VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Modeling and Design

Submitted by

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(1BM19CS197)

in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
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BENGALURU-560019
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B. M. S. College of Engineering,
Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "**Object Oriented Modeling and Design**" carried out by **George Abraham Thattampara (1BM19CS197),** who is a bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the academic year 2021-2022. The Lab report has been approved as it satisfies the academic requirements in respect of **Object Oriented Modeling and Design- (20CS6PCOMD)** work prescribed for the said degree.

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Course Outcome

CO4	**Ability to conduct practical experiment to solve a given problem using Unified Modeling language.**

1. College Information System

1.1 Problem statement

The College Information System is a system that maintains student,staff and department information . It maintains the courses taught by teachers and students enrolled in them. Admission records of student and Examination details and other important information related to college management is maintained.

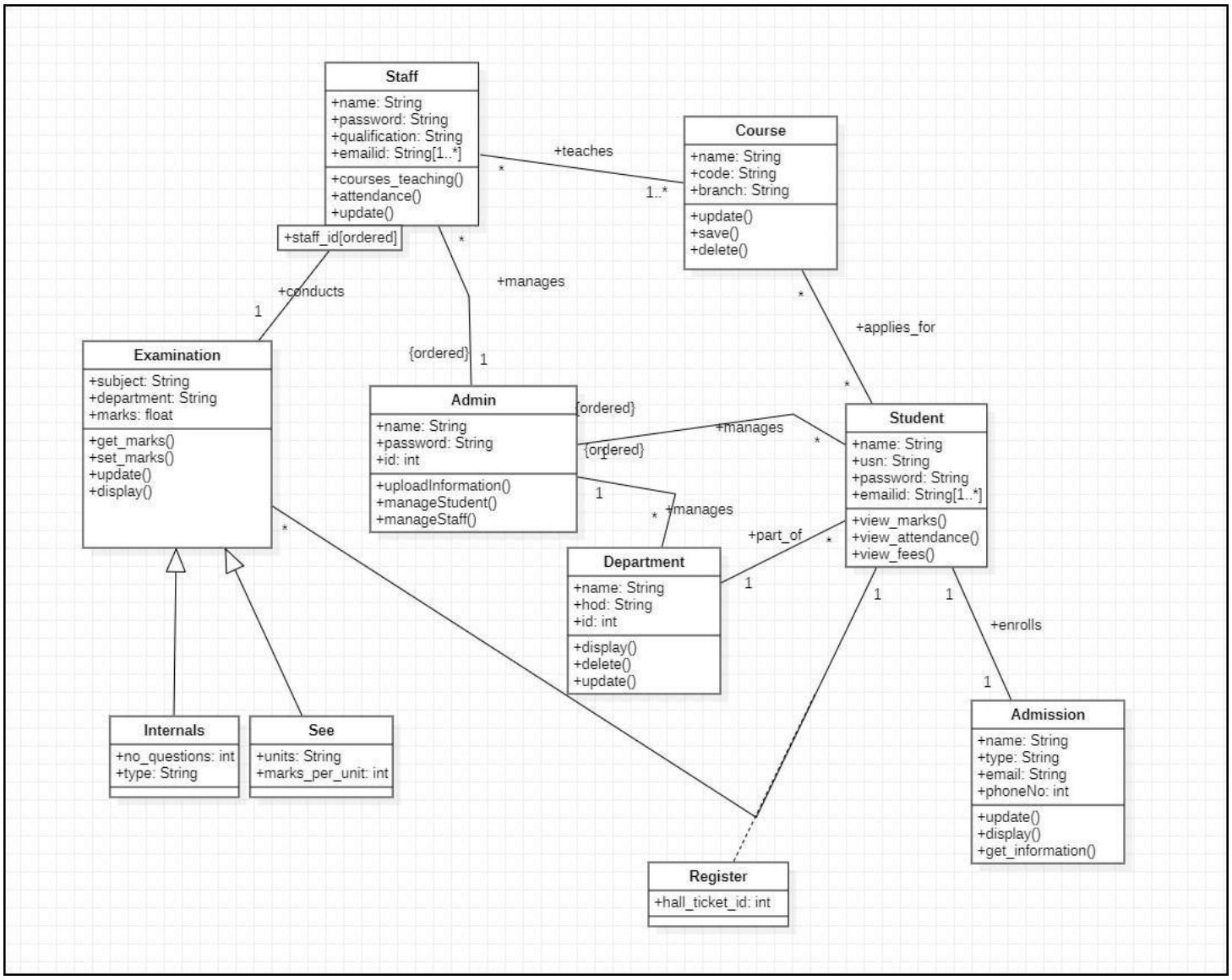
1.2 Software Requirement Specification

- College information system has an admin who manages the staff ,students and department.
- Admin can view and modify the student's records like student's profile, attendance, fee, results, and details of teachers and other employees in college, their personal information and their attendance for their salaries.
- In this system, user authentication will be done by login by user name and password and classified by user type.

- Staff in college teach more than one course to many students and the staff who are teachers conduct examinations for students of the college
- The students of the college register themselves in the department and for the courses they are interested in and join the college by taking admission and following all the admission procedures.
- There are different types of examinations conducted by the college for the students. Internals and semester end examinations are two of them.
- Every course has a name and its unique name. Every course has different subjects and every subject has its own unique name.
- Department will provide the details about departments within a college with their name and every department have its Department name.

1.3 Class Diagram

Admin can view and modify the student's records, teachers and department details.The students of the college register themselves in the department and examination and for the courses they are interested in and join the college by taking admission and following all the admission procedures.College conducts Internals and semester end examination for students.


Staff
+name: String
+password: String
+qualification: String
+emailid: String[1..*]
+courses_teaching()
+attendance()
+update()
+staff_id[ordered]
+teaches
Course
+name: String
+code: String
+branch: String
+update()
+save()
+delete()
+conducts
+manages
+applies_for
Examination
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+department: String
+marks: float
+get_marks()
+set_marks()
+update()
+display()
{ordered}
Admin
+name: String
+password: String
+id: int
+uploadInformation()
+manageStudent()
+manageStaff()
Student
+name: String
+usn: String
+password: String
+emailid: String[1..*]
+view_marks()
+view_attendance()
+view_fees()
Department
+name: String
+hod: String
+id: int
+display()
+delete()
+update()
+part_of
+enrolls
Admission
+name: String
+type: String
+email: String
+phoneNo: int
+update()
+display()
+get_information()
Internals
+no_questions: int
+type: String
See
+units: String
+marks_per_unit: int
Register
+hall_ticket_id: int

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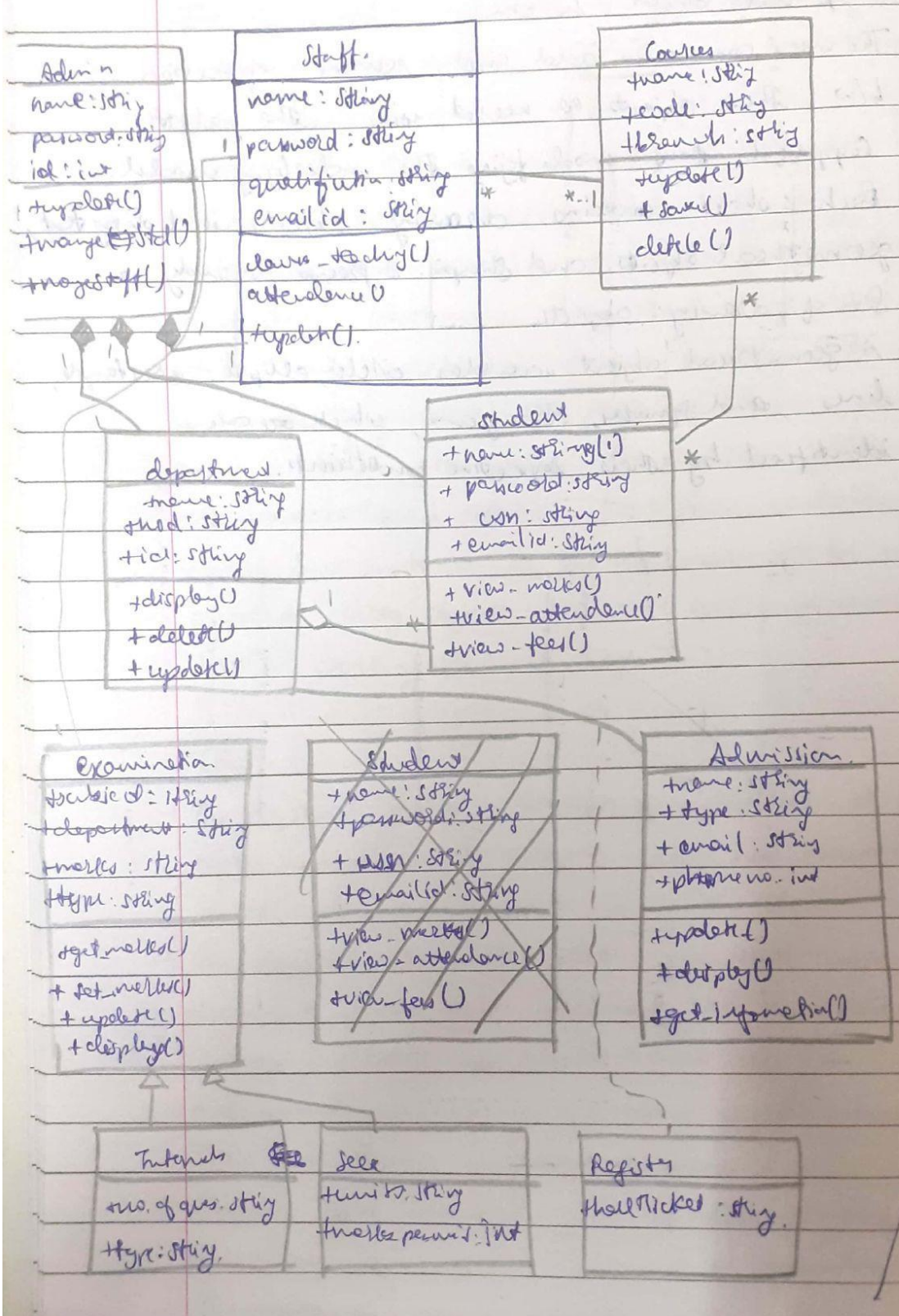
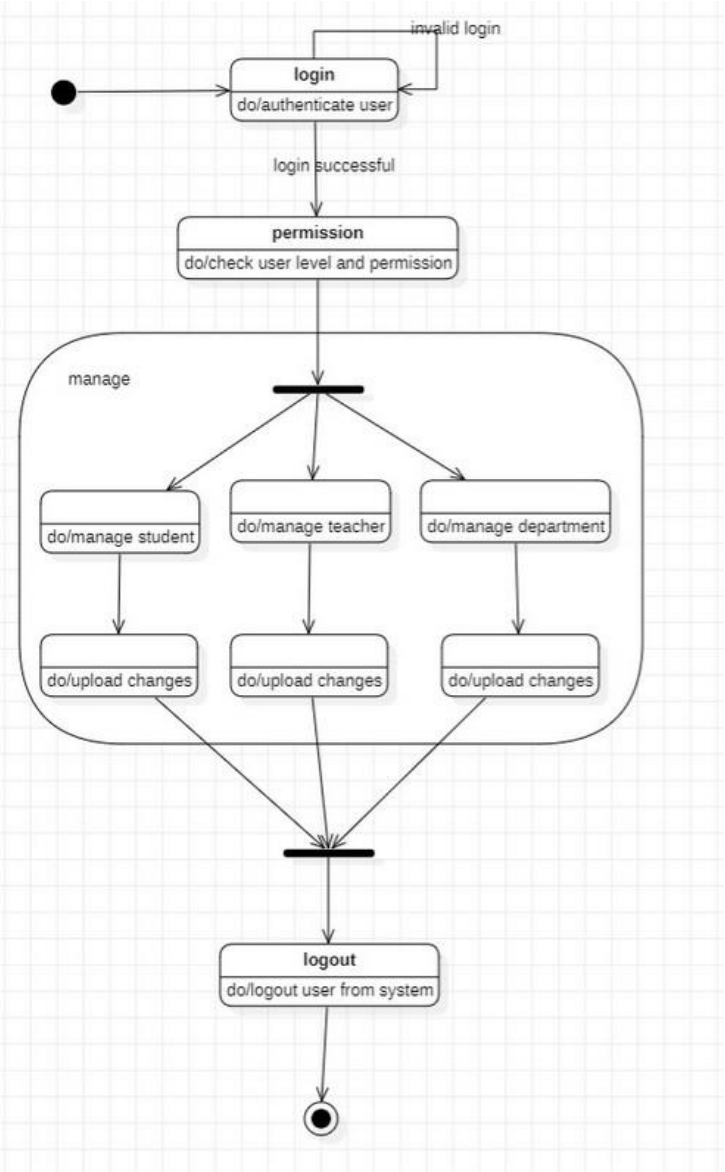
SPLASH

1/ College Information System:-



1.4 State Diagram



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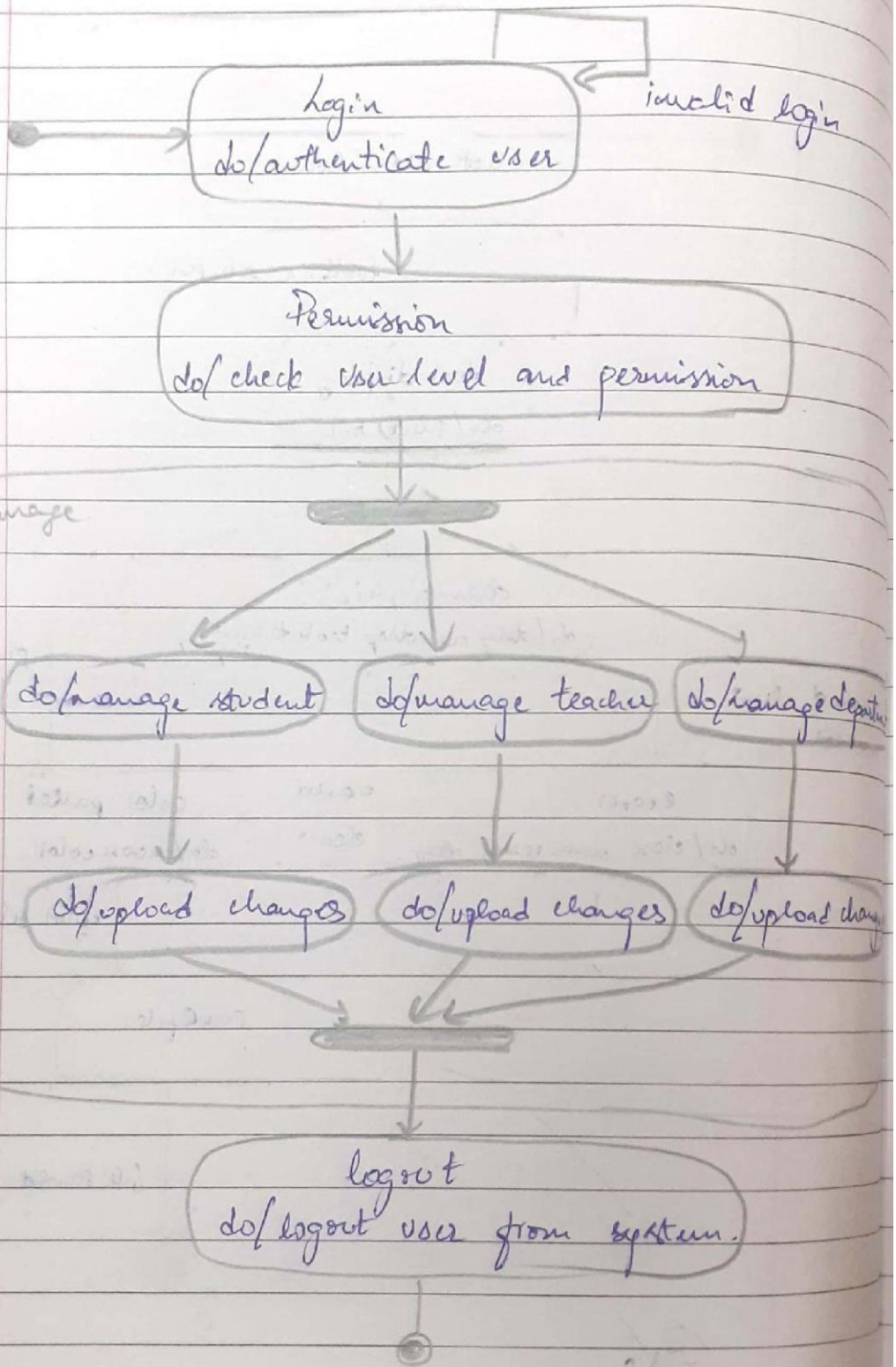
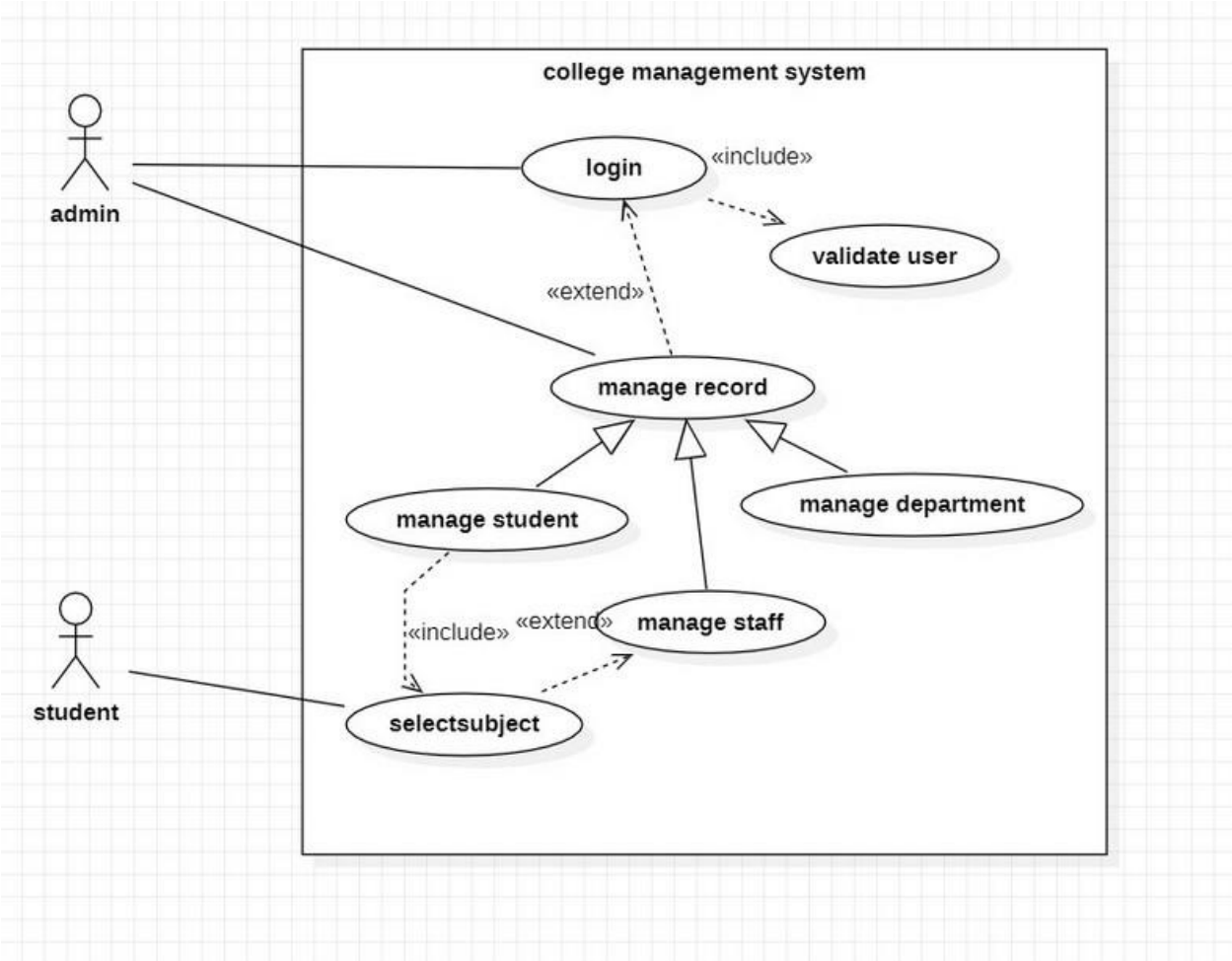
I Advanced state Diagram -



The above state diagram describes the states the admin goes though in uploading information of students,staff and department. The admin first needs to login which then leads to the validate state,where the login id and password are validated. If invalid it then goes back to the login state or goes to the get information state. Upon receiving the correct information it goes to the upload state and then to the commit state to save all changes. The admin first needs to login and be cleared of their permissions. The admin can then manage information related to the student,teacher,or department.After necessary changes the admin can update the information and logout from the system.

