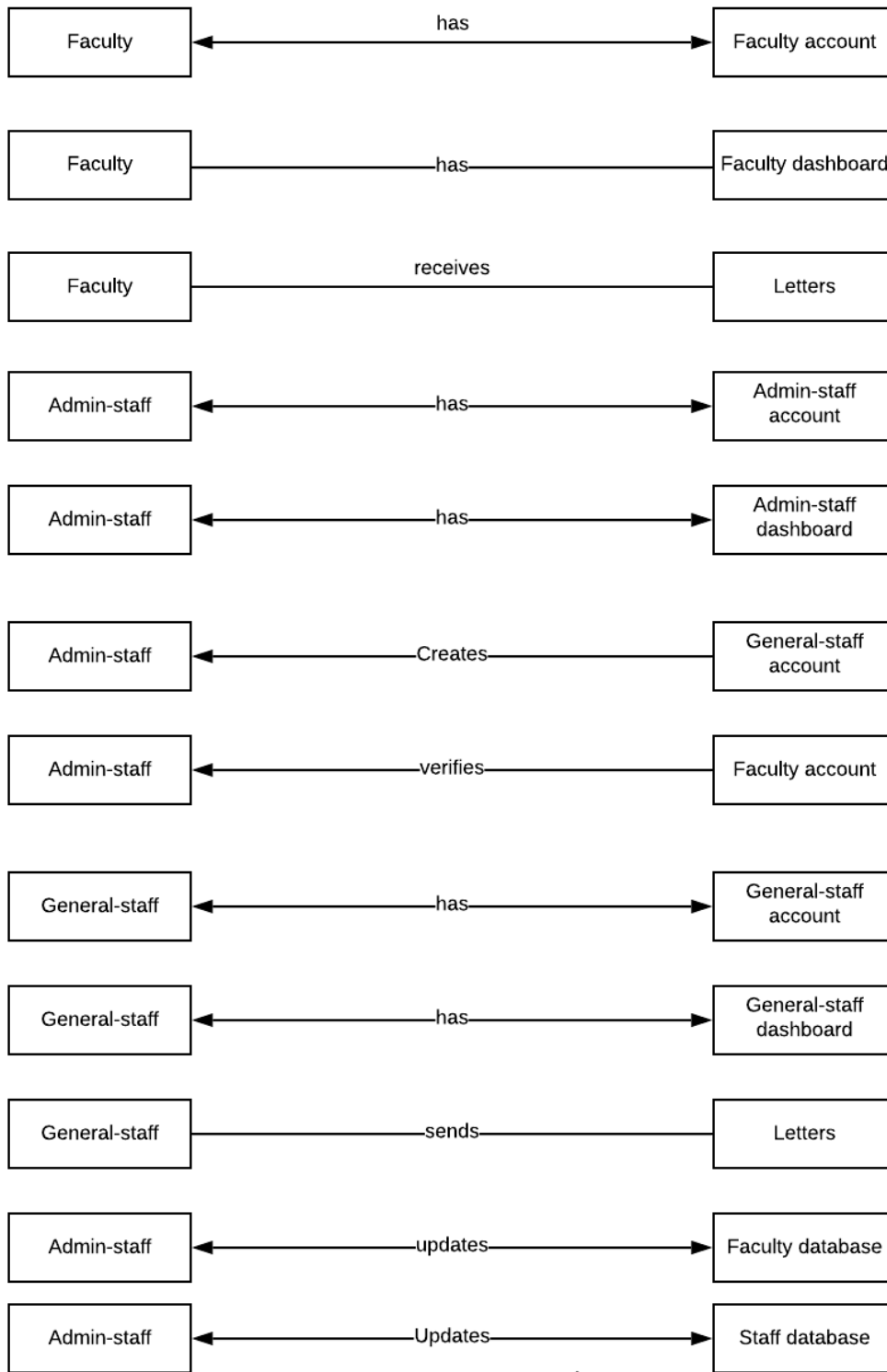
### **Final data objects:**

- Letters - 47,48,49,50
- Faculty - 26,27,29,44,45
- Admin-Staff - 57,58,59
- General staff - 57,58,59
- Faculty account - 25,26,27,28,29,30
- Admin-staff account - 30,32
- General staff account - 30,32
- Faculty dashboard - 48,68
- Admin Staff dashboard - 47,48,50,68,70,71,72
- General Staff dashboard - 47,48,50,68,70,71,72
- Faculty database-25,26,27,28,29,30

- Staff database-25,30,32,35



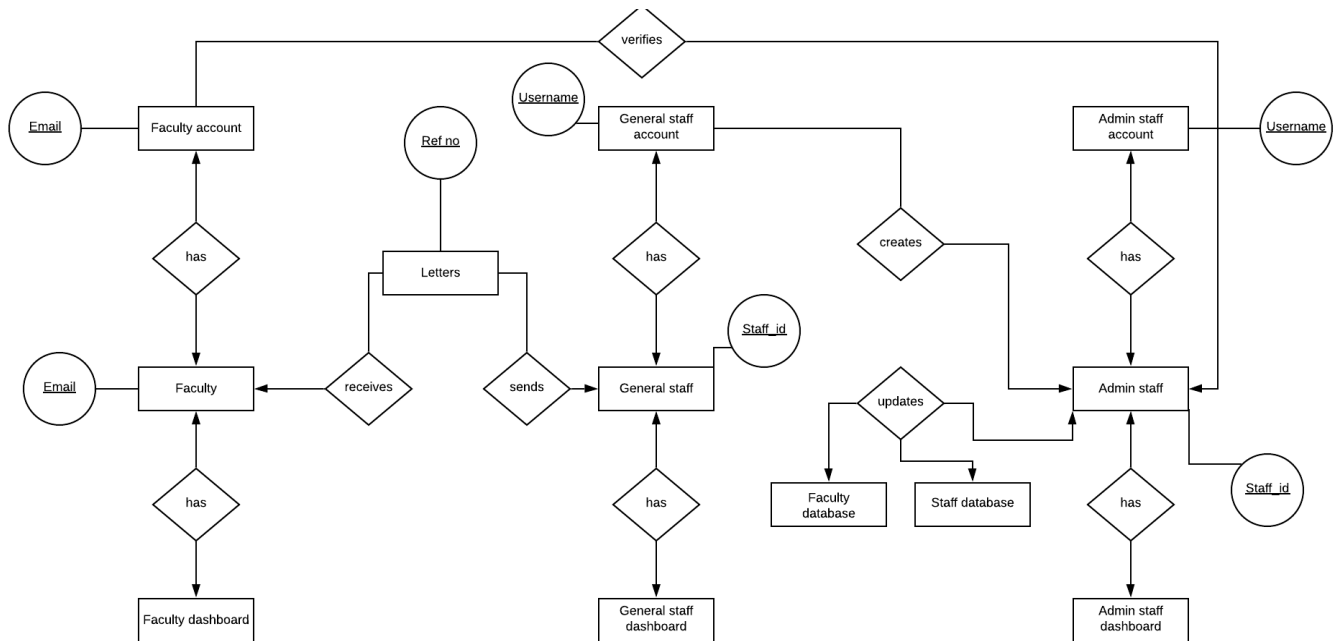
## Data Object Relationship:



# ER Diagram:

## Definition of ER Diagram

An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how “entities” such as people, objects or concepts relate to each other within a system.



### Schema Diagram:

Data object	Attribute	Type	Size
Letters	- <u>Reference Number</u>	Varchar	50
	-Sending Date	Varchar	50
	-Letter's Subject	Varchar	50
	-Letter's Body	Varchar	50
Faculty	-Faculty Name	Varchar	50
	-Designation	Varchar	50
	-Department / Institution Name	Varchar	50
	-Mobile Number	Varchar	50
	- <u>Email address</u>	Varchar	50

Admin-staff	<u>-Staff ID</u> -Staff name -Staff Designation -Staff phone number	Varchar Varchar Varchar	50 50 50
General-staff	<u>-Staff ID</u> -Staff name -Staff Designation -Staff phone number	Varchar Varchar Varchar	50 50 50
Faculty account	-Full Name -Department / Institution Name -Teacher ID -Mobile Number <u>-Email address</u> -Password	Varchar Varchar Varchar Varchar Varchar Varchar	50 50 50 50 50 50
Admin staff	<u>-Username</u>	Varchar	50

account	-Password	Varchar	50
General staff account	<u>-Username</u> -Password	Varchar Varchar	50 50
Faculty dashboard	-Sending Date -Checkbox	Date Boolean	
Admin-staff dashboard	-Reference Number -Sending Date -Letter's Body -Checkbox -Name of the recipient -Search by Reference Number -Search by Faculty name	Varchar Date Varchar Boolean Varchar Varchar Varchar	50  50  50 50 50
Faculty database	Full Name -Department / Institution Name	Varchar Varchar	50 50 50

	-Teacher ID	Varchar	
	-Mobile Number	Varchar	50
	<u>-Email address</u>	Varchar	50
	-Password	Varchar	
Staff database	<u>-Username</u>	Varchar	50
	-Password	Varchar	50
	_Full name	Varchar	50
	_Mobile Number	Varchar	50
General-staff account	-Reference Number	Varchar	50
	-Sending Date	Date	
	-Letter's Body	Varchar	50
	-Checkbox	Boolean	
	-Name of the recipient	Varchar	50
	-Search by Reference Number	Varchar	50
	-Search by Faculty name	Varchar	50

## CLASS-BASED MODELING

Noun list(Solution Space only)

No	Noun	No	Noun
1.	Letters	22.	Letter's subject
2.	Account	23.	Letter's body
3.	Faculty	24.	Course database
4.	Full name	25.	Course name

5.	Mobile number	26.	Course code
6.	Email	27.	Course syllabus
7.	Email address	28.	Staff name
8.	Teacher ID	29.	Staff designation
9.	Department / Institution Name	30.	Staff phone number
10.	Password	31.	Dashboard
11.	Admin-staff	32.	Faculty dashboard
12.	Username	33.	Admin staff dashboard
13.	General-staff	34.	General staff dashboard
14.	Verification	35.	Checkbox
15.	Super admin	36.	Name of the recipient
16.	Admin staff account	37.	Search by reference number
17.	Faculty name	38.	Search by faculty name



18.	Designation	39.	Faculty account
19.	Letter database	40.	General staff account
20.	Reference Number	41.	Faculty database
21.	Sending date	42.	Staff database

Verb list:

No	Verb	No	Verb
1.	Send(letter)	16.	Report(to staff admin)
2.	Automate(letter sending process)	17.	Log in(to system)
3.	Create(account)	18.	Maintain(database)
4.	Enter(System)	19.	Remind(faculty)
5.	Need(to give)	20.	Turn(red)

	information)		
6.	Give entry(information)	21.	Notify(system)
7.	Provide(information)	22.	Tick(checkbox)
8.	Verify(provided credentials)	23.	Disappear(alert box)
9.	Update(password)	24.	Change(password)
10.	Assign(Admin)	25.	Show(in dashboard)
11.	Forget(password)	26.	Search(by ref no)
12.	Recover(password)	27.	Search(by faculty name)
13.	Send(recovery link)	28.	Get view(reg faculties)
14.	Click(link)	29.	Contact(through phone)
15.	Input(new password)		

### General classification

Candidate classes were then characterized in seven general classifications.