1.5 Use Case Diagram



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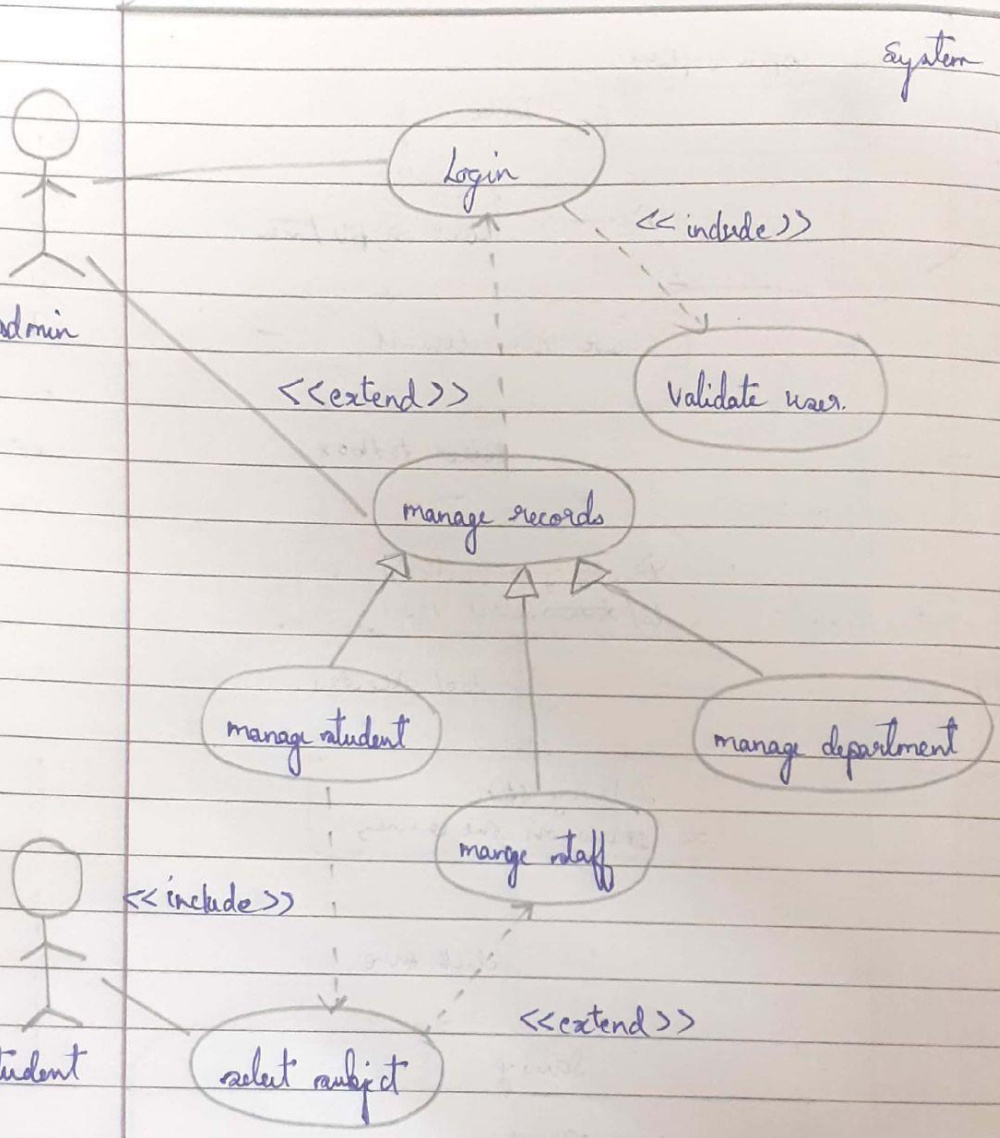
Advanced use case diagram



Actors:

Admin:the person who manages everything

Student: A person who uses the system

Use Cases:

Manage details: the admin can update,insert or delete the data.

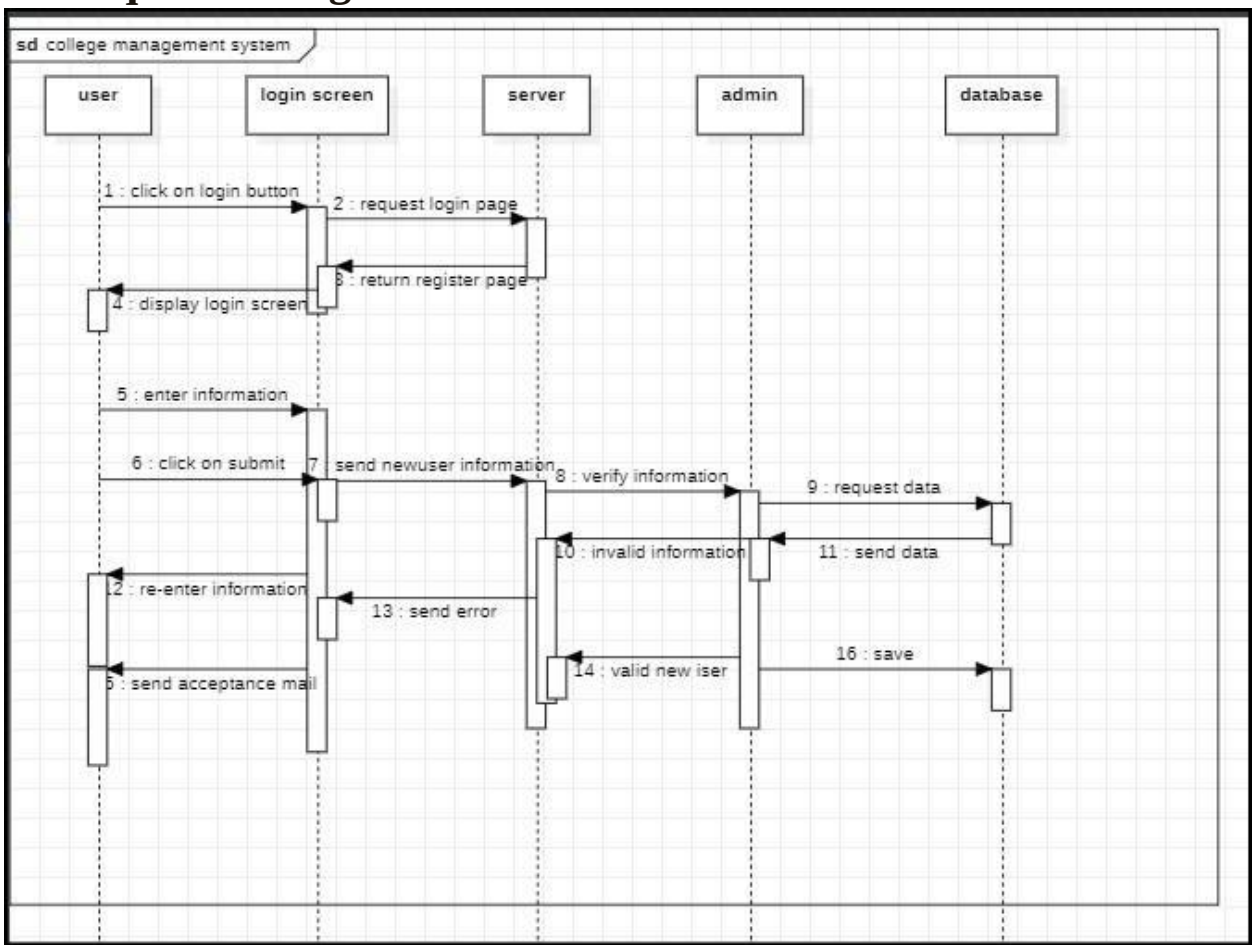
View results: displays the result of students.

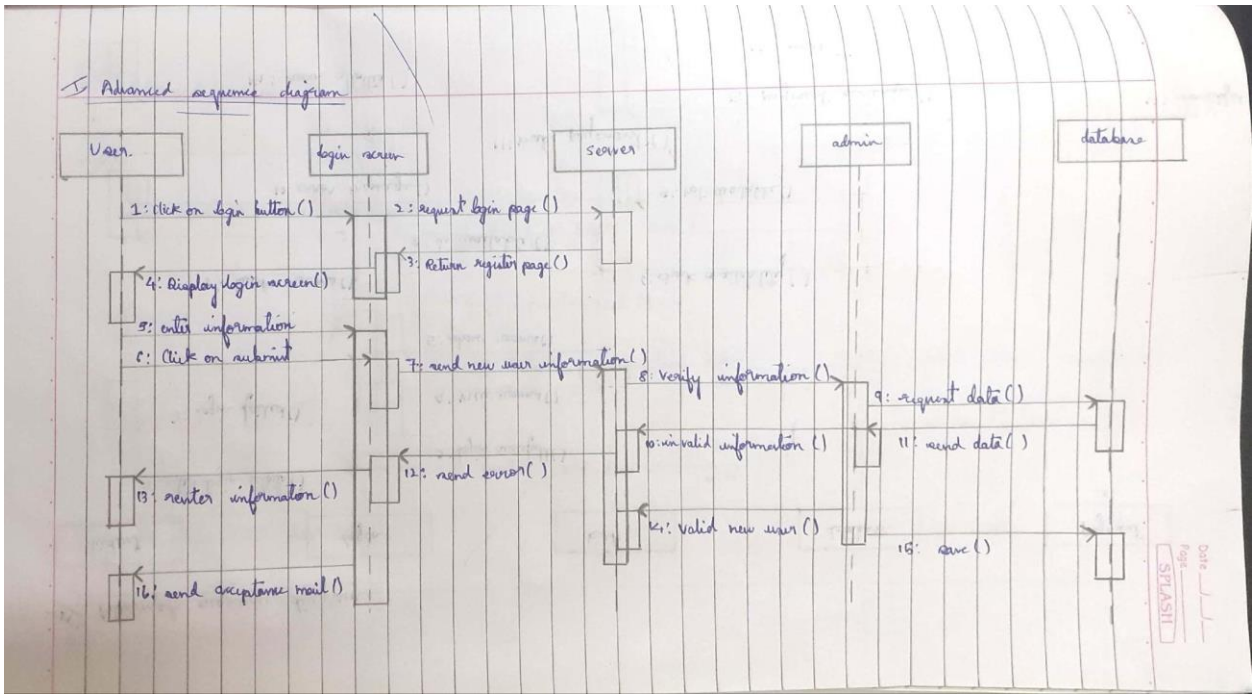
Subject details:various details related to subject is displayed.

View student details: the details of student is displayed

Declare results: the results of exams written by student is displayed.

1.6 Sequence Diagram

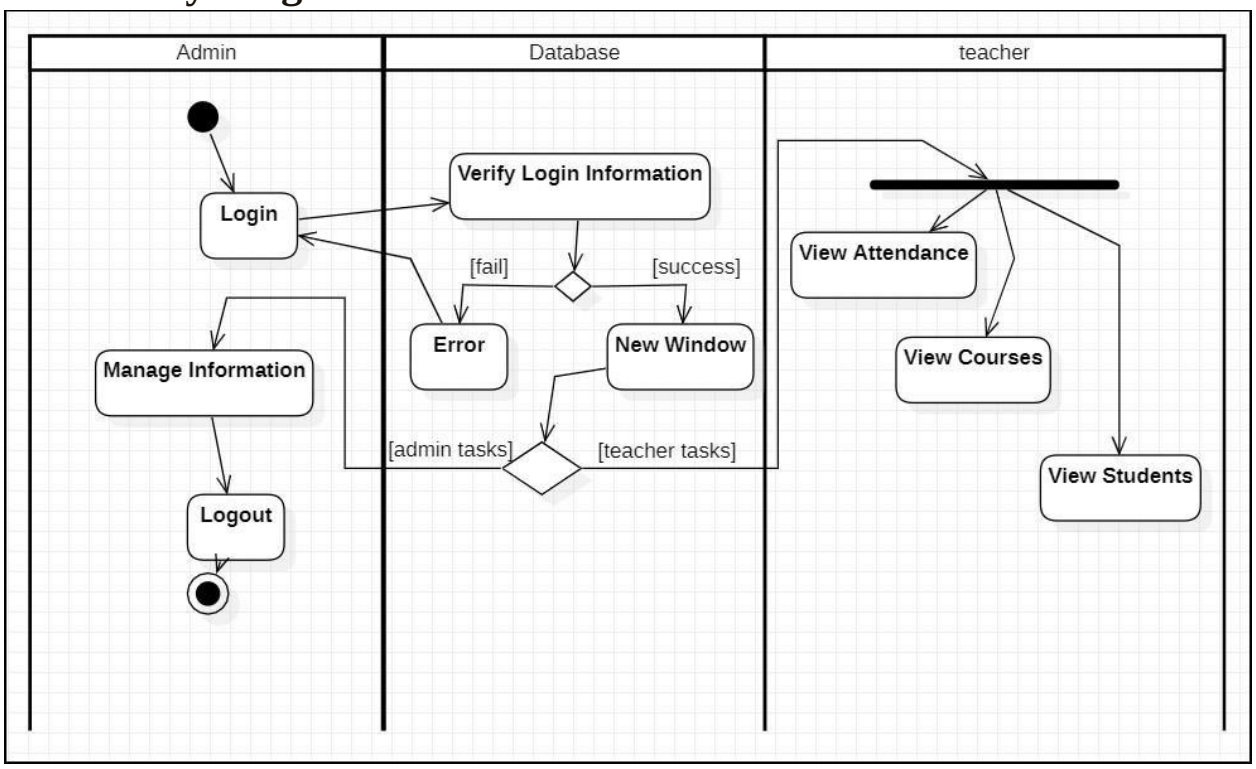


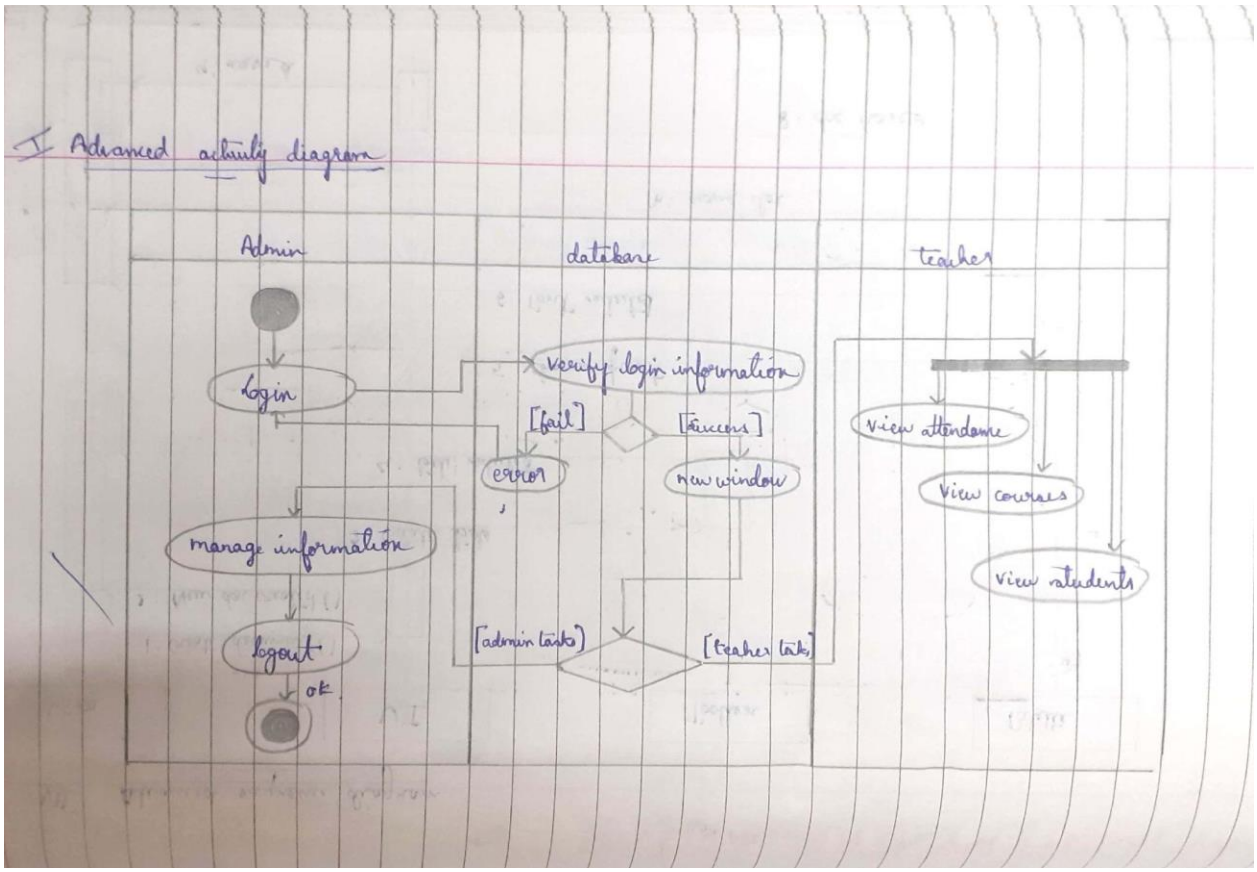


The above sequence diagram gives the interaction between objects while a user is logging into a system. The user enters login information in the website which is sent to the server,where the

information is validated and the appropriate reply message is displayed to the user.

1.7 Activity Diagram





The above activity diagram has three swimlanes mainly admin,database and teacher. The admin can login and manage information. The

database verifies the login information and on success has two options. He teacher can view attendance,view course details, and view student list

2. Hostel Management System

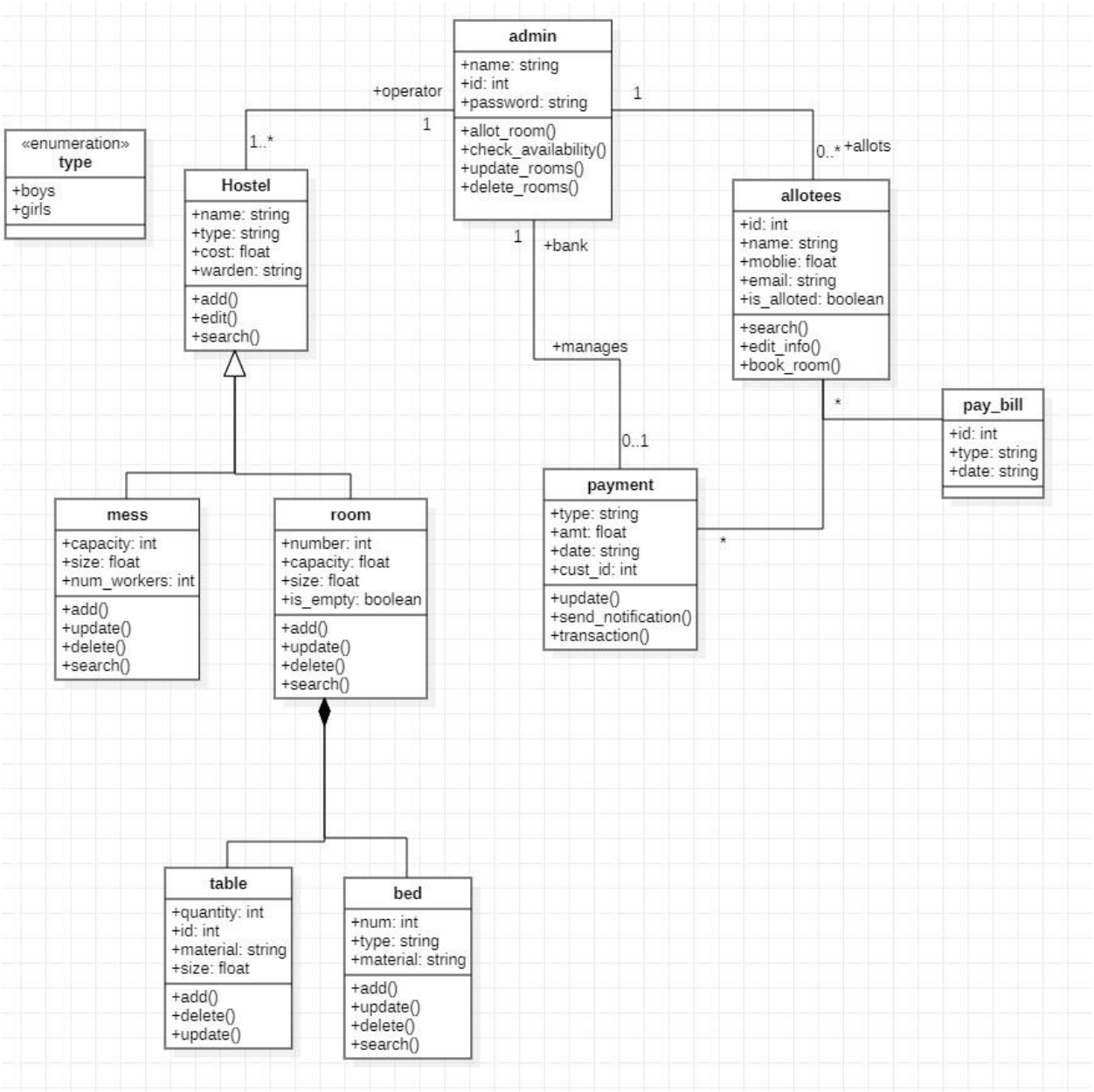
2.1 Problem Statement

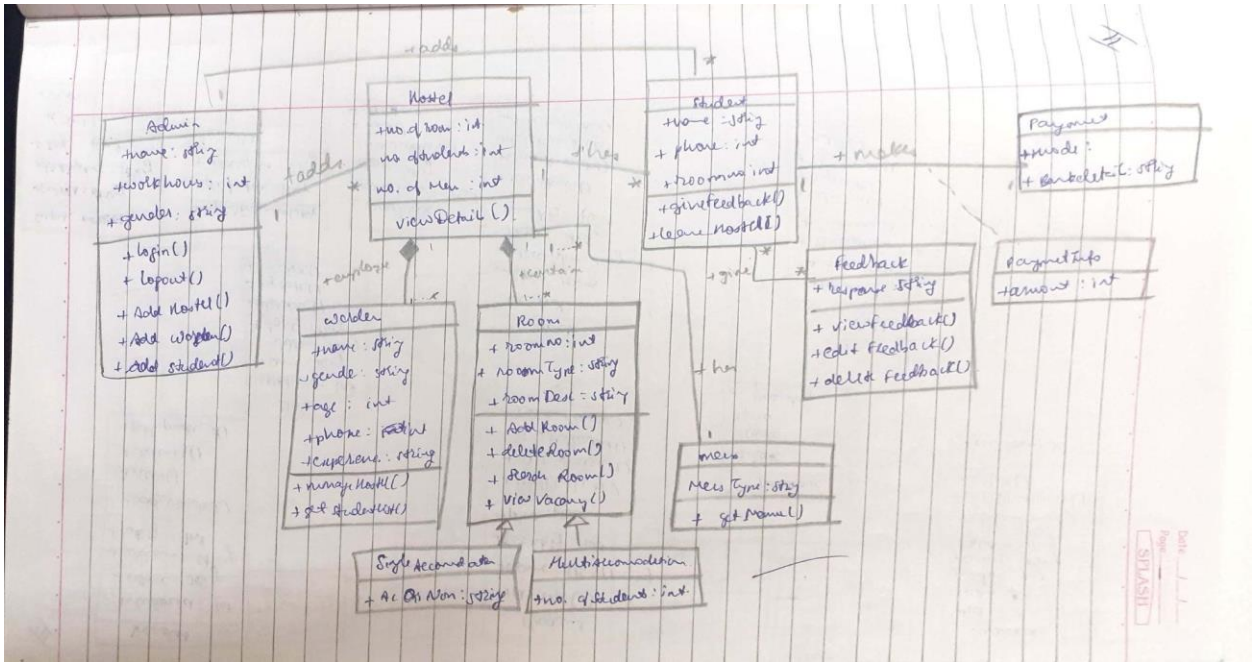
The hostel management system is to provide college students accommodation to the university hostel more efficiently. This project also keeps details of the hostellers and applied students. It is headed by Warden. He will be the administrator.This document is intended to minimize human works and make hostel allocation an easier job for students and hostel authorities by providing online application for hostel.

2.2 Software Requirements Specification

- Hostel management system has an admin who manages the hostel,allot-es and payment methods.The admin will allocate a room to students according to the section or class. Theadmin will also keep track of the payment made by the student/allot-es .
- As the student's course is over they will vacate their rooms. So it is required for the administrator to remove their records from the database tables.
- The allot-es makes payment according to the bill generated which have the attributes bill number,type and date.
- The details of the students staying in the hostels like name, place, address, contact details are maintained in the database.
- The hostel is categorized into two types I.e boys and girls hostel.Each hostel type has different costs ,warden and name.
- A hostel is made up of mess and rooms.A mess account will also generate. This account has the mess status of the whole month. On the base of this account monthly charges of mess of a student will be defined.
- The hostel management system will allow renewing the student's registration every year. The rooms of the hostel are composed of tables and beds,where a count of the same is maintained and the allot-es can use them as they wish.

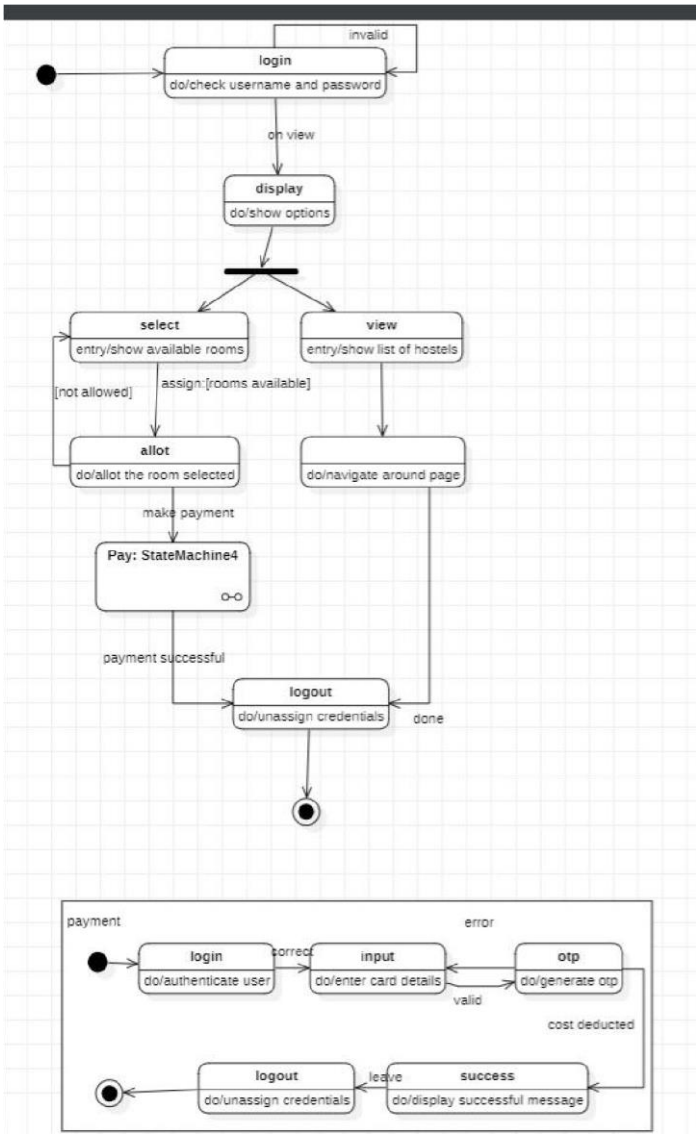
2.3 Class Diagram





Hostel management system has admin who manages the hostel,allot-es and payment methods.The allot-es makes payment according to the bill generated which have the attributes bill number,type and date.The hostel is categorized into two types I.e boys and girls hostel.A hostel is made up of mess and rooms.A mess account will also generate. This account has the mess status of the whole month.

2.4 State Diagrams



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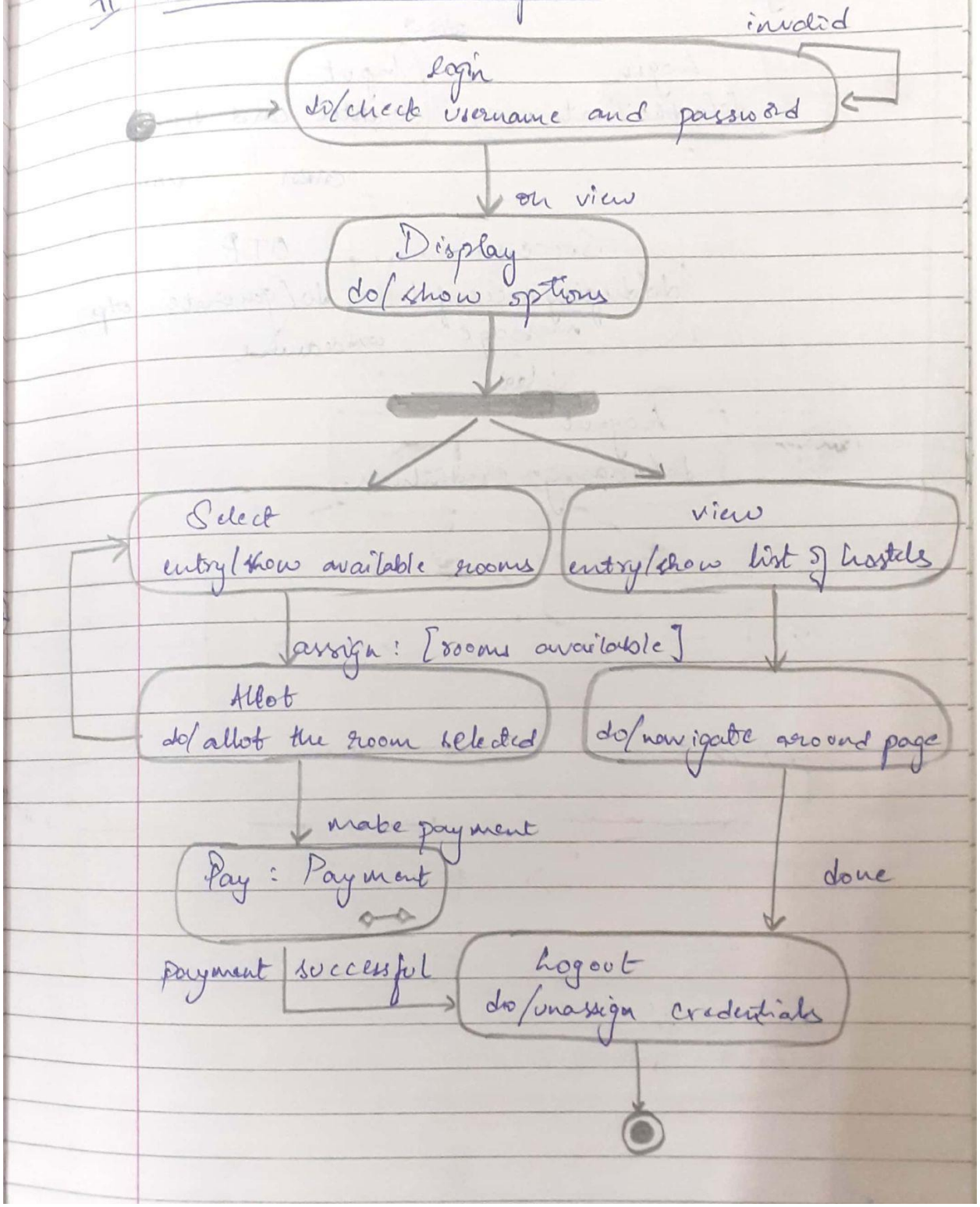
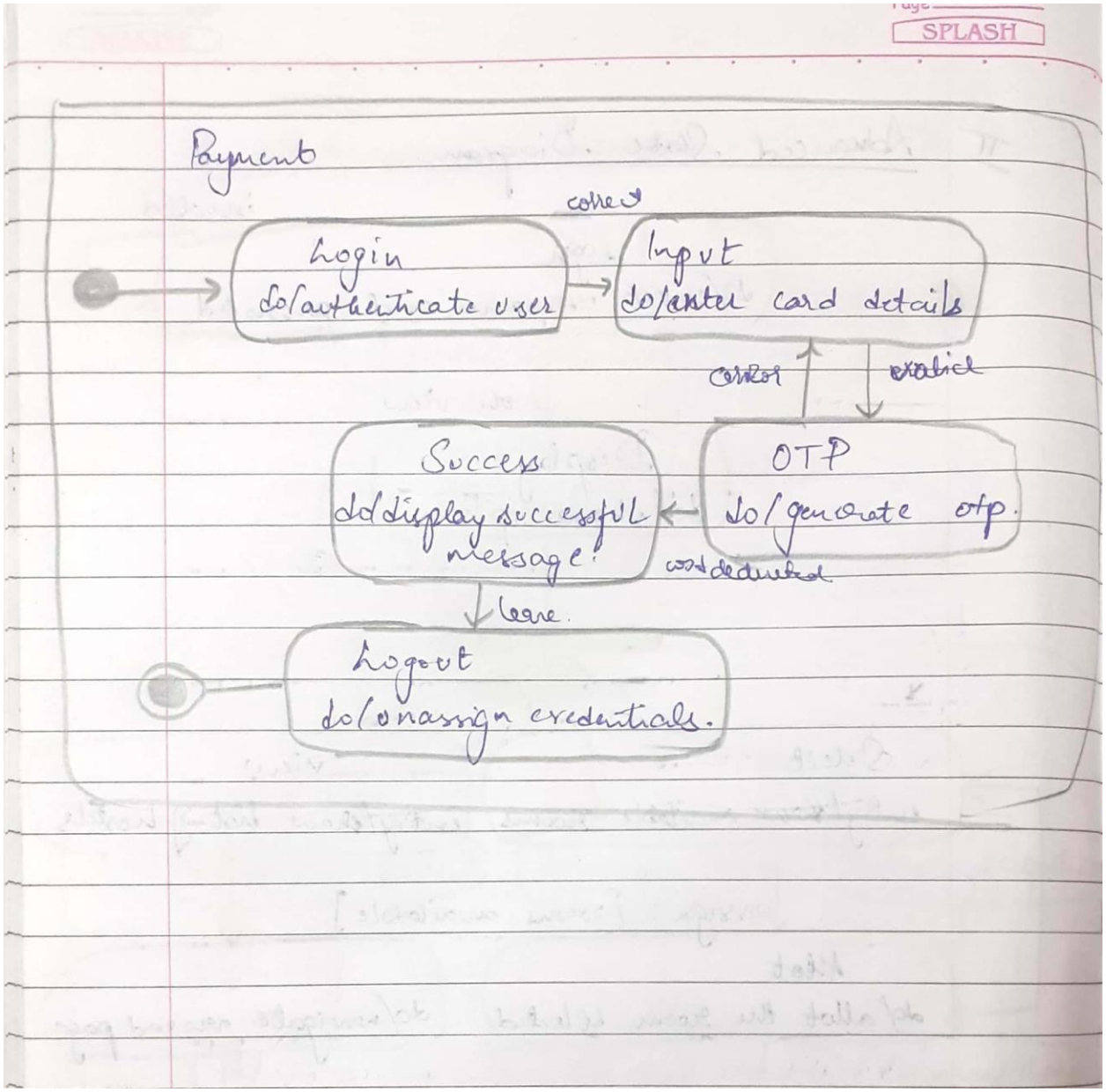
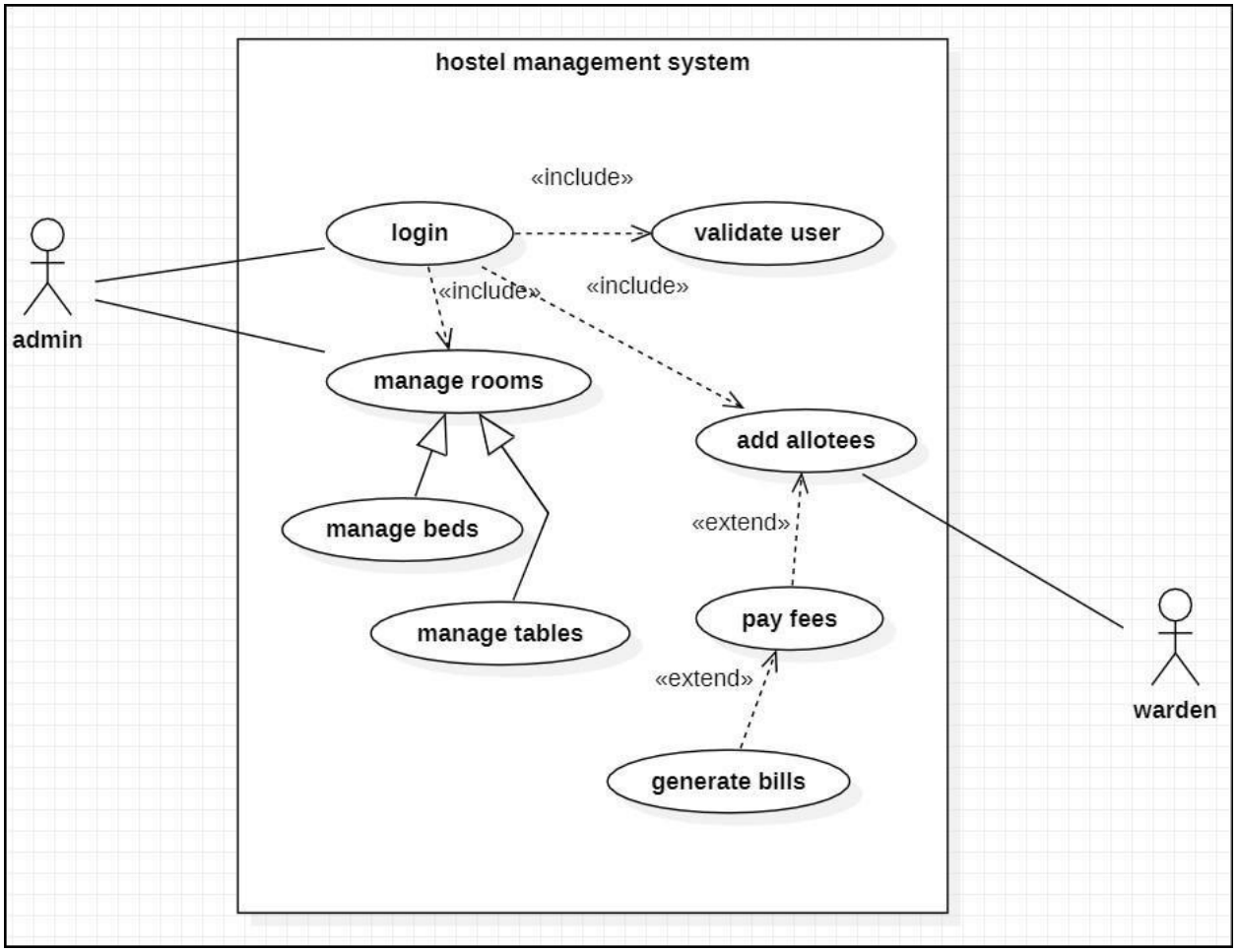
II Advanced State Diagram.