The seven general characteristics are as follows:

1. **External entities:** Other systems, devices, people that produce or consume information to be used by a computer-based system
2. **Things** : Reports, displays, letters, signals that are a part of the information domain for the problem.
3. **Events** : Actions or transfers (a property transfer or the completion of a series of robot movements) that occur within the context of system operation.
4. **Roles** : Responsibilities played by the people who interact with the system.
5. **Organizational units:** Divisions, groups, teams that are relevant to an application.
6. **Places** : Platform that establishes the context of the problem and overall function of the system.
7. **Structures** : Something that defines a class of objects or related classes of objects.

Potential nouns to become a class after general classification criteria :

Noun	General Classification
Letters	2,7
Account	2,7
Faculty	4,5,7
Full name	2
Mobile number	2
Email	1,2
Email address	2
Teacher ID	2
Department / Institution Name	2
Password	2
Admin-staff	4,5,7
Username	2
General-staff	4,5,7

Verification	3
Super-admin	4
Admin-staff account	2,7
Faculty name	2
Designation	2
Letter database	2,7
Reference number	2
Sending date	2
Letter subject	2
Letter's body	2
Course database	2,7
Course name	2
Course code	2
Course syllabus	2
Staff name	2

Staff designation	2
Staff phone number	2
Dashboard	2,7
Faculty dashboard	2,7
Admin-staff dashboard	2,7
General-staff dashboard	2,7
Checkbox	2
Name of the recipient	2
Search by ref no	
Search bu faculty name	
Faculty account	2,7
General-staff account	2,7
Faculty database	2,7
Admin database	2,7

## Selection Criteria

Classes that fulfill at least 3 characteristics of general classification are again reconsidered by six Selection Criteria. The six characteristics for the selection criteria are:

1. **Retained information:** The potential class will be useful during analysis only if information about it must be remembered so that the system can function.
2. **Needed services:** The potential class must have a set of identifiable operations that can change the value of its attributes in some way.
3. **Multiple attributes:** During requirement analysis, the focus should be on “major” information; a class with a single attribute may, in fact, be useful during design, but is probably better represented as an attribute of another class during the analysis activity.
4. **Common attributes:** A set of attributes can be defined for the potential class and these attributes apply to all instances of the class.
5. **Common operations:** A set of operations can be defined for the potential class and these operations apply to all instances of the class.
6. **Essential requirements:** External entities that appear in the problem space and produce or consume information essential to the operation of any solution for the system will almost always be defined as classes in the requirements model.

Potential general classified nouns to become a class after selection criteria :

Noun	Selection criteria
Letters	1,2,3,4,5
Account	1,2,3,4,5,6
Faculty	1,2,3,4,5,6
Full name	
Mobile number	
Email	2,5,6
Email address	
Teacher ID	
Department / Institution Name	
Password	



Admin-staff	1,2,3,4,5,6
Username	
General-staff	1,2,3,4,5,6
Verification	6
Super-admin	
Admin-staff account	1,2,3,4,5,6
Faculty name	
Designation	
Letter database	1,2,3,4,5,6
Reference number	
Sending date	
Letter subject	
Letter's body	
Course database	1,2,3,4,5,6

Course name	
Course code	
Course syllabus	
Staff name	
Staff designation	
Staff phone number	
Dashboard	
Faculty dashboard	1,3,4,5
Admin-staff dashboard	1,3,4,5
General-staff dashboard	1,3,4,5
Checkbox	
Name of the recipient	
Search by ref no	
Search bu faculty name	

Faculty account	1,2,3,4,5,6
General-staff account	1,2,3,4,5,6
Faculty database	1,2,3,4,5,6
Admin database	1,2,3,4,5,6

### Attribute and Method Identification:

Class name	Attribute	Method
Letter	-reference_number -sending_date -letter's_subject -deadline -recipient_name -email_address	+send_letter() +print_letter() +generate_letterPdf()

Account	-eng_name -bang_name -department/institution_name -teacher_ID -mobile_number -email_address -password -username	+getEng_name() +setEng_name() +getBang_name() +setBang_name() +getMobile_number() +setMobile_number() +getEmail_address() +setEmail_address() +getTeacher/officer_id() +setTeacher/officer_id() +getDepartment_name() +setDepartment_name() +getPassword() +setPassword() +get_username() +set_username()
Faculty	-eng_name -bang_name -department institution_name -teacher_ID -mobile_number -email_address -password	+create_account() +recover_password() +update_password() +send_reply() +login() +log_out()

Admin-staff	-username -password	+create_staff_account() +update_password() +recover_staff_password() +update_staffInfo() +login() +add_faculty() +update_faculty() +log_out() +verify_faculty()
General-staff	-username -password -phone_number -staff_name	+forget_password() +update_info() +login() +choose_templates() +fill_template() +log_out
Bulk_sms	-sms_body	+send_sms()
Email		+send_email()

Letter info	-reference_number -sending_date -letter's_subject -deadline -recipient_name -email_address	+store_letterInfo() +store_pdfLink()
Faculty info	-faculty_name -designation -department /institution _name -mobile_number -email_address	+store_facultyInfo()_
Staff info	-staff_name -staff_designation -staff_phone_number -staff_ID	+store_staffInfo()
Faculty dashboard	-sending_date -checkbox -reference_number	+show_letters() +show_letter_statistics() +show_letter_status()

	-deadline -letter's_body	+show_alerts()
Admin-staff dashboard	-reference_number -sending_date -letter's_body -checkbox -name_of_the_recipient -search_by_reference_number -search_by_faculty_name	+show_signedup_faculties() +show_staffs() +show_letters() +show_letter_statistics() +show_letter_status() +show_alerts()
General-staff dashboard	-reference_number -sending_date -letter's_body -checkbox -name_of_the_recipient -search_by_reference_number -search_by_faculty_name	+show_letters() +show_letter_statistics() +show_letter_status() +show_letter_templates() ) +show_alerts()

**Analysis:**

Admin staff,faculty,general staff will inherit account class.

PAS class will be included which will conduct automated works.Such as-  
sending recovery mail, storing sessions & cookies, storing recovery token.

So, our final class list is given below:-

- Letter
- Account
- Faculty
- Admin staff
- General staff
- Bulk\_sms
- Email
- Letter info
- Faculty info
- Staff info
- Faculty dashboard



- Admin staff dashboard
- General staff dashboard
- PAS

### Class Cards:

**Table: Class Card for Letter Class**

Letter	
Attribute	Method
-reference_number -sending_date -letter's_subject -deadline -recipient_name -email_address	+send_letter() +print_letter() +generate_letterPdf()
Responsibilities	Collaborator

<ul style="list-style-type: none"> <li>• Sending letter</li> <li>• Printing letter</li> <li>• Generating letter pdf</li> </ul>	Email Bulk sms General Staff Letter info
--	---

**Table: Class Card for Account Class**

Account	
Attribute	Method
-eng_name	+getEng_name() +setEng_name()
-bang_name	+getBang_name() +setBang_name()
-department/institution_name	+getMobile_number() +setMobile_number()
-teacher_ID	+getEmail_address() +setEmail_address()
-mobile_number	+getTeacher/officer_id() +setTeacher/officer_id()
-email_address	+getDepartment_name() +setDepartment_name()
-password	+getPassword() +setPassword()
-username	+get_username() +set_username()

Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Creating account</li> <li>• Updating profile</li> </ul>	Faculty Admin Staff General Staff

**Table: Class Card for Faculty Class**

Faculty	
Attribute	Method
-eng_name -bang_name -department institution_name -teacher_ID -mobile_number -email_address -password	+create_account() +recover_password() +update_password() +send_reply() +login() +log_out()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Creating account</li> </ul>	Account

<ul style="list-style-type: none"> <li>● Recovering password</li> <li>● Updating password</li> <li>● Sending reply</li> <li>● Logging into account</li> <li>● Logging out from account.</li> </ul>	PAS Faculty dashboard Admin Staff Dashboard General Staff Dashboard Faculty info
--	--

**Table: Class Card for Admin-staff Class**

Admin-staff	
Attribute	Method
-username  -password	+create_staff_account()  +update_password()  +recover_staff_password()  +update_staffInfo()  +login()  +add_faculty()  +update_facultyinfo()  +log_out()

	+verify_faculty()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>● Creating staff account</li> <li>● Updating password</li> <li>● Recovering staff password</li> <li>● Updating staff info</li> <li>● Logging into account</li> <li>● Adding faculty</li> <li>● Updating faculty info</li> <li>● Logging out from account</li> <li>● Verifying faculty.</li> </ul>	Account PAS General Staff Staff info Faculty info Faculty Admin Staff Dashboard General Staff Dashboard Faculty Dashboard