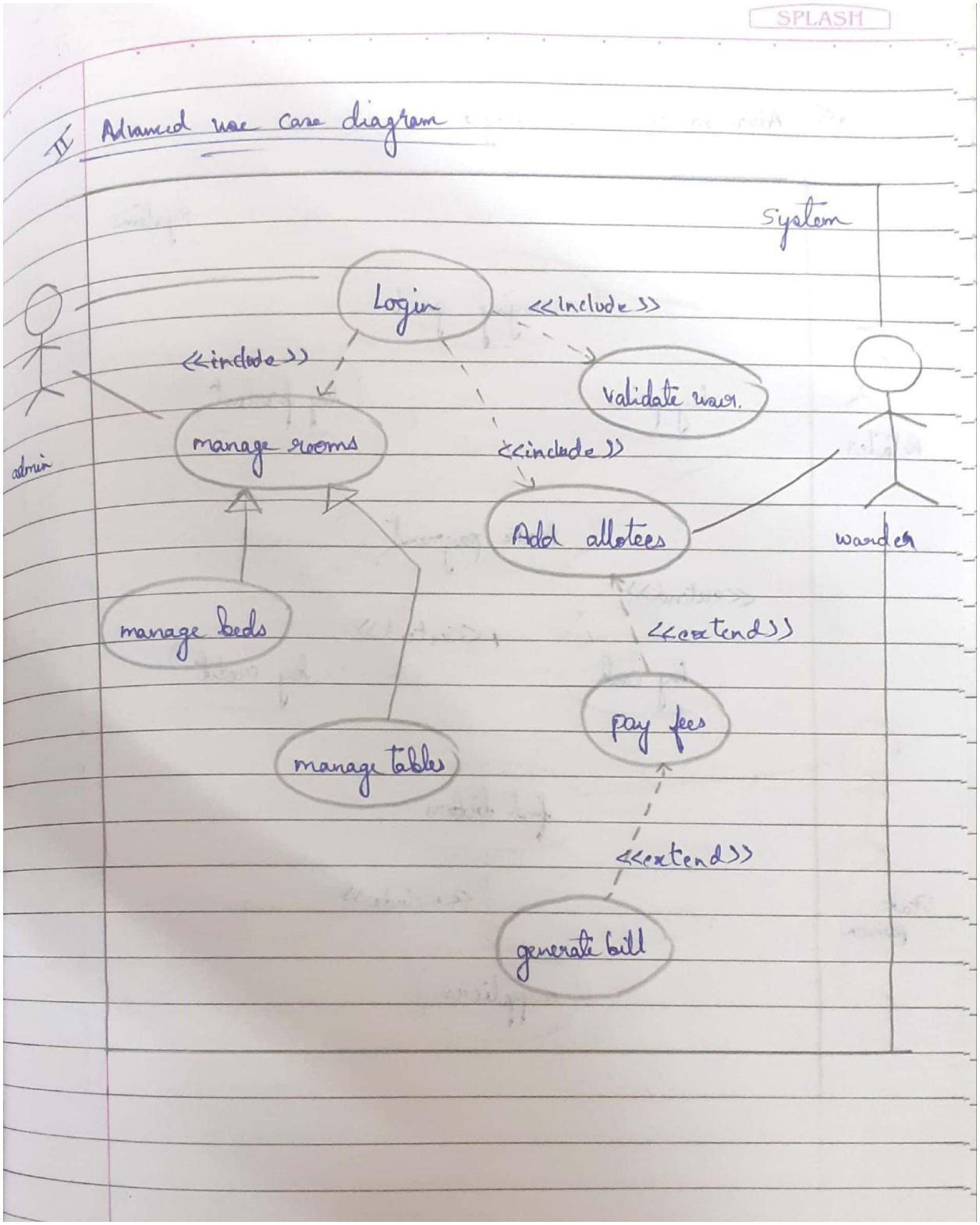




The above state diagram gives the movement of states in allotting a room to a student. The admin allots rooms for students. The admin first login s to the database ,which displays a set of options.the admin then chooses to allot rooms and finds the availability for rooms. If rooms are available then the admin allots room to the student and when successful the student makes the payment. If no rooms are available,a message is displayed and control goes back to the display state.

2.5 Use Case Diagram





Actors:

Admin: the person who manages the whole system

Warden : the person who manages the allottees

Student : the person who uses the hostel system

Use Cases:

Manage hostel : allows actor to update delete or add information

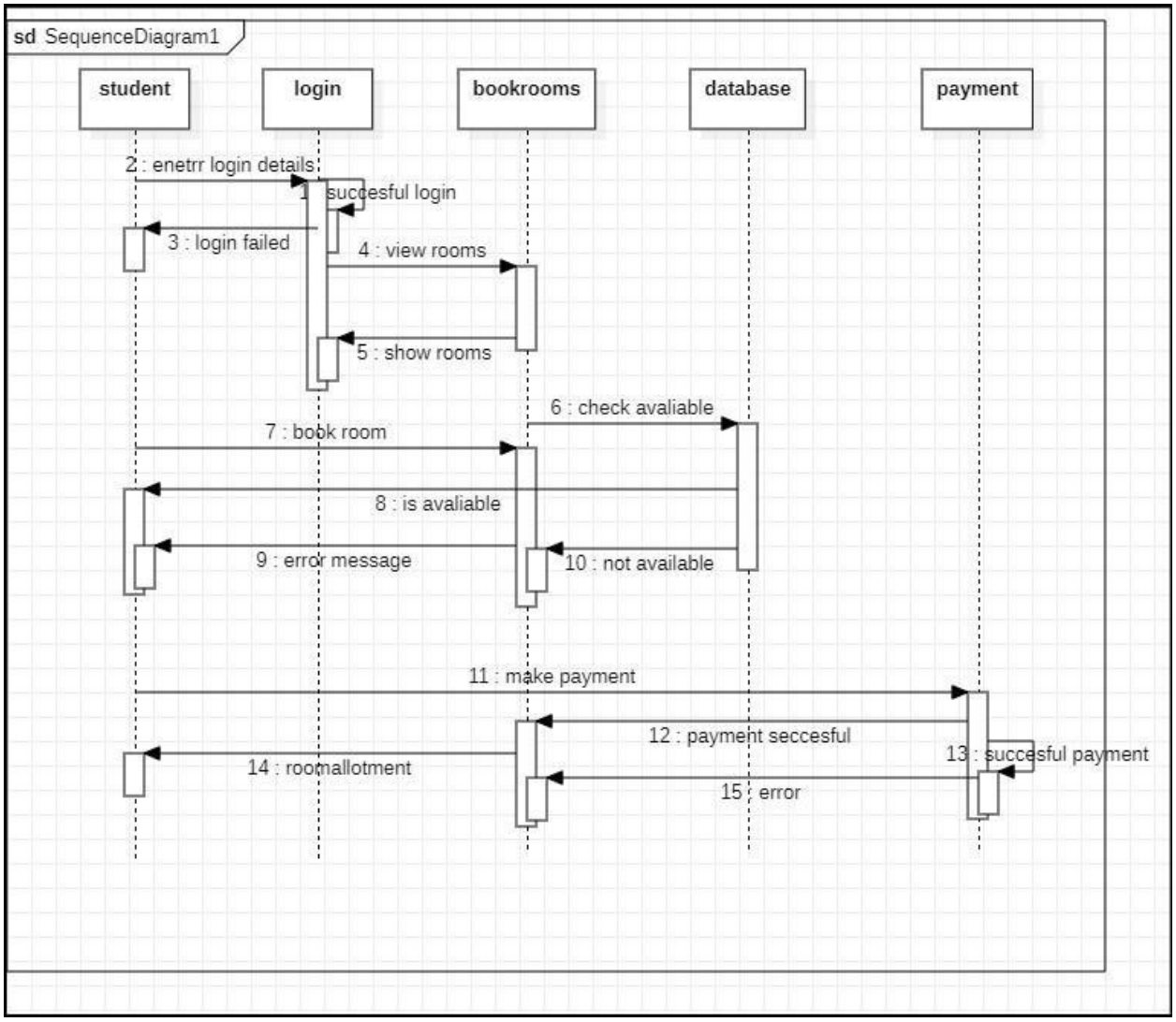
Login : allows actors to login into the system.

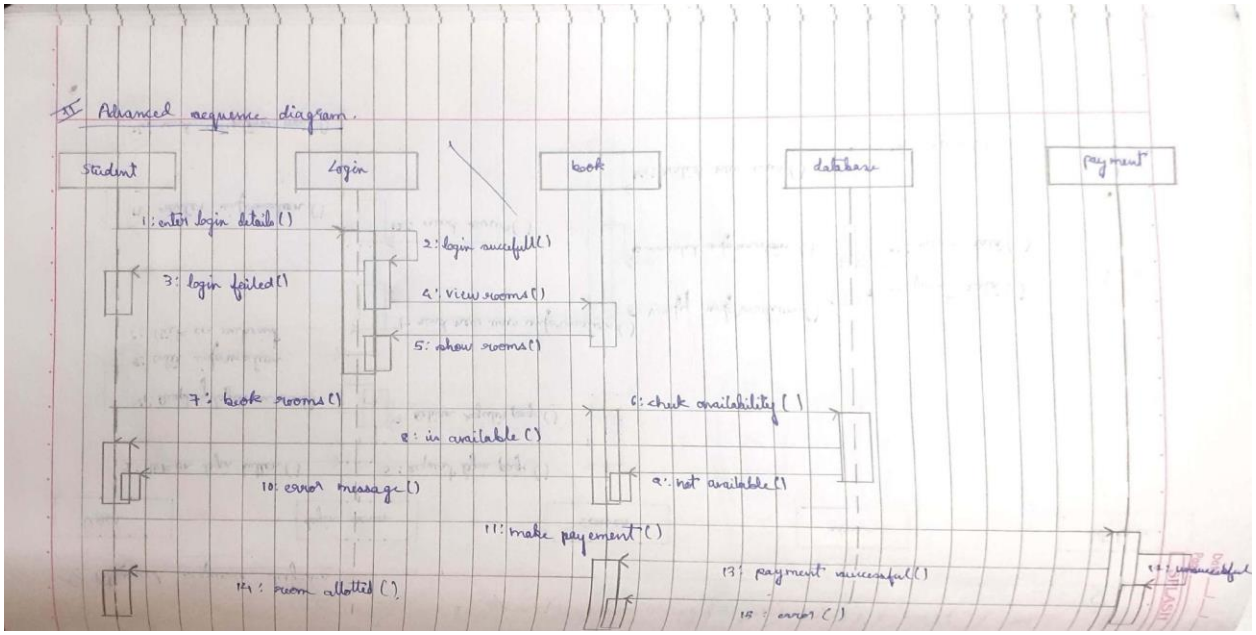
Add allotee: the students are allotted hostel rooms

Book hostel: the student can select the hostel they wish to stay in.

Pay fees: the fees payment is done by this use case.

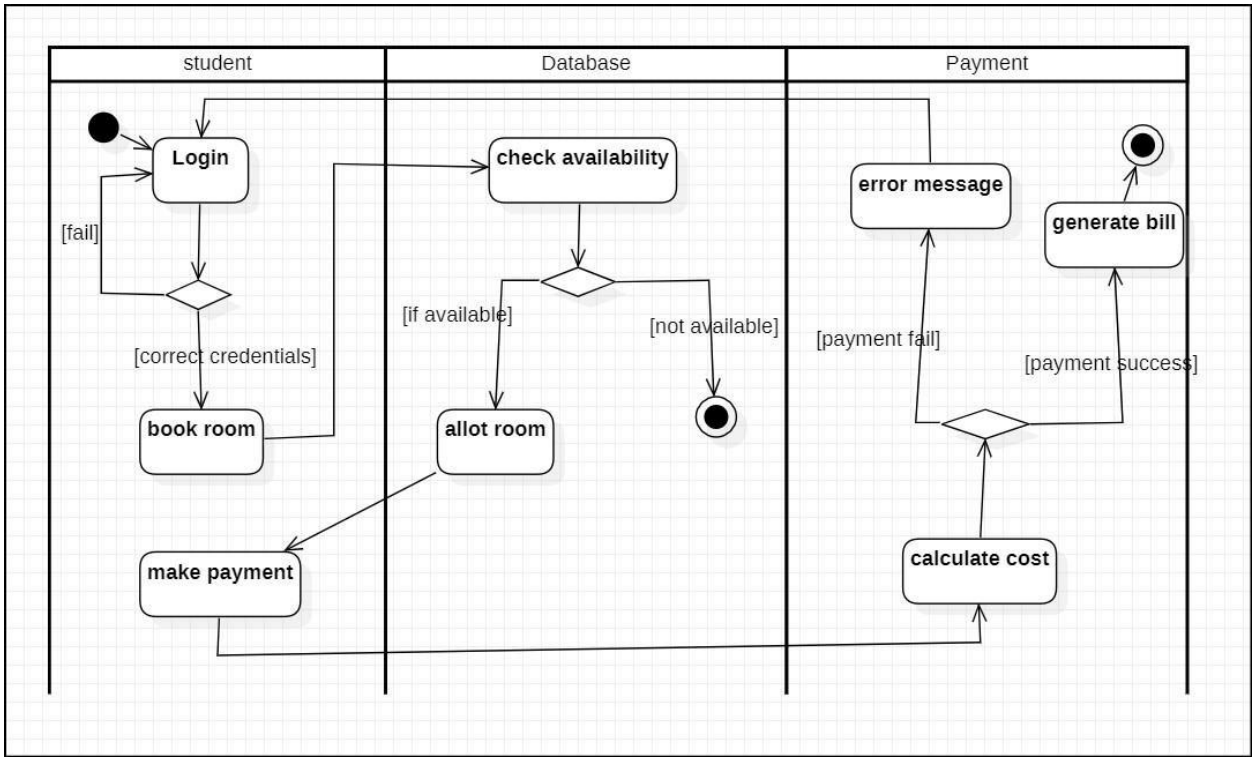
2.6 Sequence Diagram

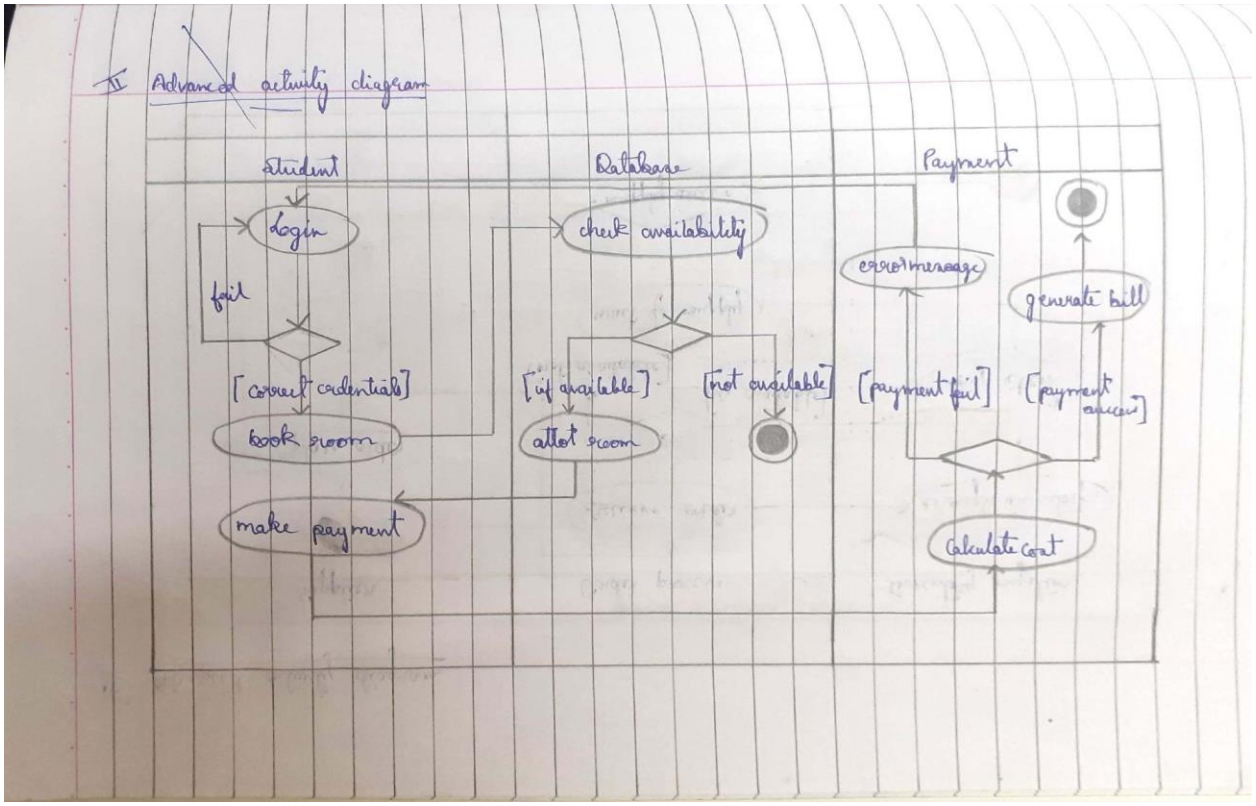




The above sequence diagram give the steps involved in a student logging in, booking a room, which is verified in the database and the payment for the same is made by the student.

2.7 Activity Diagram





The activity diagram tells about the activities involved in payment of fees. The above activity diagram gives the steps involved in a student logging in, booking a room, which is verified in the database and the payment for the same is made by the student.

3. Stock Maintenance System

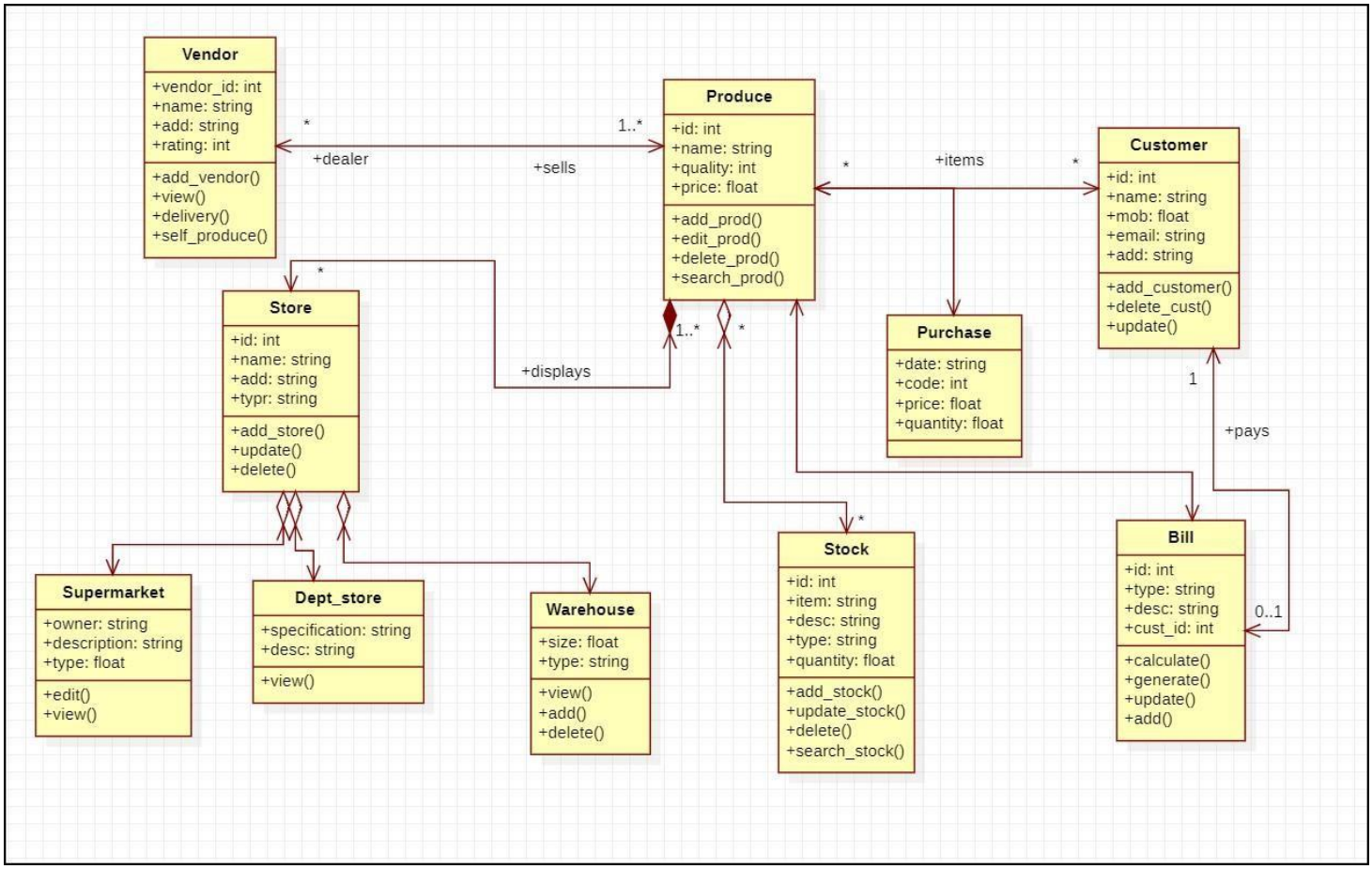
3.1 Problem Statement

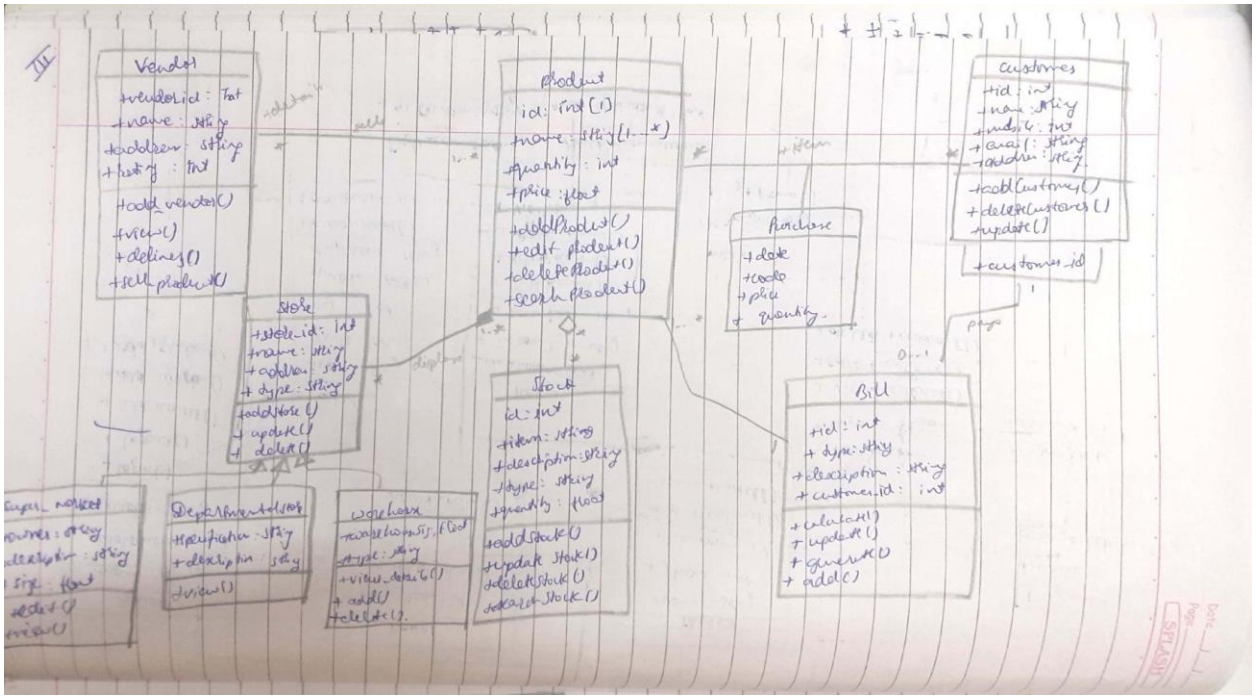
The stock maintenance system is basically for the customers who access the information about the stock and retrieves the information.The stock maintenance system is to replace the existing maintenance system which is inefficient. The new stock maintenance system will allow the employee to record information of the products available in the store. The vendor deals with the information about the details of the suppliers giving products to the organization.

3.2 Software Requirement Specification

- The customer can purchase one or more product on any day,which will have a code price and quantity.
- The customer will need to pay the bill for the products he or she has purchased.the bill number,type description and customer who is paying the bill is maintained.
- The stock of the products is maintained separately,The stock deals with information about the details of the product that the concern handling.
- Stock consist of details such as the name of the product, id generated, quantity, cost, etc. This information is retrieved during the sales and purchase of a product.
- The vendor deals with the information about the details of the suppliers giving product to the organization.
- Vendor consist of details such as vendor name, address, email id, sales tax number etc. This information is retrieved when a Purchase is done
- The products are displayed in stores across the city or world. All the information regarding the store such as store id,name,address and type are used to locate any product.The stores can be of many types.Some of them are departmental stores,super markets and ware houses where the products are kept for display.

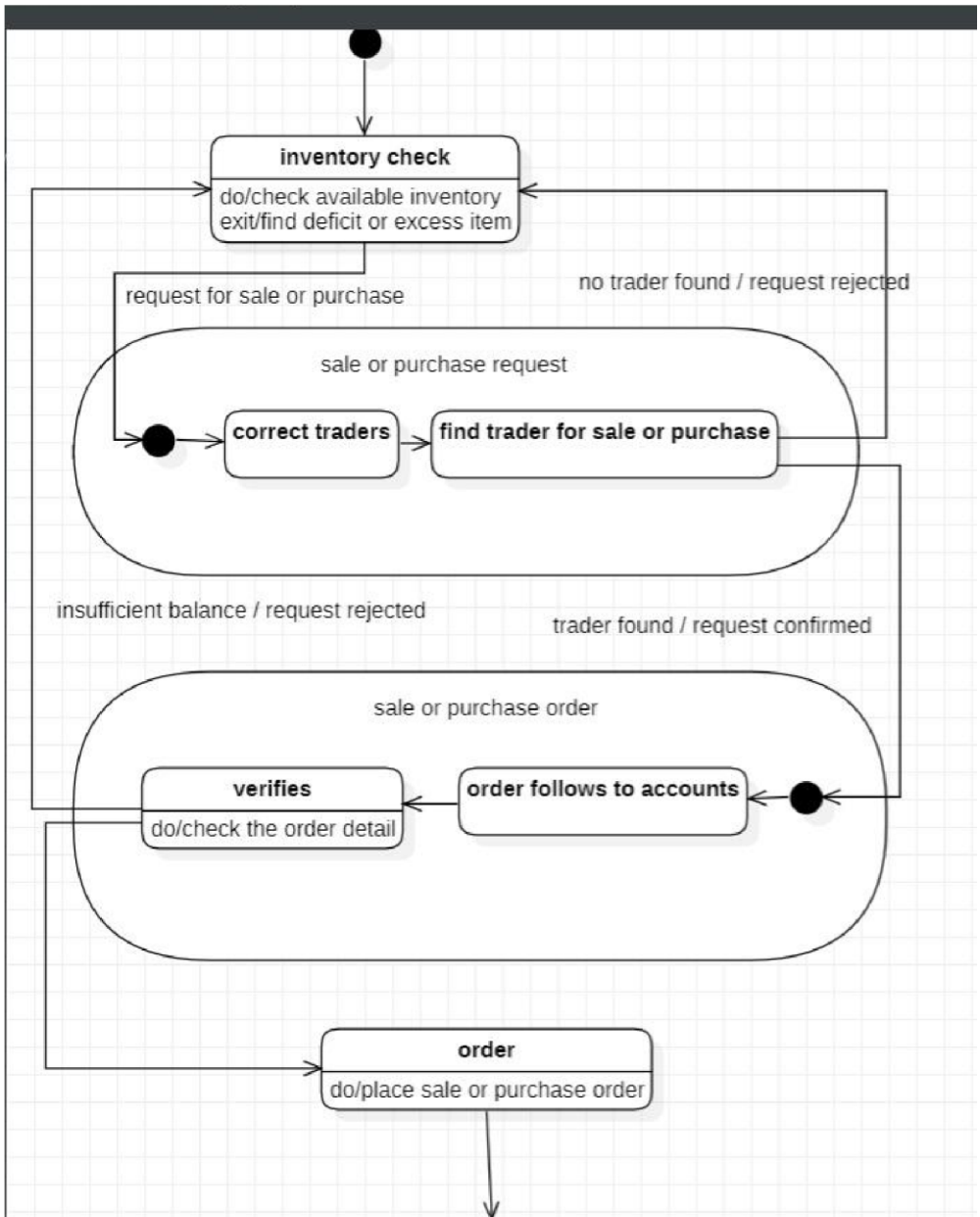
3.3 Class Diagram





The products are displayed in stores across the city or world. All the information regarding the store are used to locate any product.The stores can be of many types.Some of them are departmental stores,super markets and warehouses where the products are kept for display.The vendor deals with the information about the details of the suppliers giving product to the organization.The stock of the products is maintained separately.The stock deals with information about the details of the product that the concern handling.