**Table: Class Card for General-staff Class**

General-staff	
Attribute	Method
-username	+forget_password()
-password	+update_info()
-phone_number	+login()

-staff_name	+choose_templates()  +fill_template()  +log_out
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Updating info</li> <li>• Logging into account</li> <li>• Choosing template</li> <li>• Filling template</li> <li>• Logging out from account.</li> </ul>	Admin Staff info Letter Letter info Faculty info Account Admin Staff Dashboard General Staff Dashboard Faculty Dashboard

**Table: Class Card for Bulk\_sms Class**

Bulk_sms	
Attribute	Method
-sms_body	+send_sms()
Responsibilities	Collaborator

<ul style="list-style-type: none"> <li>• Sending sms</li> </ul>	Letter Faculty info
---	------------------------

**Table: Class Card for Email Class**

Email	
Attribute	Method
	+send_email()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Sending email</li> </ul>	Letter Faculty info

**Table: Class Card for Letter info Class**

Letter info	
Attribute	Method
-reference_number	+store_letterInfo()

-sending_date -letter's_subject -deadline -recipient_name -email_address	+store_pdfLink()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Storing letter info</li> <li>• Storing pdf link of letter.</li> </ul>	Letter Admin Staff General Staff Admin Staff Dashboard General Staff Dashboard Faculty Dashboard

**Table: Class Card for Faculty info Class**

Faculty info	
Attribute	Method



-faculty_name -designation -department / Institution_name -mobile_number -email_address	+store_facultyInfo()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>Storing faculty info</li> </ul>	Faculty Admin Staff General Staff Bulk sms Email PAS Admin Staff Dashboard

**Table: Class Card for Staff info Class**

Staff info	
Attribute	Method
-staff_name -staff_designation	+store_staffInfo()

-staff_phone_number -staff_ID	
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>Storing staff info.</li> </ul>	General Staff Admin Staff Admin Staff Dashboard

**Table: Class Card for Faculty dashboard Class**

Faculty dashboard	
Attribute	Method
-sending_date -checkbox -reference_number -deadline -letter's_body	+show_letters() +show_letter_statistics() +show_letter_status() +show_alerts()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>Showing letters.</li> <li>Showing letter statistics.</li> <li>Showing letter status</li> </ul>	Letter info

<ul style="list-style-type: none"> <li>● Showing alert box.</li> </ul>	
--	--

**Table: Class Card for Admin staff dashboard Class**

Admin staff dashboard	
Attribute	Method
-reference_number -sending_date -letter's_body -checkbox -name_of_the_recipient -search_by_reference_number -search_by_faculty_name	+show_signedup_faculties() +show_staffs() +show_letters() +show_letter_statistics() +show_letter_status() +show_alerts()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>● Showing signed up faculties</li> <li>● Showing staff.</li> <li>● Showing letters.</li> <li>● Showing letter</li> </ul>	Faculty info Staff Info Letter info

<p>statistics.</p> <ul style="list-style-type: none"> <li>● Showing letter status.</li> <li>● Showing alert box.</li> </ul>	
---	--

**Table: Class Card for General staff dashboard Class**

General staff dashboard	
Attribute	Method
<p>-reference_number</p> <p>-sending_date</p> <p>-letter's_body</p> <p>-checkbox</p> <p>-name_of_the_recipient</p> <p>-search_by_reference-number</p> <p>-search_by_faculty_name</p>	<p>+show_letters()</p> <p>+show_letter_statistics()</p> <p>+show_letter_status()</p> <p>+show_letter_templates()</p> <p>+show_alerts()</p>
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>● Showing letters.</li> <li>● Showing letter statistics.</li> <li>● Showing letter status.</li> </ul>	<p>Letter info</p> <p>Letter</p>

<ul style="list-style-type: none"> <li>• Showing letter template.</li> <li>• Showing alert box.</li> </ul>	
--	--

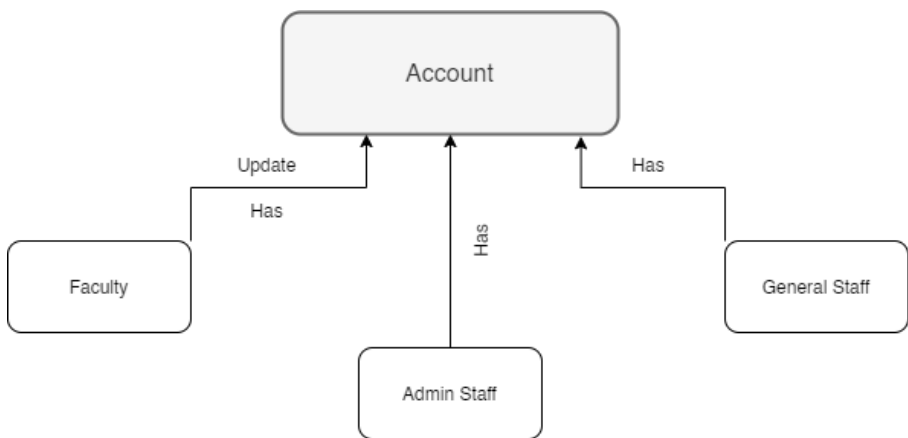
**Table: Class Card for PAS Class**

PAS	
Attribute	Method
	+send_recovery_email() +store_recovery_token() +store_session_cookies()
Responsibilities	Collaborator
<ul style="list-style-type: none"> <li>• Sending recovery email</li> <li>• Storing recovery token</li> <li>• Storing session cookies.</li> </ul>	Faculty info Faculty