3.4 State Diagrams



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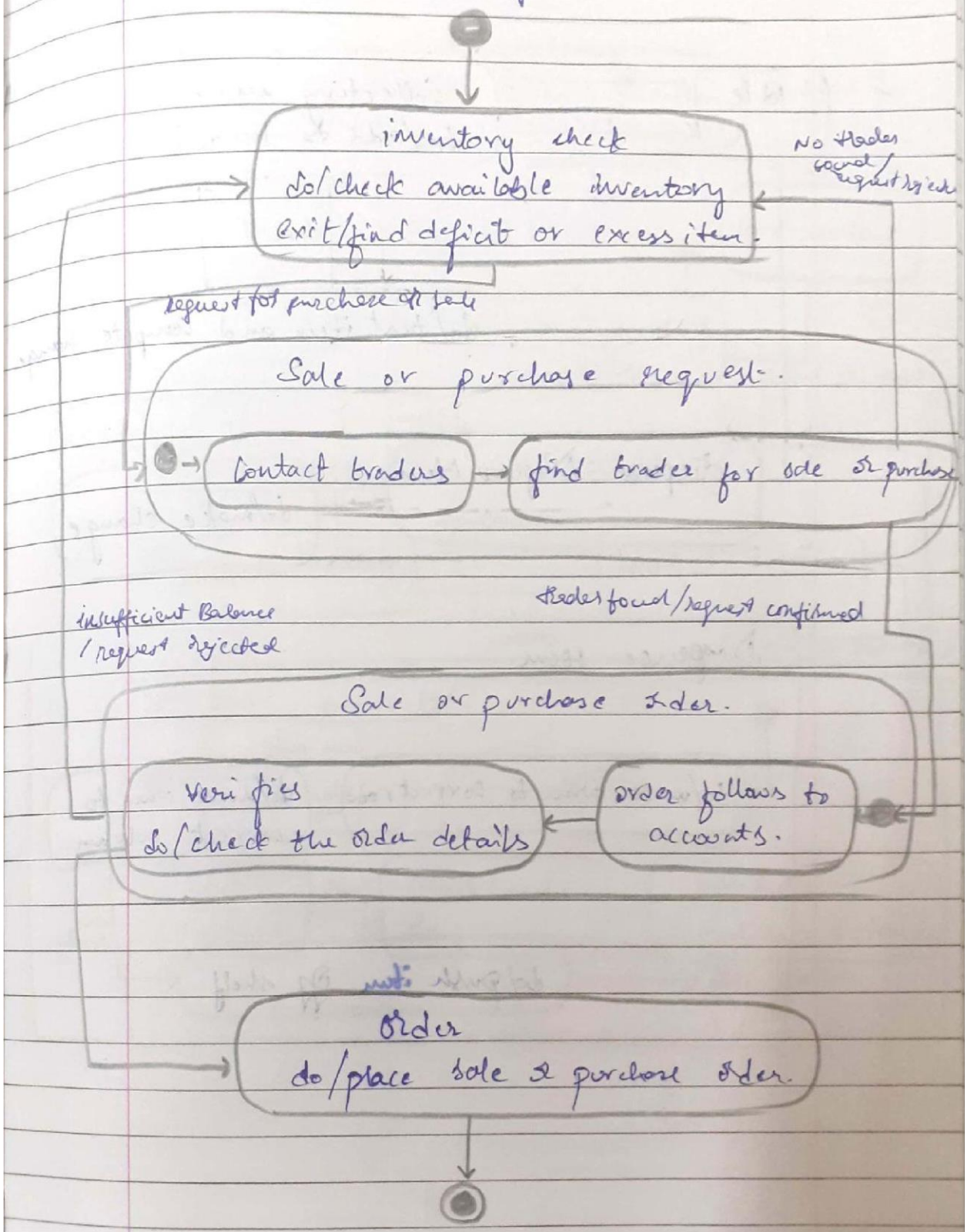
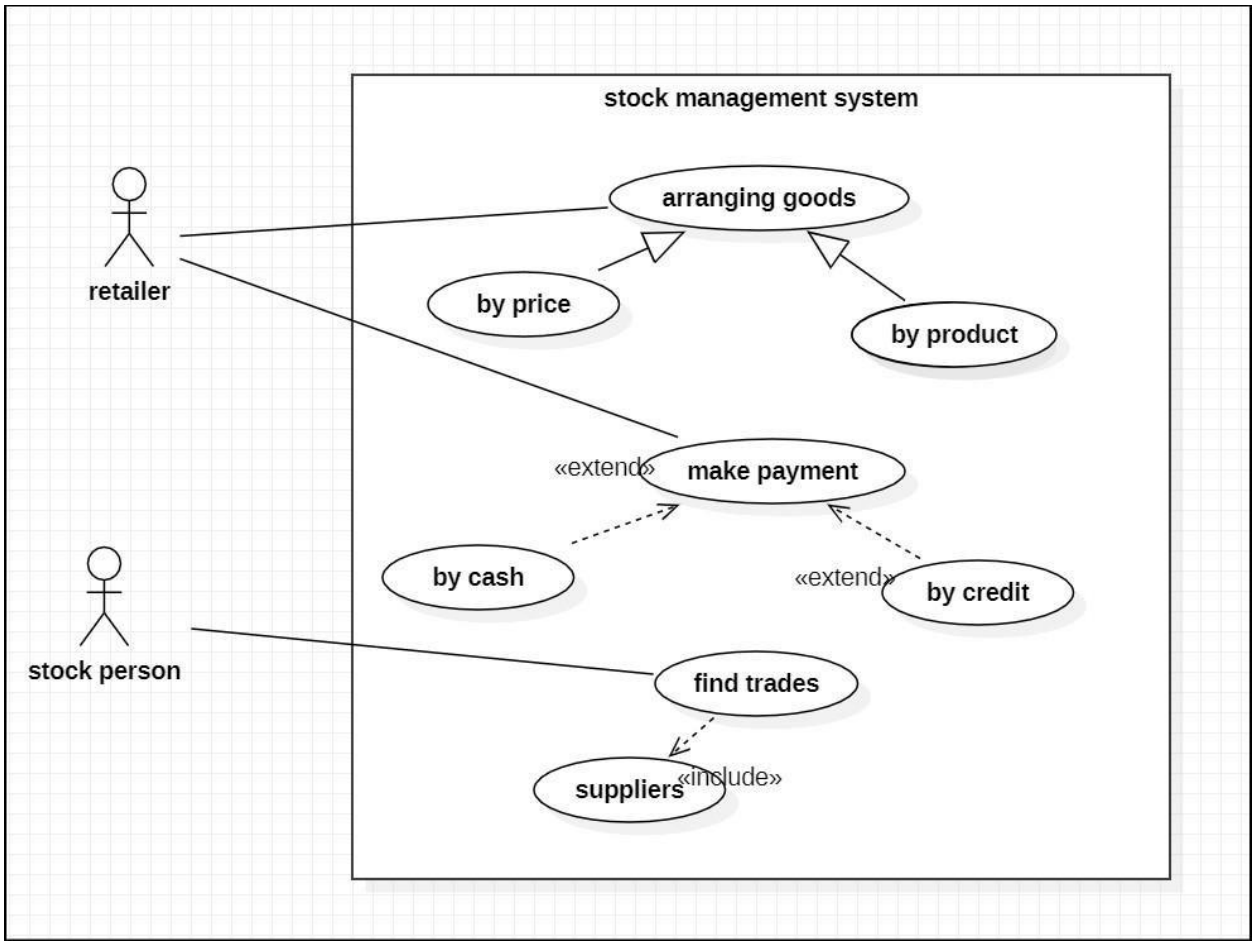
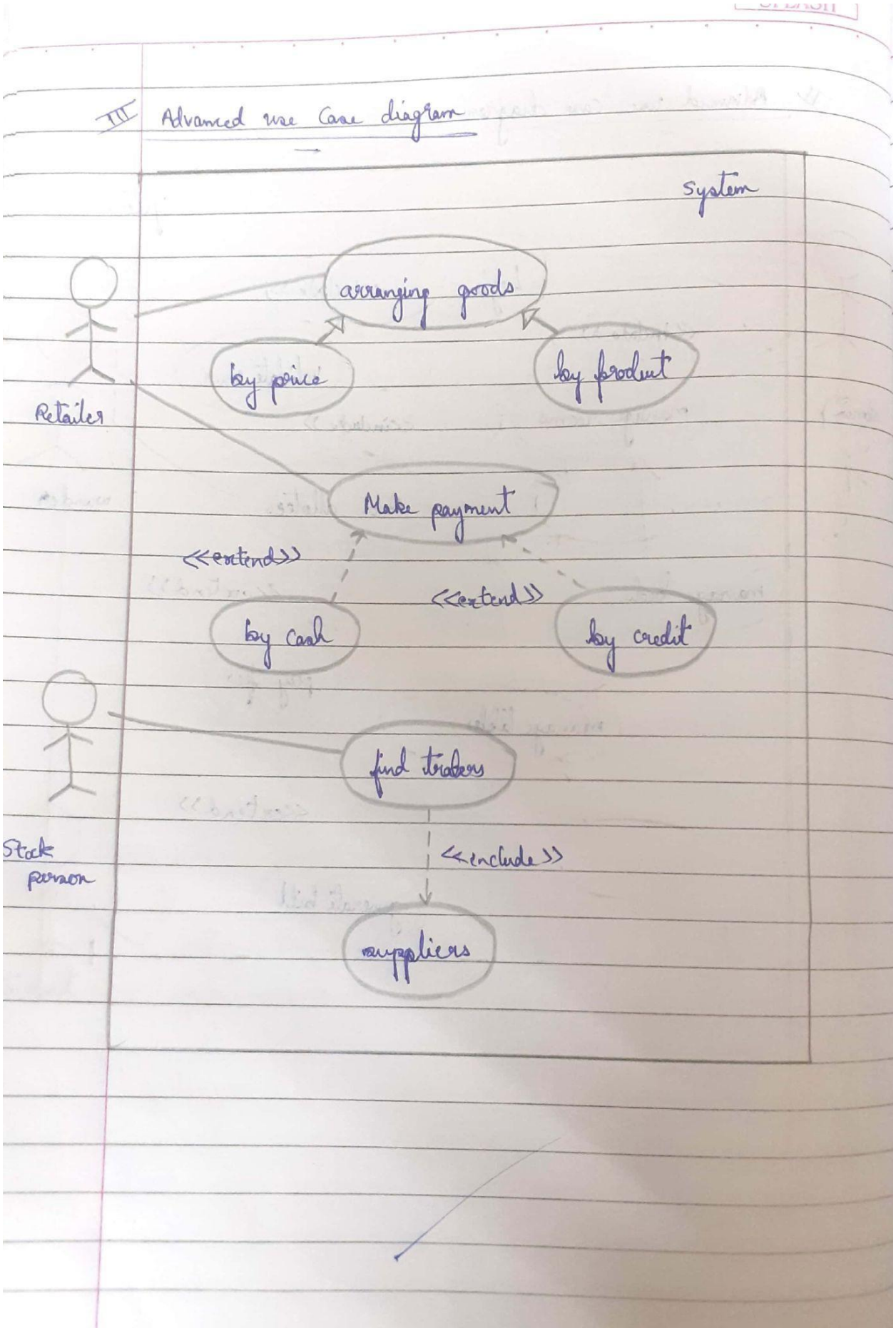
III Advanced State Diagram.



The state diagram above gives us the states involved in purchasing a product and placing the order for the same. There is first an inventory check ,where the stock of products is noted and if the stock is less than minimum an order is placed by first searching for a suitable trader . If a suitable trader is found , the order is placed and verified by the accountant. After the accountant has verified a payment is made for the products purchased

3.5 Use Case Diagram




III Advanced use Case diagram
System
arranging goods
by price
by product
Retailer
Make payment
<<extend>>
<<extend>>
by cash
by credit
find traders
<<include>>
suppliers
Stock person

Actors:

Customer: a person who purchases the products

Retailer: a person who sells the products

Use Cases:

Purchase item: allows a user to purchase any product

Make payment: accepts the payment

Supply stock: keeps track of the stock supplied

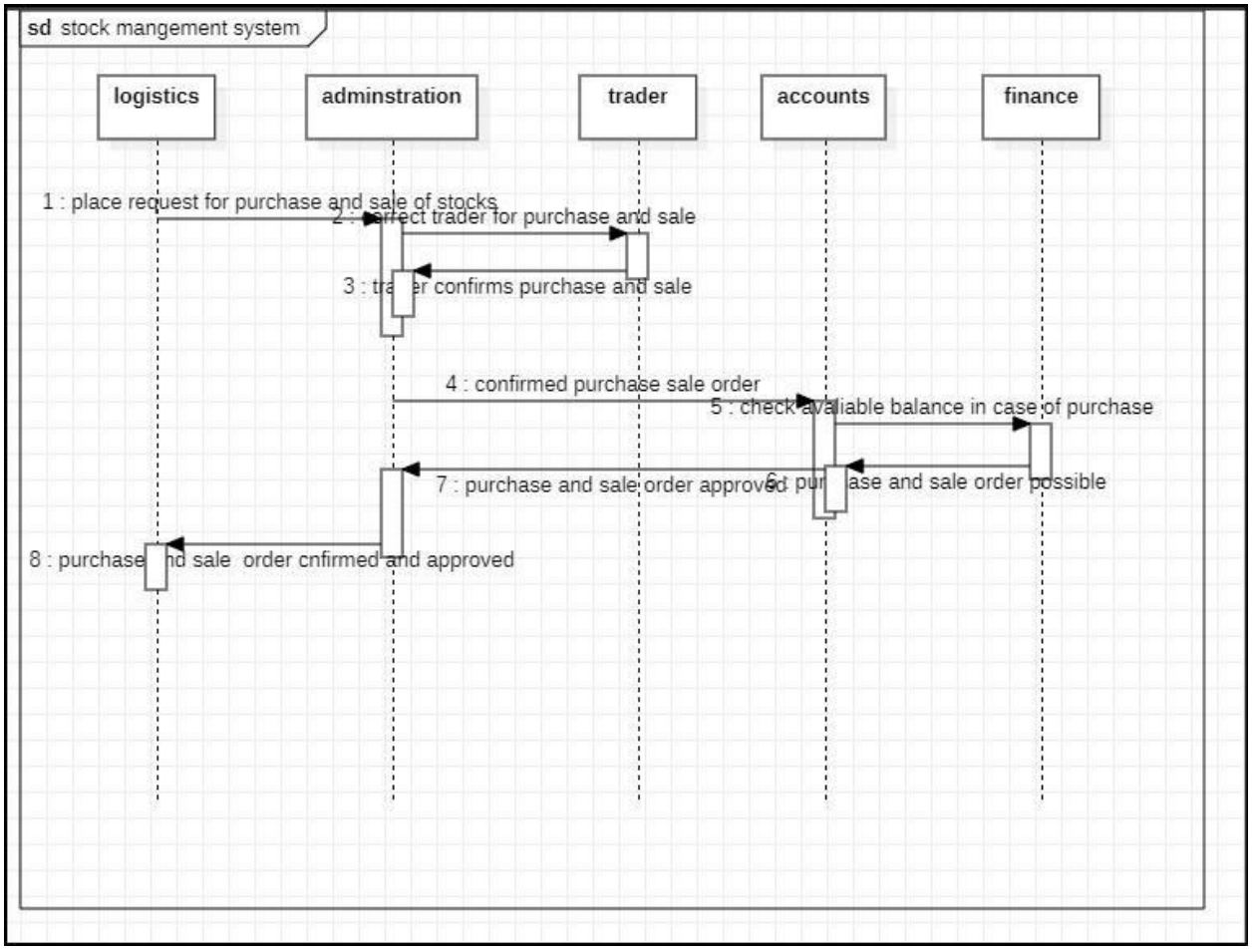
Find traders: provides a list of traders

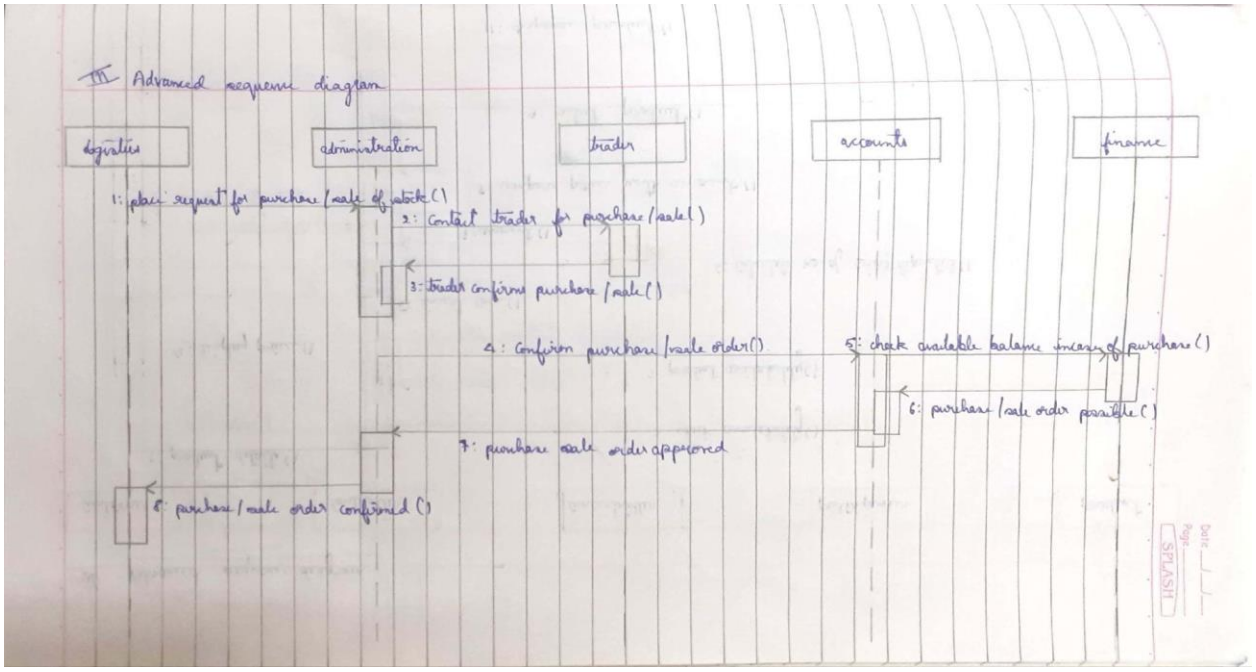
Update stock: the stock list is updated by the stock person

Order goods: the products coming to an end are ordered

Prepare bill:a bill for products purchased is made

3.6 Sequence Diagram





Place request for purchase/sale of stock

Contact seller for purchase/sale

Seller confirms purchase/sale

Confirmed purchase/sale order

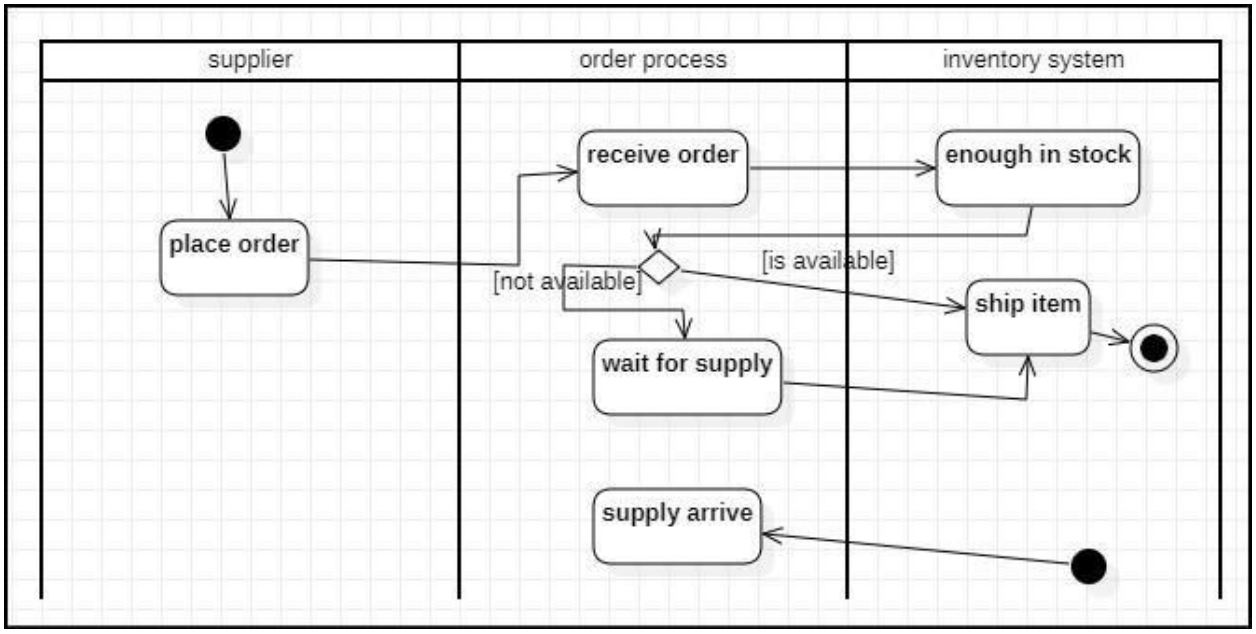
Check available balance in case of purchase order

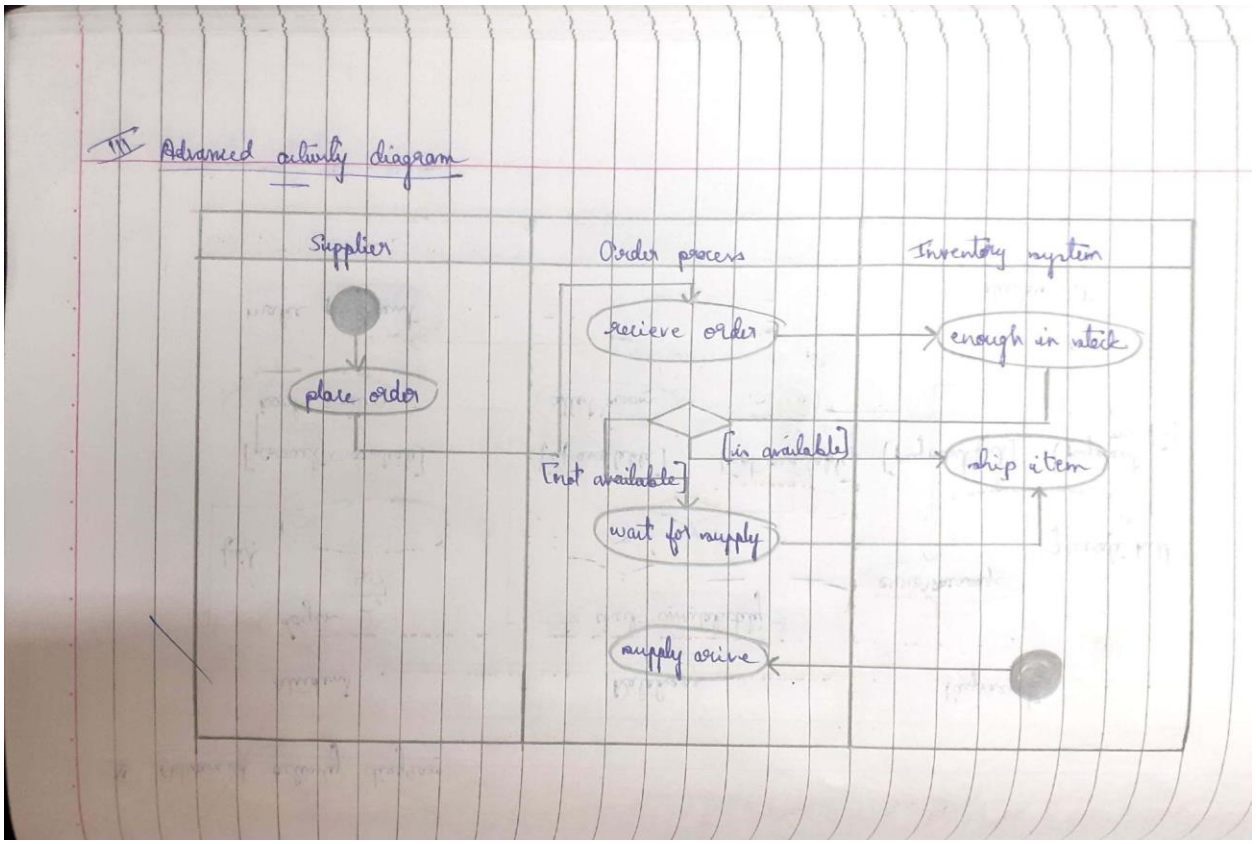
Purchase/sale order possible

Purchase/sale order approved

Purchase/sale of stock confirmed and approved.

3.7 Activity Diagram





The above advanced activity diagram gives us the activities involved with each swim lane. There are three swimlanes I.e supplier,order process and inventory system which have the activities of placing order, receiving order and check for stock, and ship the item respectively.

4. Coffee Vending Machine

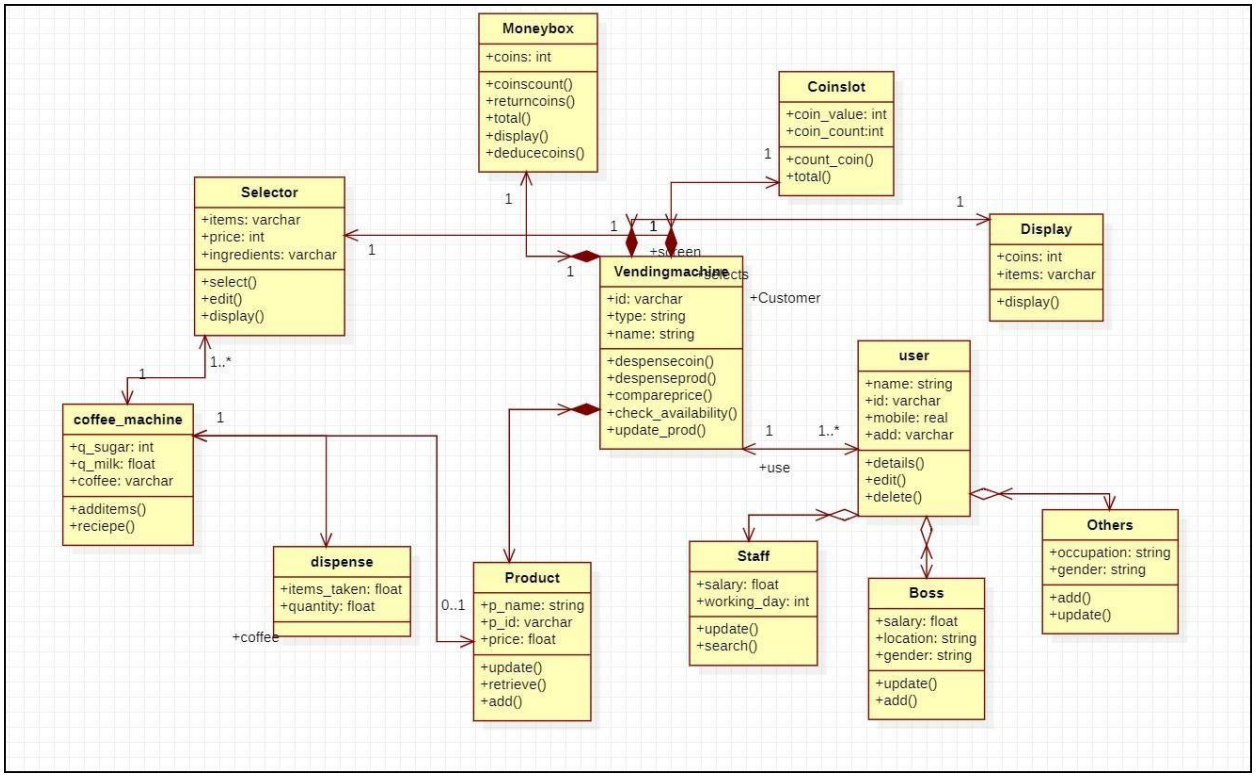
4.1 Problem Statement

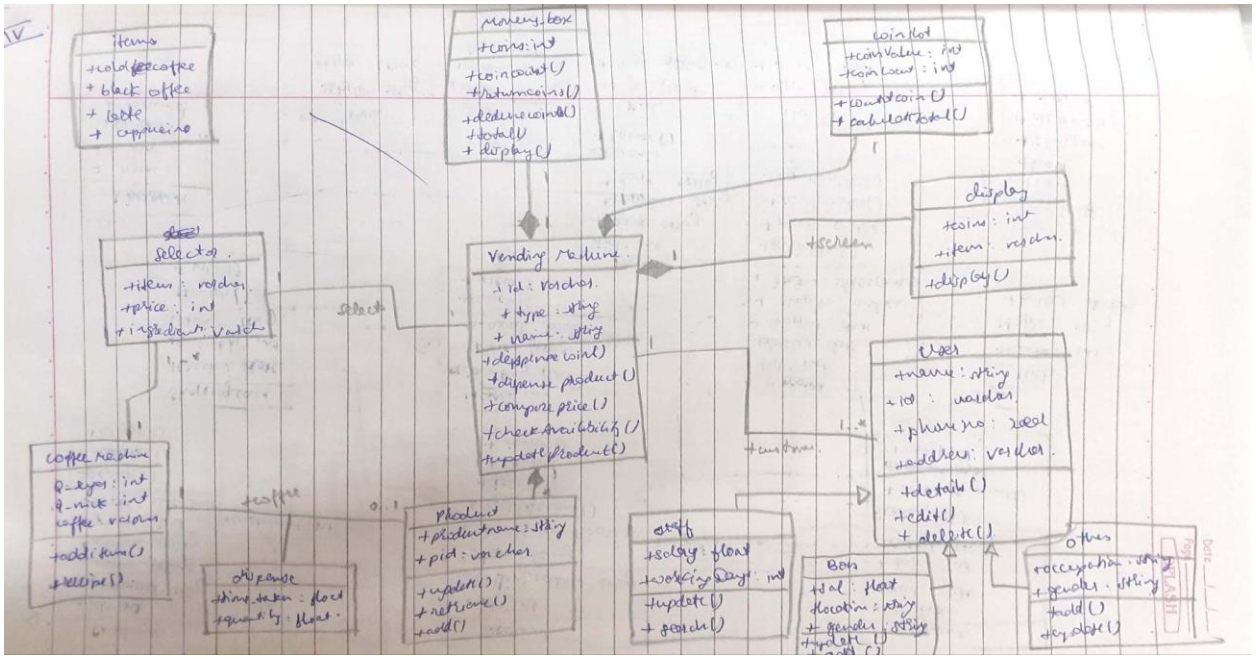
The coffee vending machine is basically for the customers to buy coffee by themselves without any third person being involved. A coffee vending machine sells different types of coffee such as cappuccino,black coffee,cold coffee and latte. Each type of coffee has a price and a name. A customer can buy their choice of coffee by selecting the button of their coffee and paying for the same through the coin box.

4.2 Software Requirements Specification

- The vending machine must have money box, coin slot, display screen and products i.e coffee for the machine to be used.
- The user on selecting a coffee ,the coffee machine must be able to dispense the selected coffee to the user.
- The user shall get empty cup placed right below the filter.The user shall be able to choose his preferred beverage from the list of options(buttons).
- There must be buttons(start,pause,stop,coffee,tea,milk) for user to interact with the system.
- The user shall be able to purchase one kind of available drink at a time and get back the exact changes if he has put extra money. The user shall be able to quit the dispense of any beverage at any time during the dispensing.
- The system(machine) shall check for properly inserted coins.
- The system shall be able to dispense coffee(or selected beverage) after a coin has been inserted.
- The system must accept coins of different amounts and the system must compare the item cost with the entered coin.
- The system must check the validity of coins.
- The system shall be able to detect the low amount of ingredients and low number of cups and indicate with an indicator(small LED).

4.3 Class Diagram

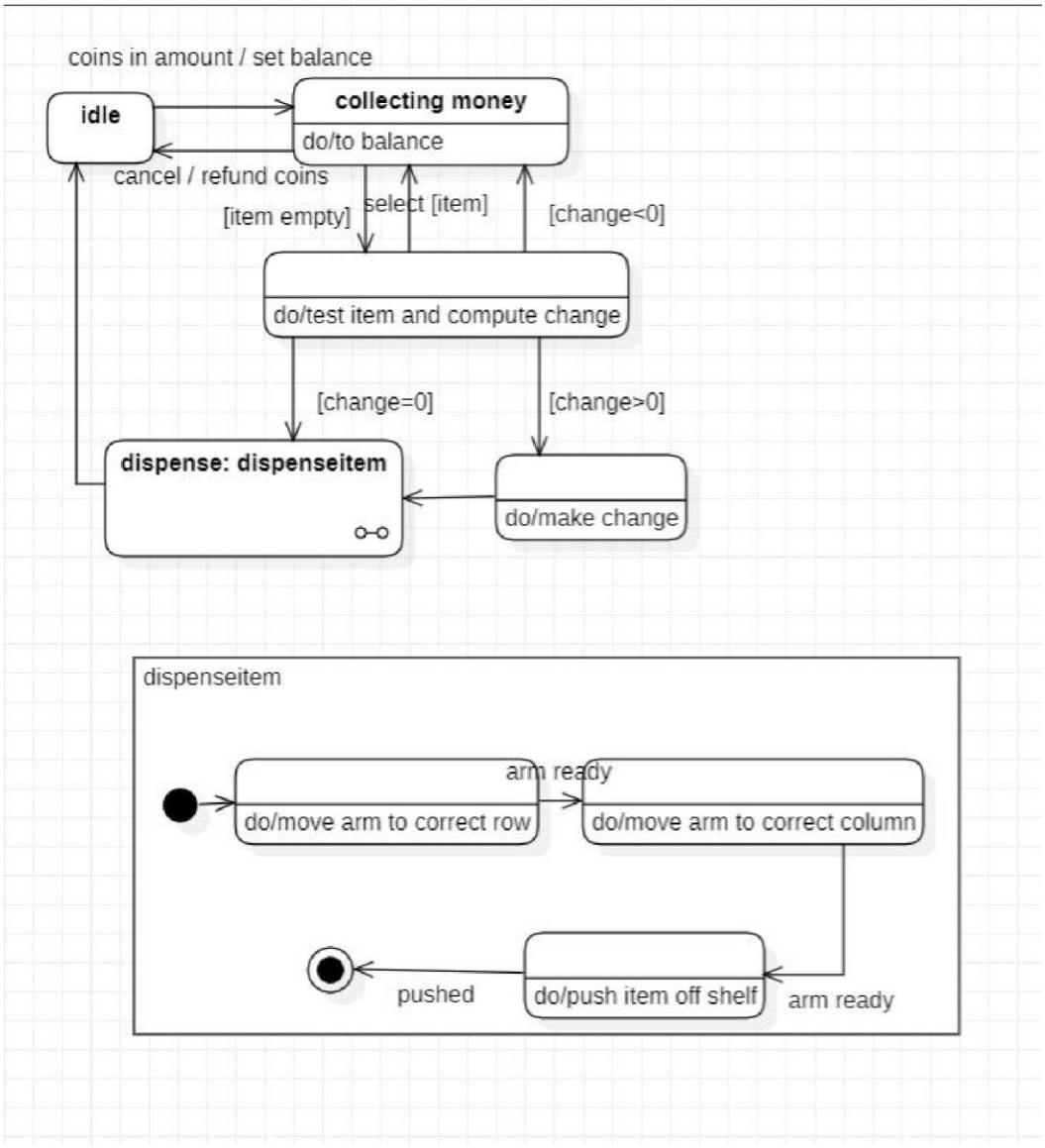


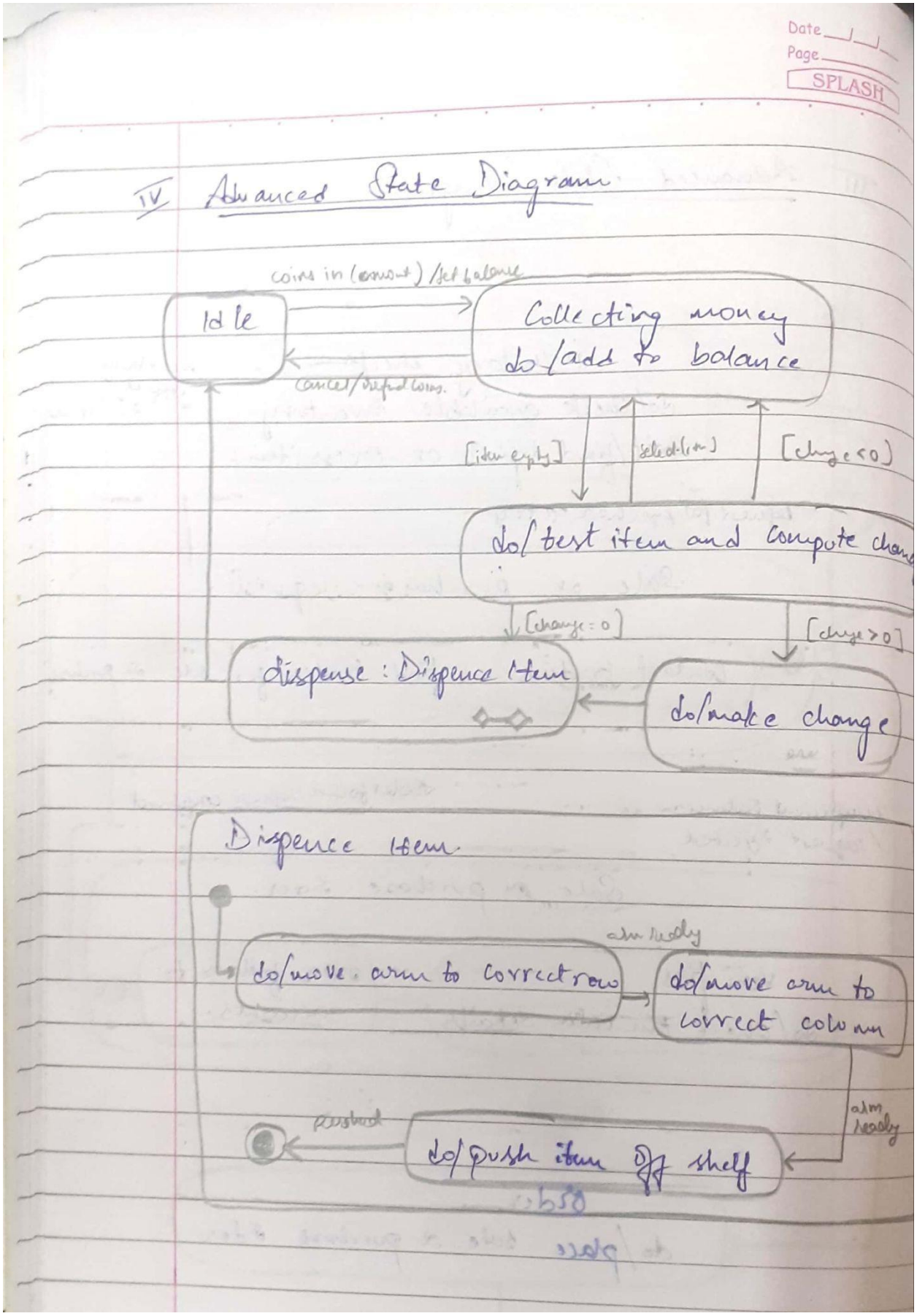


The vending machine must have a money box, coin slot, display screen and products i.e coffee for the machine to be used.The user on selecting a coffee ,the coffee machine must be able to dispense the selected coffee to the user. The user shall get an empty cup placed right below the filter.The user shall be able to choose his preferred beverage from the

list of options.There are different types of coffee such as cappuccino,black coffee,cold coffee and latte. Each type of coffee has a price and a name. A customer can buy their choice of coffee by selecting the button of their coffee and paying for the same through the coin box.