## CRC Diagrams:

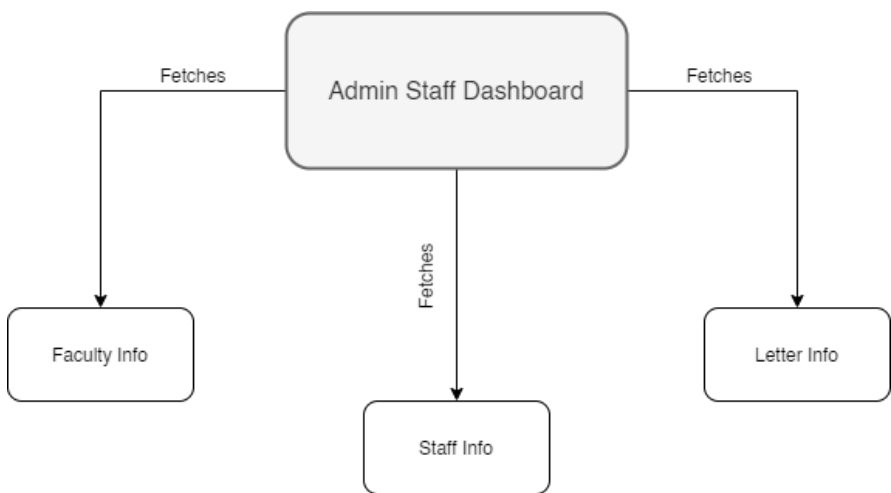
**Diagram ID: 1**

**Name:** Account



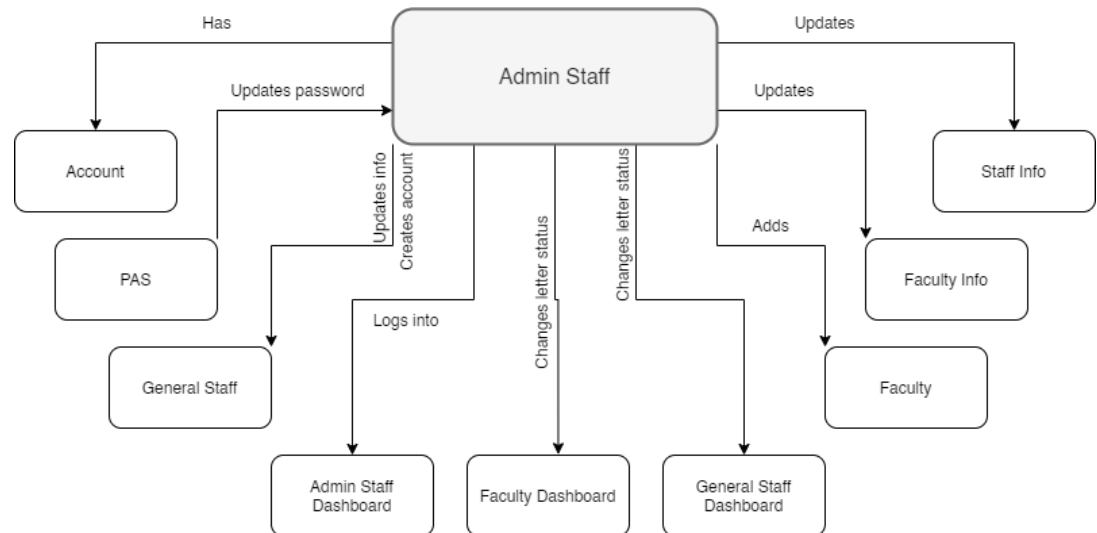
**Diagram ID: 2**

**Name:** Admin Staff Dashboard



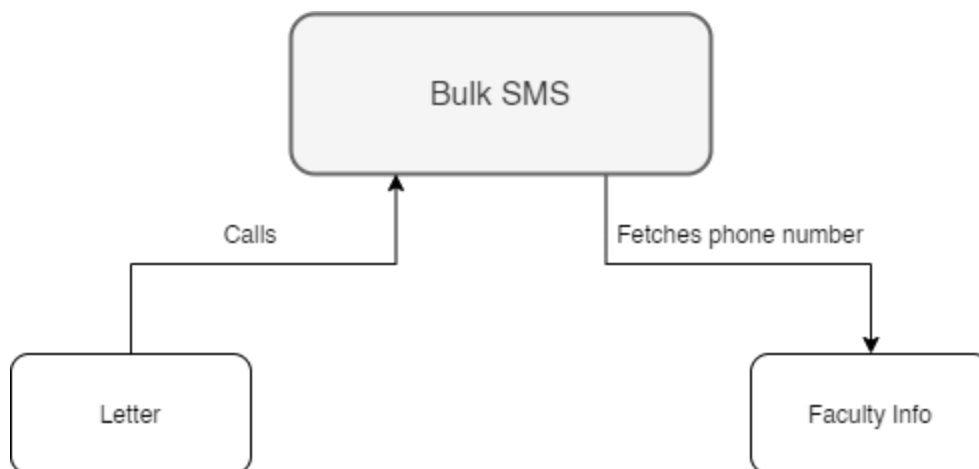
### Diagram ID: 3

Name: Admin Staff



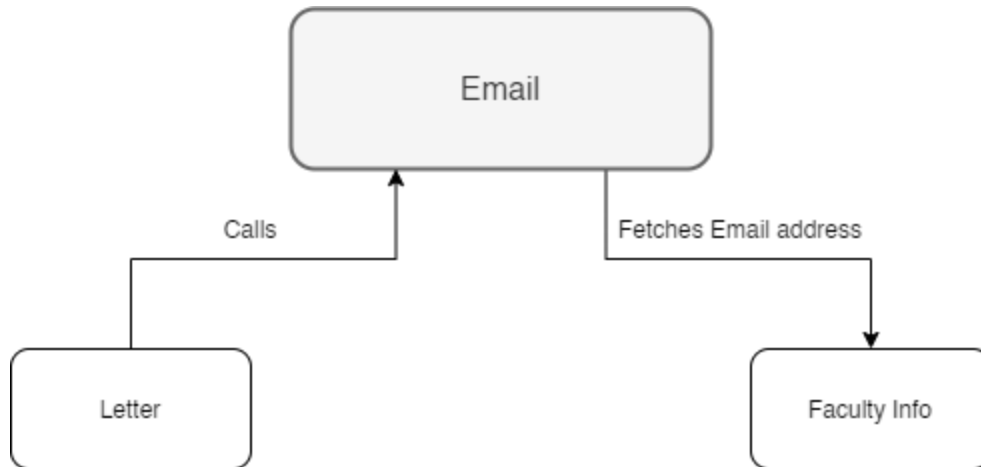
### Diagram ID: 4

Name: bulk sms



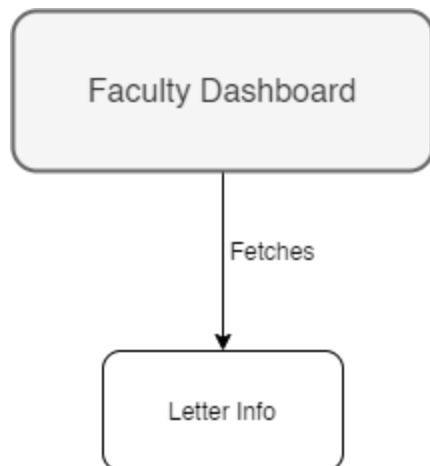
**Diagram ID: 5**

**Name:** Email



**Diagram ID: 6**

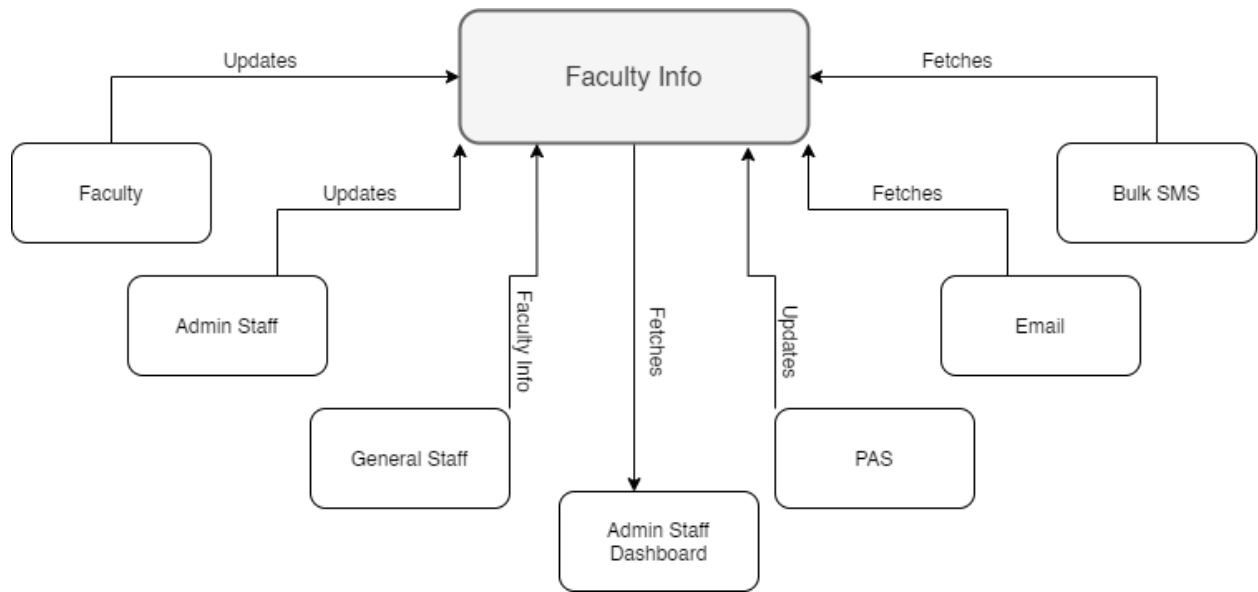
**Name:** Faculty Dashboard





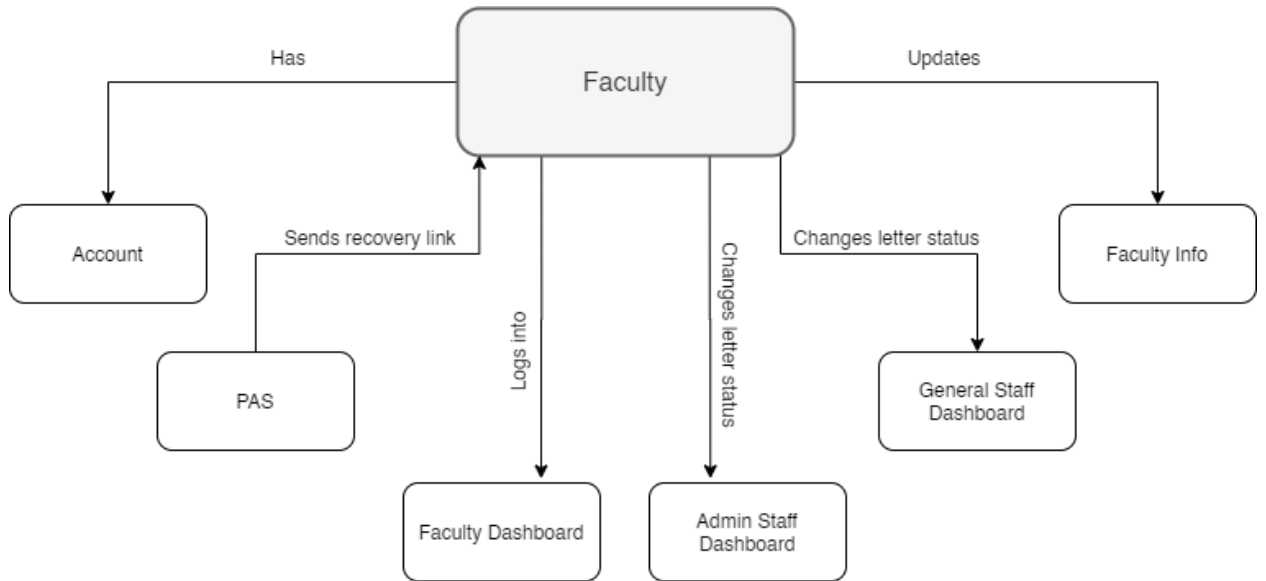
**Diagram ID: 7**

**Name:** Faculty Info



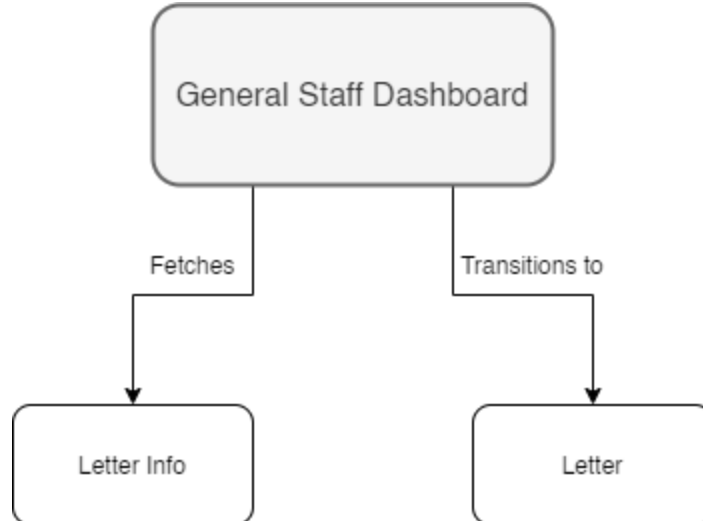
**Diagram ID: 8**

**Name:** Faculty



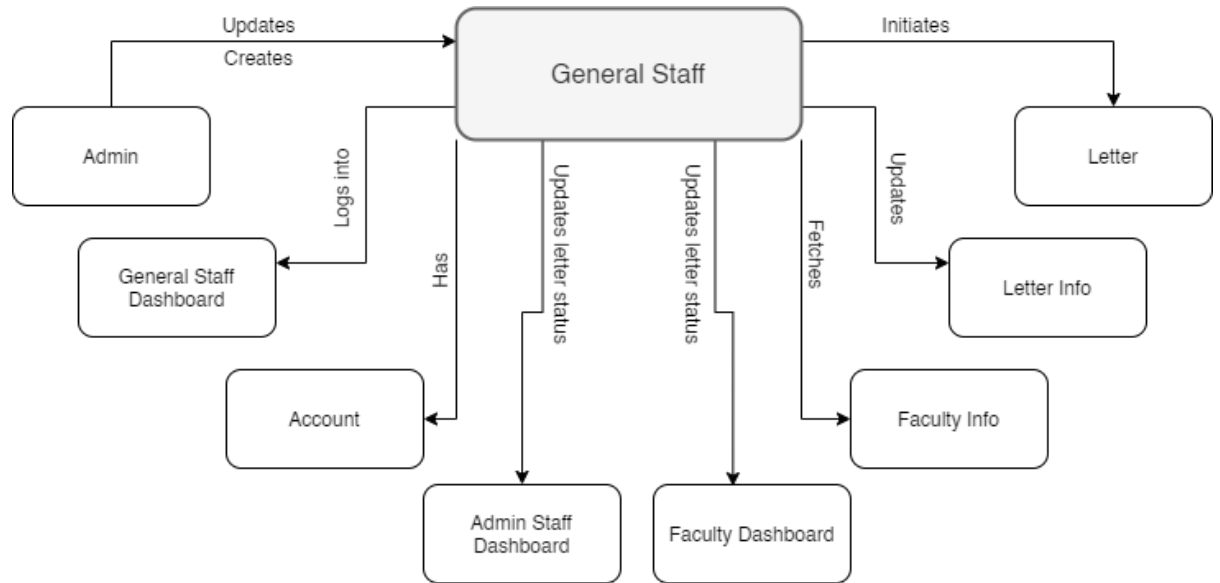
**Diagram ID: 9**

**Name: General Staff Dashboard**



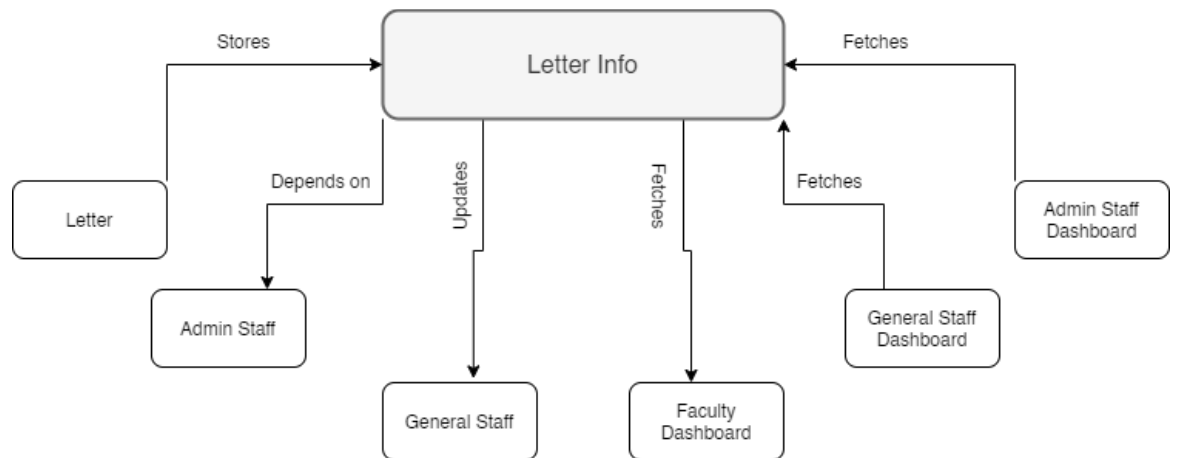
**Diagram ID: 10**

**Name: General Staff**



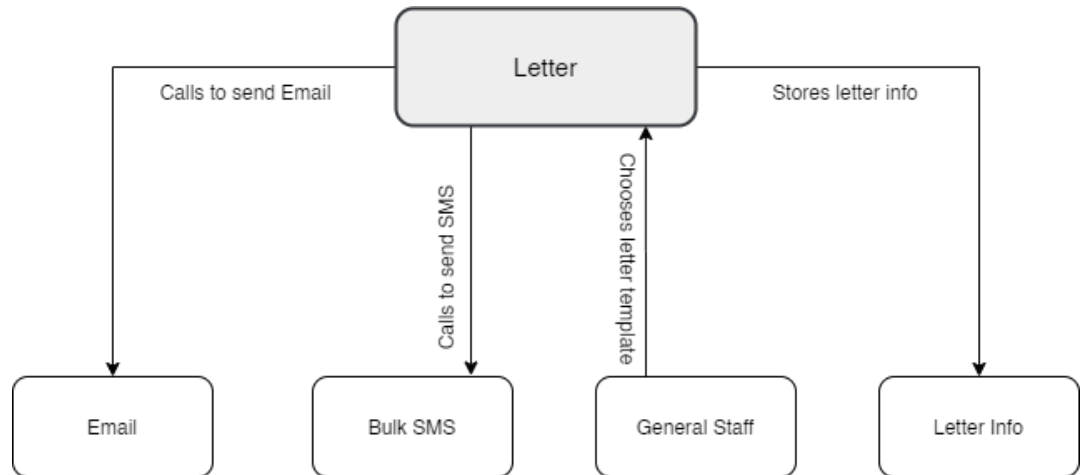
**Diagram ID: 11**

**Name:** Letter info



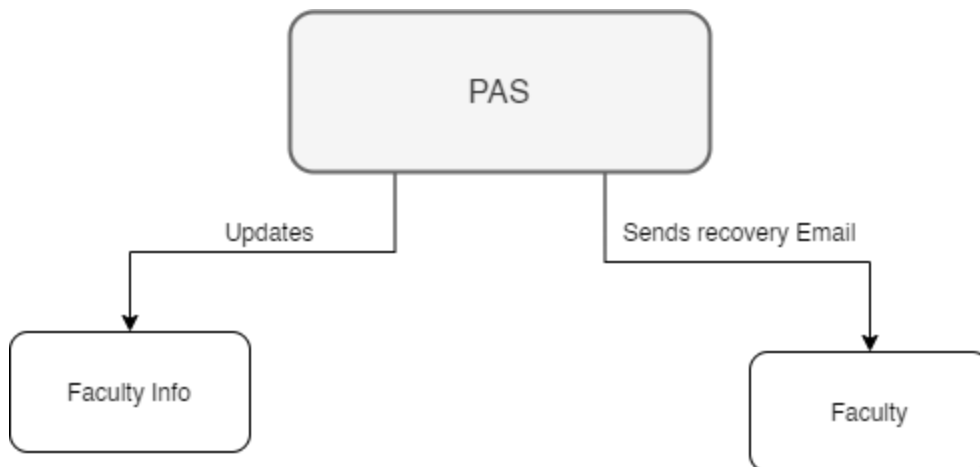