4.4 State Diagram

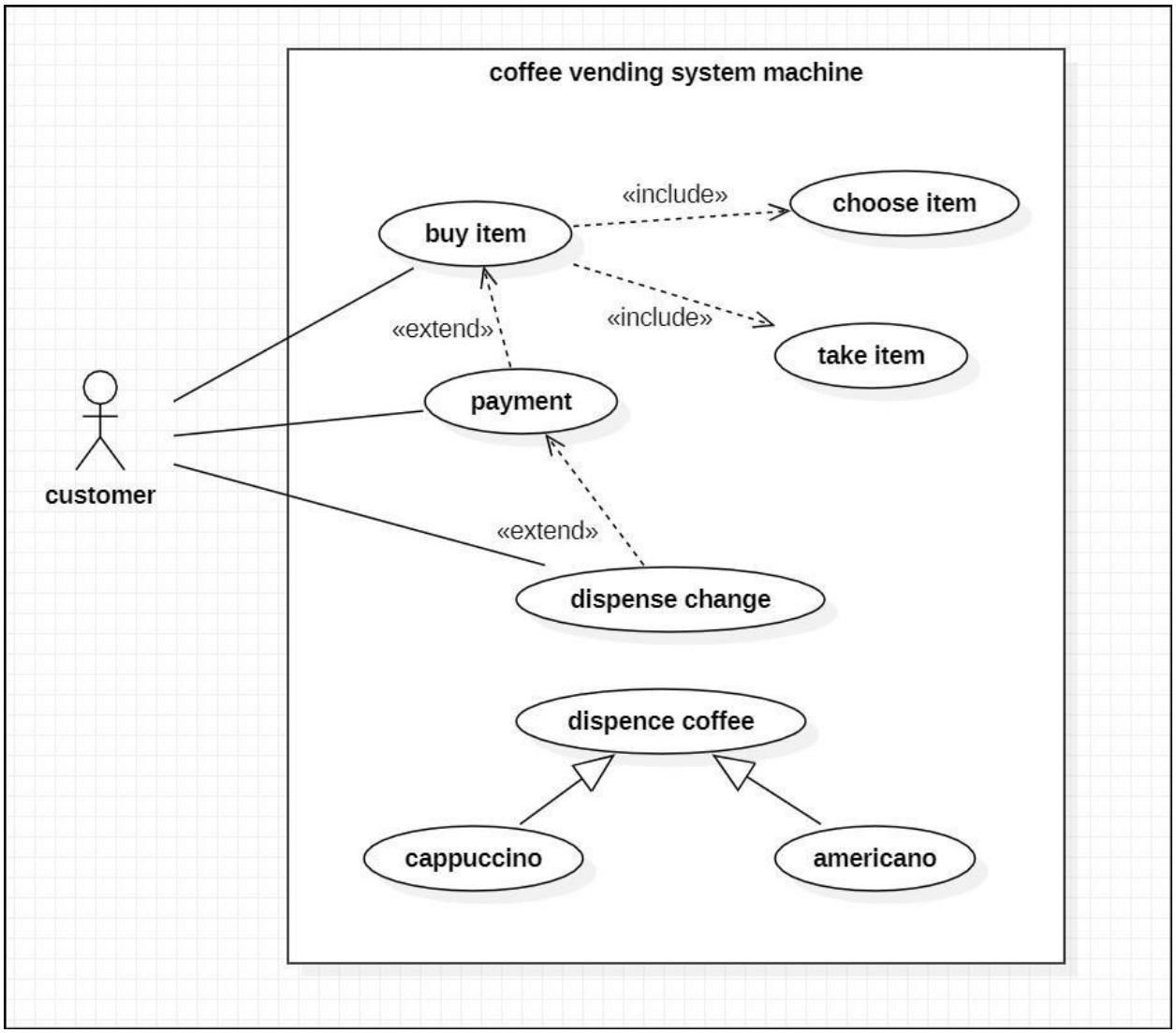


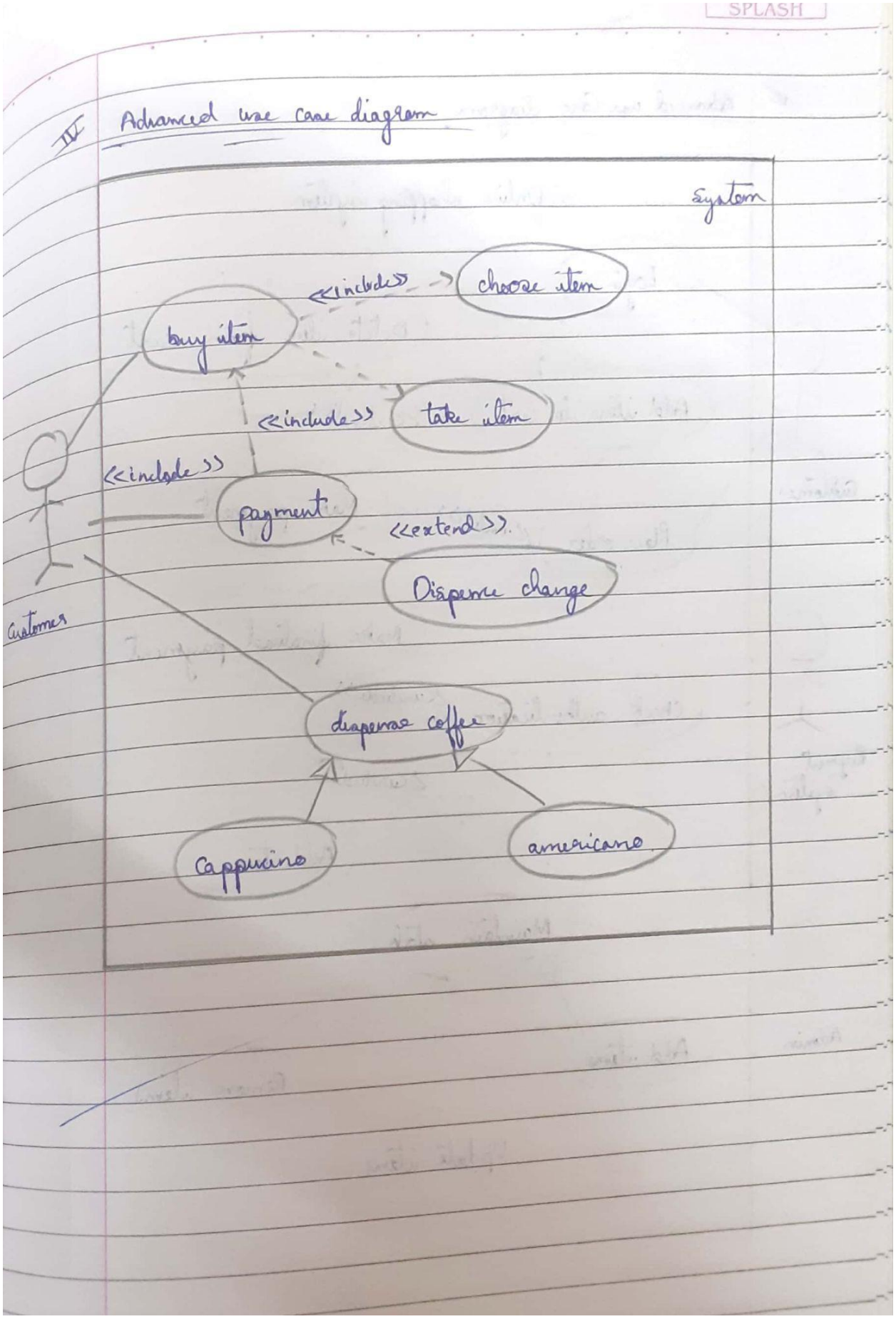


Initially the vending machine is in the waiting state. The machine displays the selected item selected by the user. When the person inserts

a coin the machine adds the amount to the cumulative balance. After adding some coins, a person can select any item. If an item is empty or the balance is insufficient,the machine waits for another selection. Otherwise the machine dispenses the item and returns the appropriate change. The state diagram for coffee vending machine has a submachine called dispense Item ,which has the states for dispensing an item from the vending machine.the arm of the machine first moves to an appropriate row,when ready,moves to an appropriate column and when the arm is ready it finally dispenses the item from the machine.

4.5 Use Case Diagram


coffee vending system machine
«include»
choose item
buy item
«include»
take item
«extend»
payment
customer
«extend»
dispense change
dispence coffee
cappuccino
americano


SPLASH
IV Advanced use case diagram
System
choose item
<<include>>
buy item
take item
<<include>>
<<include>>
payment
<<extend>>
Dispense change
Customer
dispense coffee
Cappuccino
americano

Actors:

Customer :a person who uses the coffee vending machine

Use Case:

Display payment details : displays the payment details

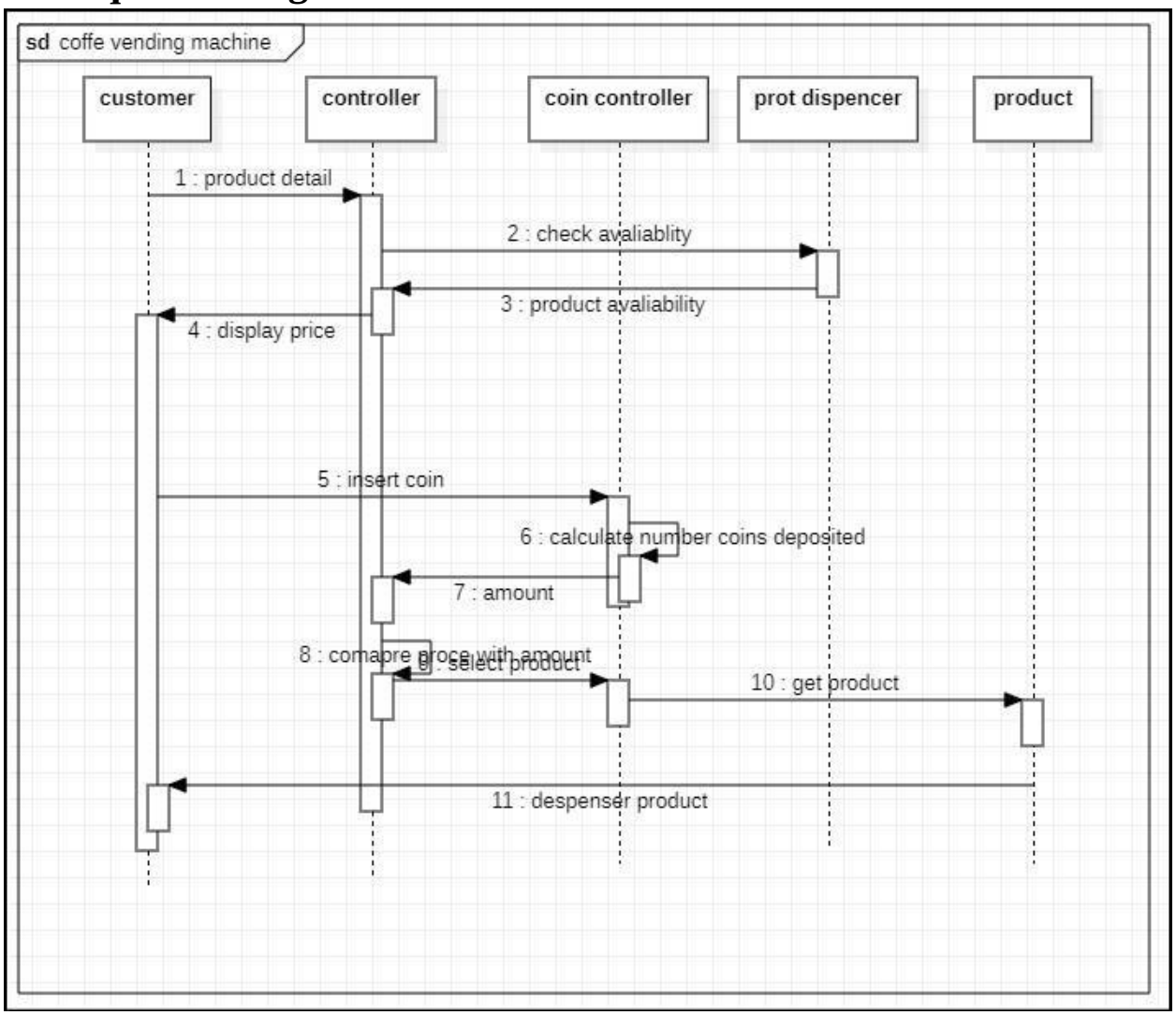
Request coffee : allows user to order their coffee

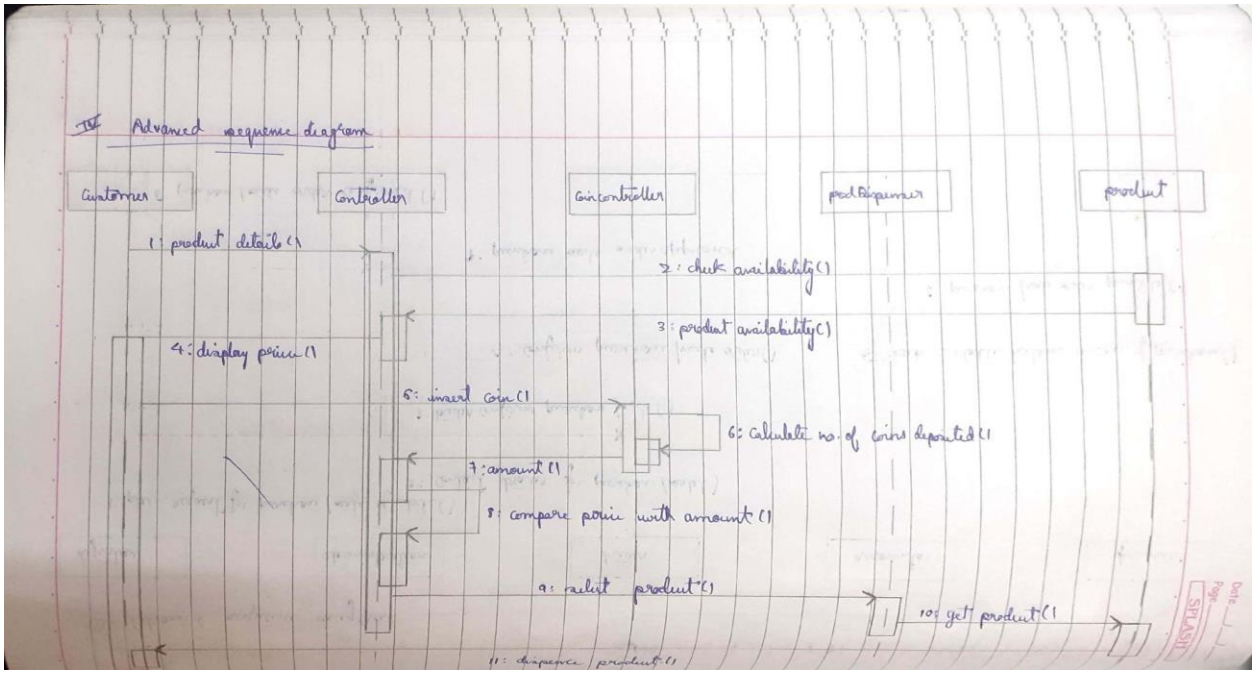
Make payment : accepts money for the coffee

Load ingredients : is the use case where the operator fills the machine with ingredients

Dispense coffee : the coffee ordered is prepared and given

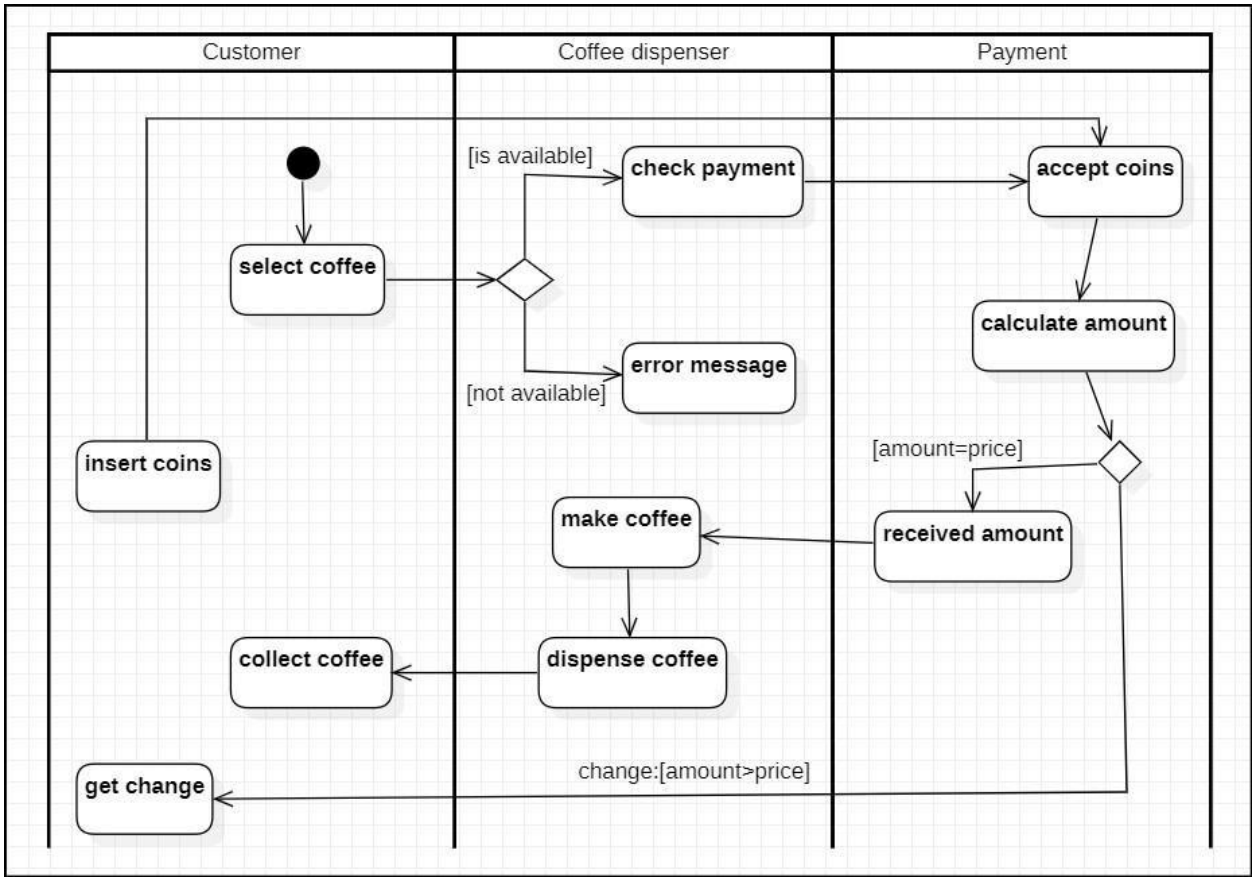
4.6 Sequence Diagram