**Diagram ID: 12**

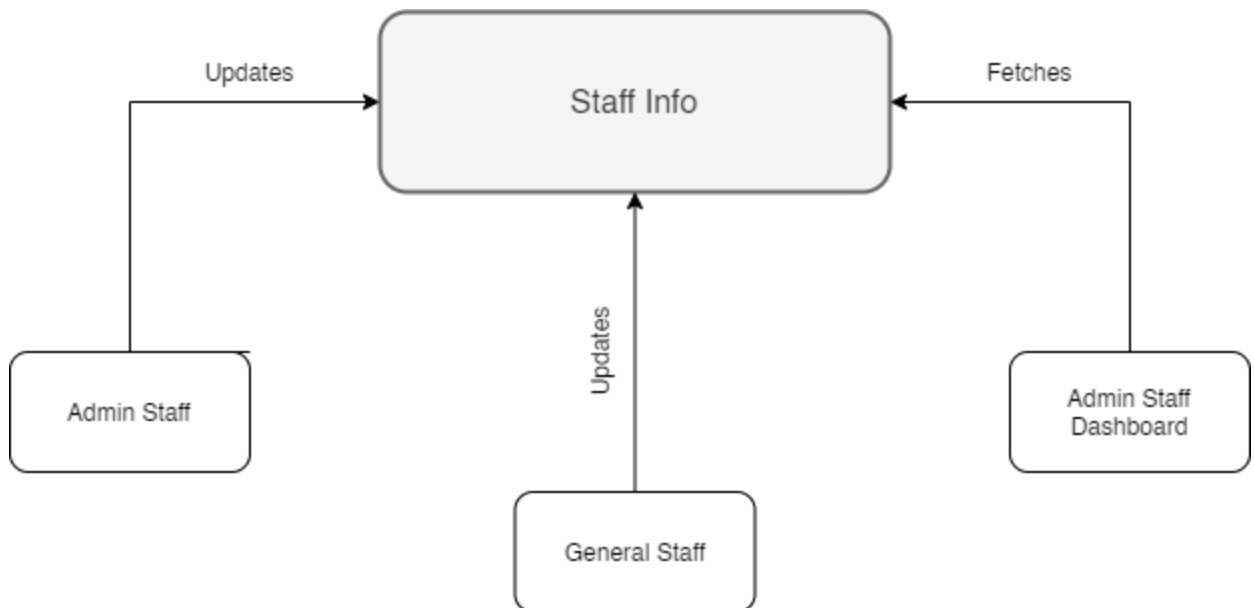
**Name:** Letter



**Diagram ID: 13**

**Name: PAS**



**Diagram ID: 14****Name:** Staff info

## BEHAVIORAL MODELING

**Event Table:**

SL no	Event	State name	Initiator	Collaborator	Associated methods
1	Will send letters to teachers	Send_letter	General staff, Letter	Faculty info,	+choose_templates() +fill_template()

					+send_letter()
<b>2</b>	Will automate the letter sending process	Automate_Letter_sending	PAS		
<b>3</b>	Will create account	Create_account	Faculty	Account, Faculty info	+create_account() +verify_faculty() +store_facultyInfo()
<b>4</b>	Will enter into the system	Enter_into_system	Faculty, Admin-staff, General-staff		+create_account() +login()
<b>5</b>	Will provide information	Provide_info	Faculty	Account, Faculty info	+create_account()
<b>6</b>	will be verified by	Verification	Admin-staff	Faculty info, Faculty	+verify_faculty()



<b>11</b>	Will verify general staff account	Verify_ General-staf f_account	Admin-staff	Staff info	+verify_staff()
<b>12</b>	Will be able to recover password through email	Recover_ Password_ through_em ail	Faculty	PAS,Email,	+recover_pass word()
<b>13</b>	Click on the “recover password” button	Click_recov er_ Password_ button	Faculty		+recover_pass word()
<b>14</b>	Recovery link will be sent	Send_ recovery_lin k	PAS	Email, Faculty	+send_recover_email() +store_recover_token()
<b>15</b>	Will input new password	Input_new_ password	Faculty	Faculty info	+update_password()
<b>16</b>	Password	Update_	PAS	Faculty info	+update_passw



	will be uploaded in database	Password_i n_ db			ord() +store_facultyIn fo()
17	Will report it to the super admin	Report_to_ super-admin n	Admin-staff	PAS,staff info	+update_passw ord()
18	Will report about forgotten password to admin	report_forgo tten_passw ord	General-staff	Admin staff, Staff info	+update_passw ord()
19	Will be able to log in	LogIn	Faculty,Admin -staff, general Staff		+login()
20	Database will be maintained	Maintain_ db	PAS	Faculty info, Staff info	
21	Will initially give entry to	give_db_ent ry	PAS	Faculty info, Staff info	

	database				
<b>22</b>	Will update faculty info	Update_ faculty_info	Admin staff	Faculty info	+update_info()
<b>23</b>	Alert box will remind about notifications	popup_alert	PAS	Faculty dashboard, Admin-staff Dashboard, General-staff Dashboard	
<b>24</b>	Special alert will be shown if the deadline is inside two days	popup_spec ial_alert	PAS	Faculty dashboard, Admin-staff Dashboard, General-staff Dashboard	
<b>25</b>	Get letters through email	Get_letters_ through_email	Faculty	Email,Letter- info	+get_letters()
<b>26</b>	Alert box will	disappear_a	PAS	Faculty	

	disappear if checkbox is ticked	Alert		dashboard, Admin-staff Dashboard, General-staff Dashboard	
<b>27</b>	Change password button will be there	change_password	Faculty		+change_password()
<b>28</b>	Will get reply	Get_reply	Admin-staff Dashboard, General staff dashboard		+get_reply()
<b>29</b>	Account will be created	Create_general_Staff_account	Admin staff	General staff, Staff info, Account	+create_account
<b>30</b>	Password will be reset	Reset_password	Admin-staff	PAS	+reset_password()

<b>31</b>	Faculty list will be updated	Update_ faculty_list	Admin-staff	Faculty-info	+update_faculty ( )
<b>32</b>	Will change letter status	Change_ status	General-staff dashboard		+change_status ( )
<b>33</b>	Password will be changed	Change_ Password_ for_general _staff	General staff	Admin-staff, Staff info	+update_info() +store_staffInfo ( )
<b>34</b>	Will store letter	store_letter	letter,letter_info		+store_letter()
<b>35</b>	Will be able to choose letter template	Choose_letter_template	General-staff		+choose_templates()
<b>36</b>	Fill the blanks of the templates	Fill_template	General-staff	Faculty info	+fill_template()

<b>37</b>	Letter will be sent through email	Send_letter s_ through_email	Letter,Email	Faculty info, Bulk-sms	+send_letter() +send_email()
<b>38</b>	Letter will be printed	Print_letter	Letter		+print_letter()
<b>39</b>	A sms will be sent	Send_sms	Bulk_sms	Letter Faculty info	+send_sms()
<b>40</b>	Letters will be shown in the dashboards	Show_ Letters_in_ dashboard	Faculty dashboard, Admin-staff Dashboard, General-staff Dashboard	Letter info	+show_letters() +show_letter_statistics() +show_letter_status()
<b>41</b>	Can send reply to the letter	Send_reply	Faculty	Faculty_ dashboard	+send_reply()

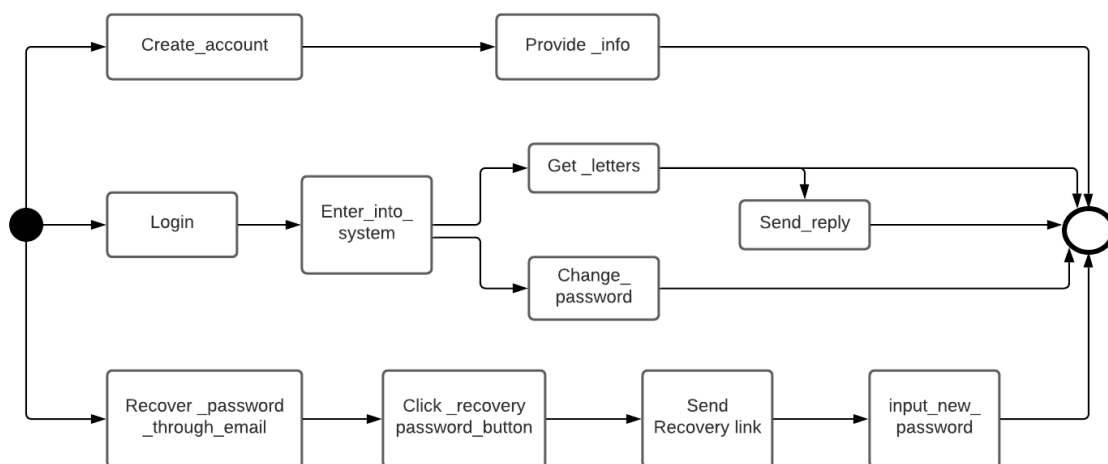
## STATE TRANSITION DIAGRAM :

State diagram represents active states for each class the events (triggers). For this we identified all the events, their initiators and collaborators.

### State Transition

ID : 1

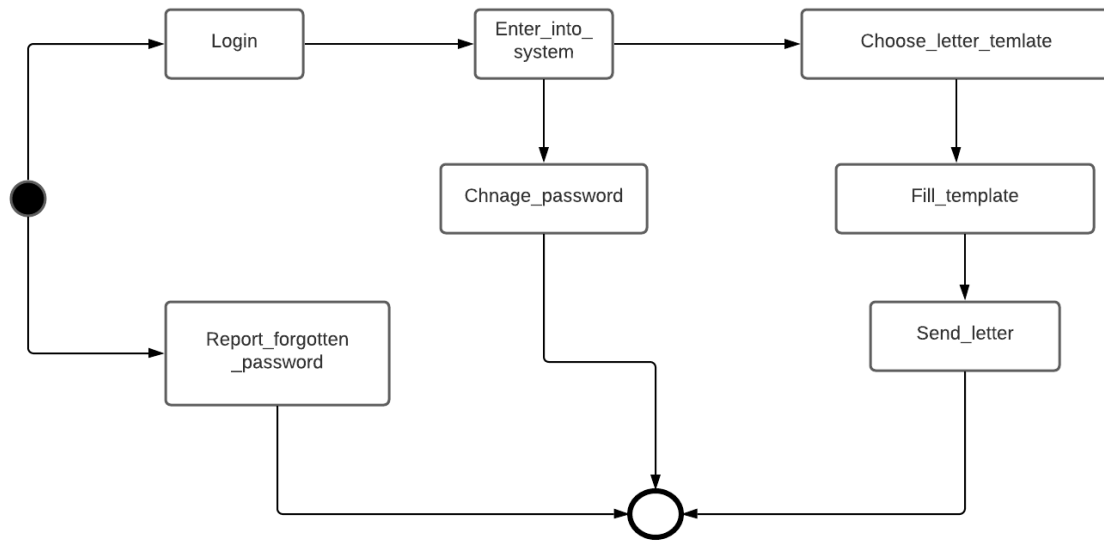
Name :Faculty



ID : 2

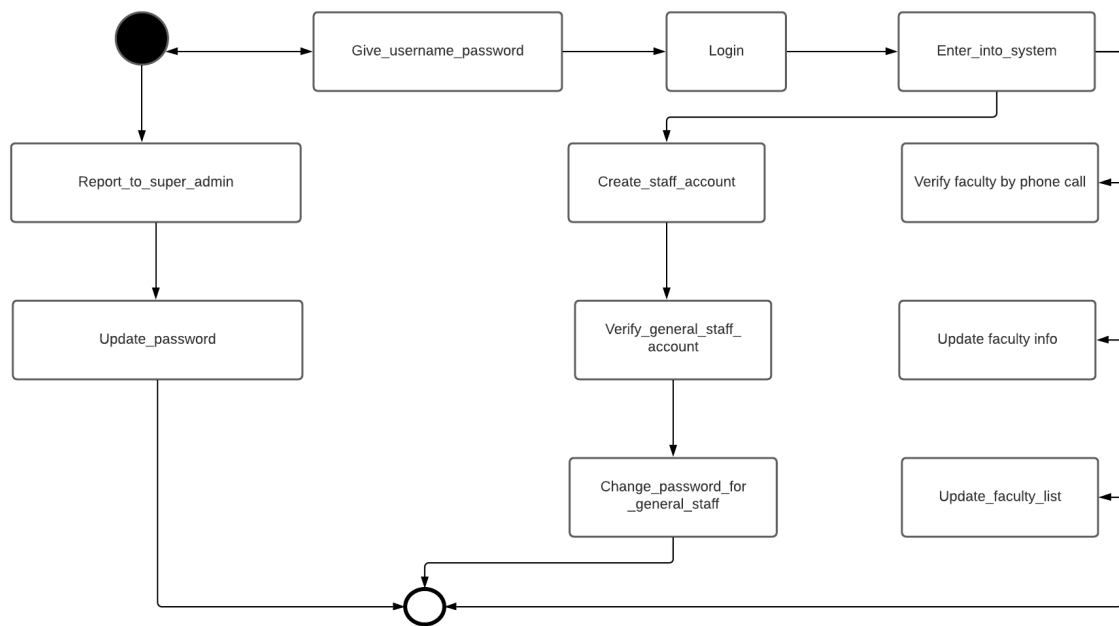
Name : General Staff

Initial State



**ID : 3**

**Name :Admin Staff**



**ID : 4**

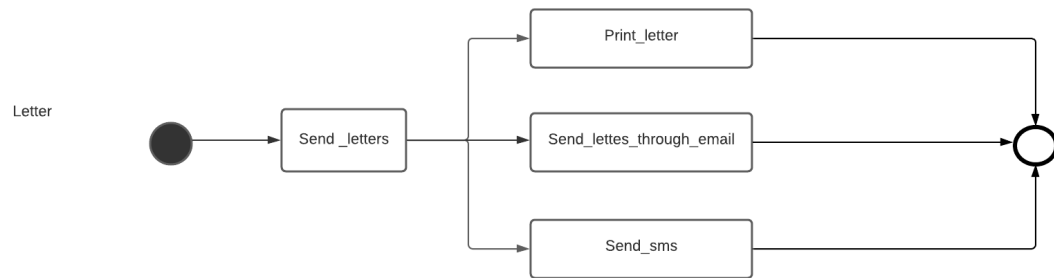
**Name :Letter info**



**ID : 5**

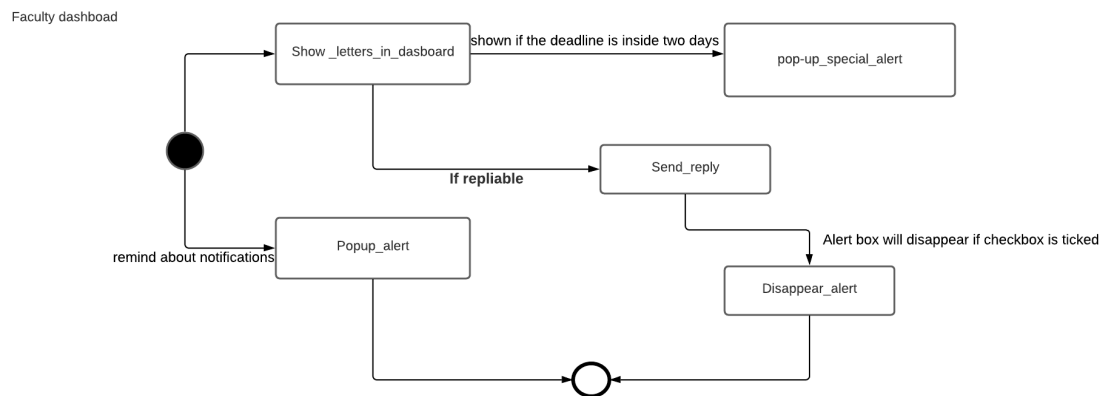
**Name :Letter**





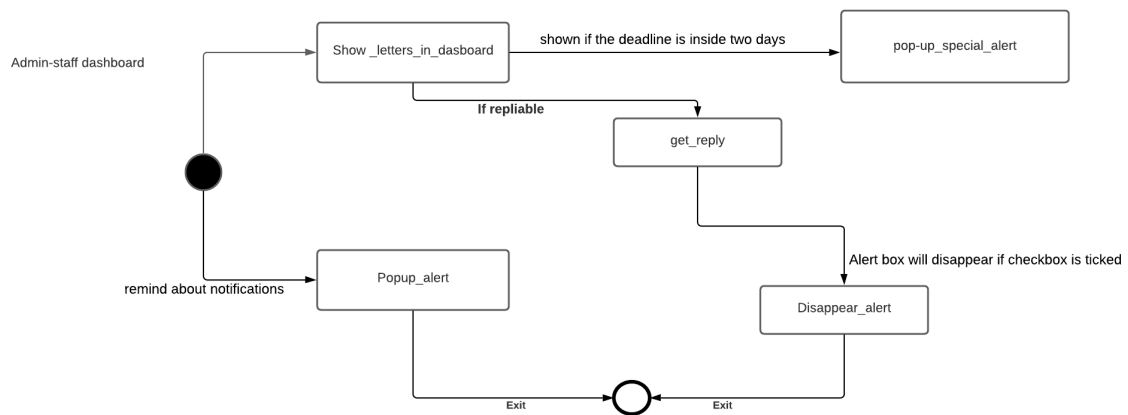
**ID : 6**

**Name :Faculty Dashboard**



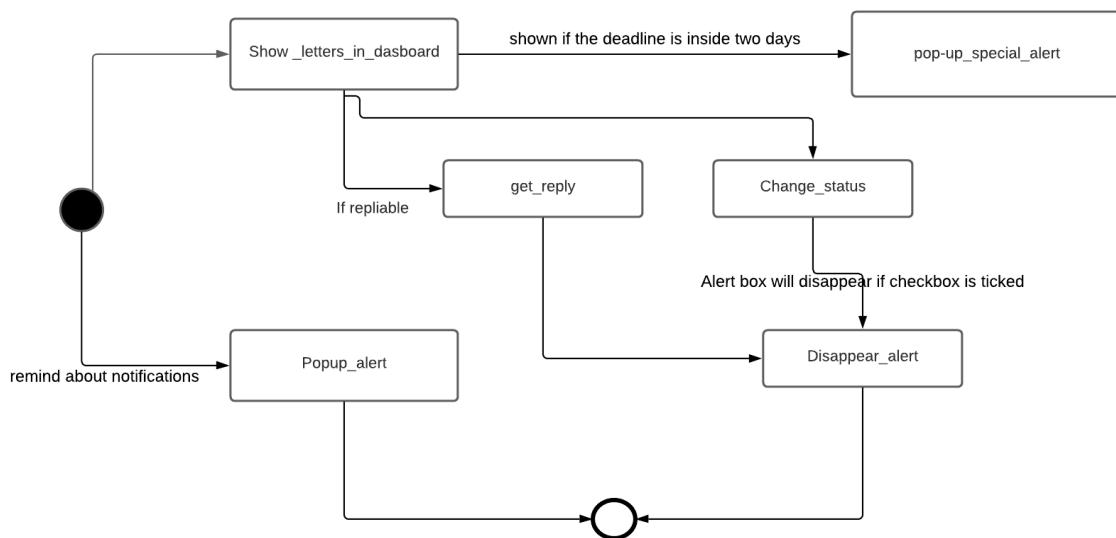
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**Name :Admin Staff Dashboard**



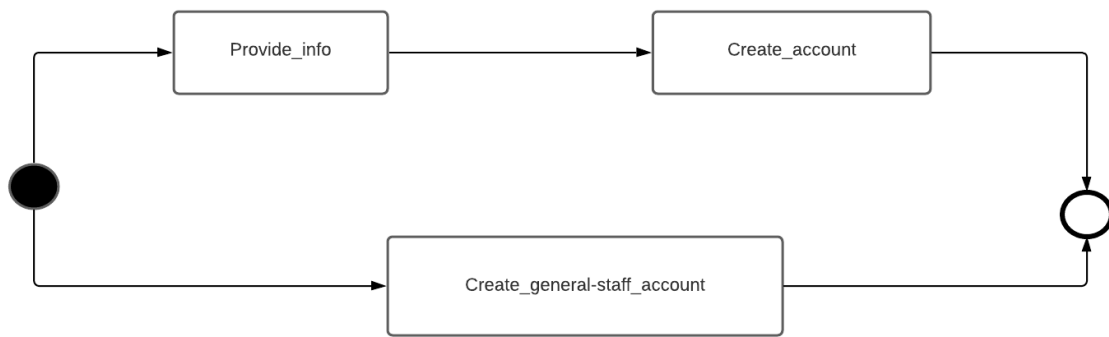
**ID : 8**

**Name :General Staff Dashboard**



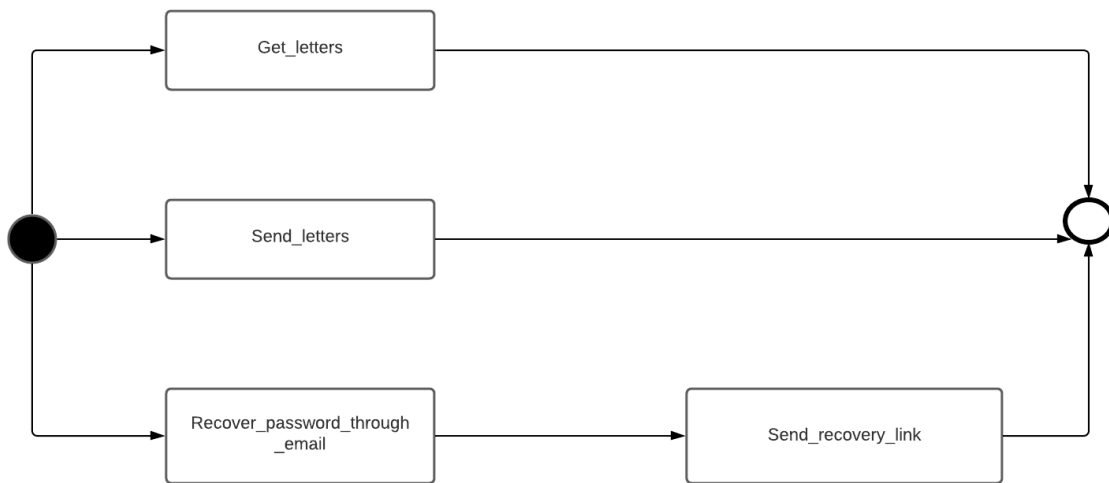
**ID : 9**

**Name :Account**



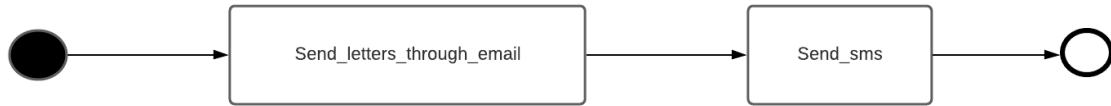
**ID : 10**

**Name :Email**



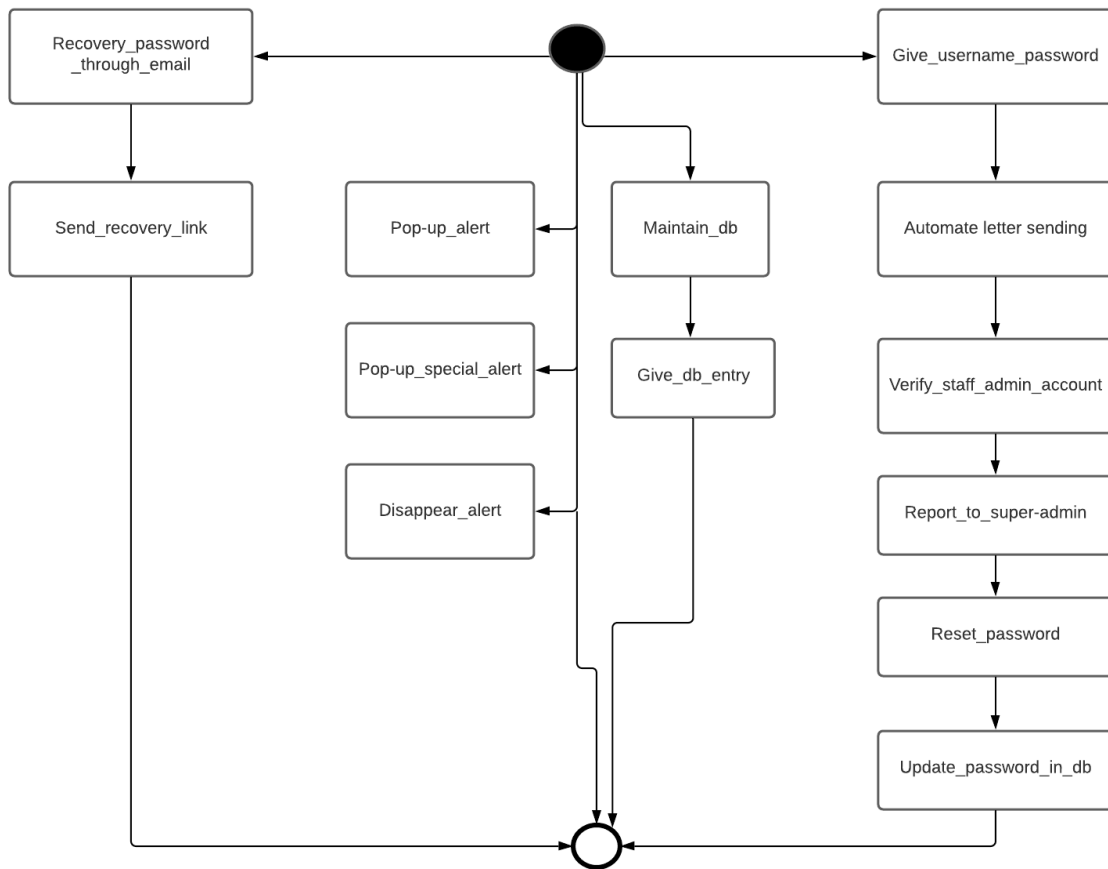
**ID : 11**

**Name :Bulk sms**



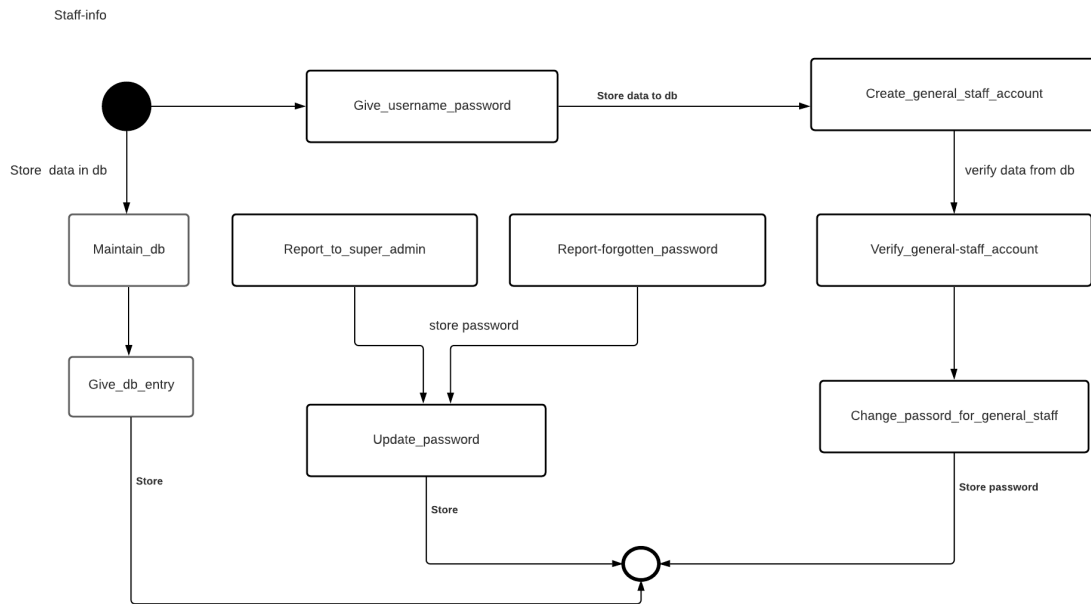
**ID : 12**

**Name :PAS**



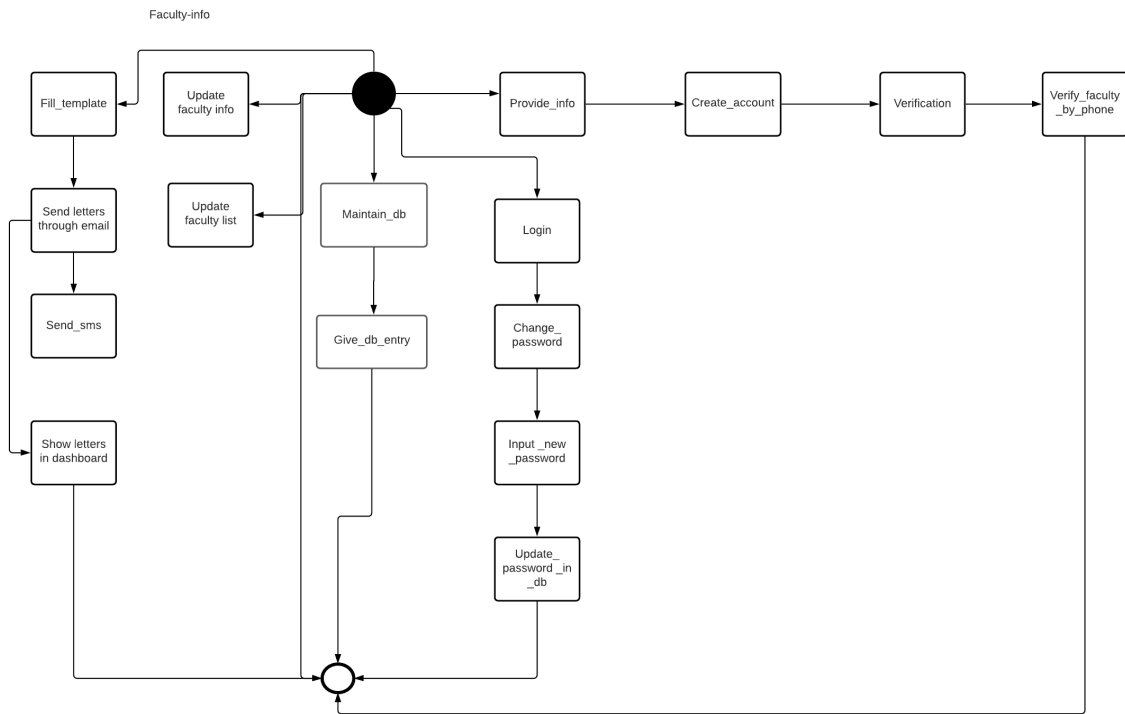
**ID : 13**

**Name :Admin Staff**



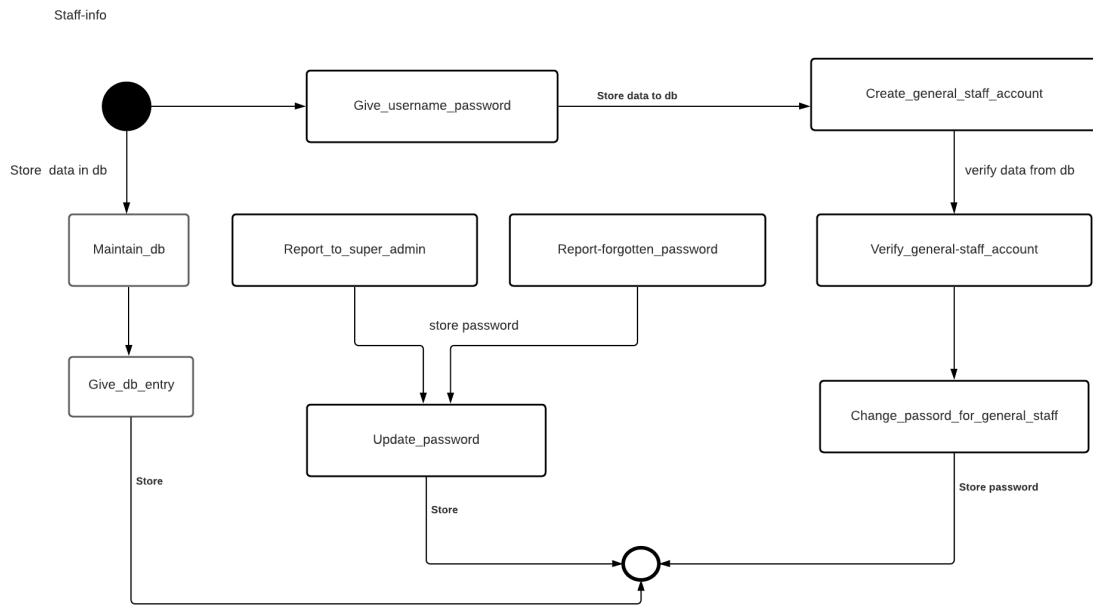
**ID : 14**

**Name :Faculty Info**



ID : 15

Name :Staff Info



## Sequence Diagram:



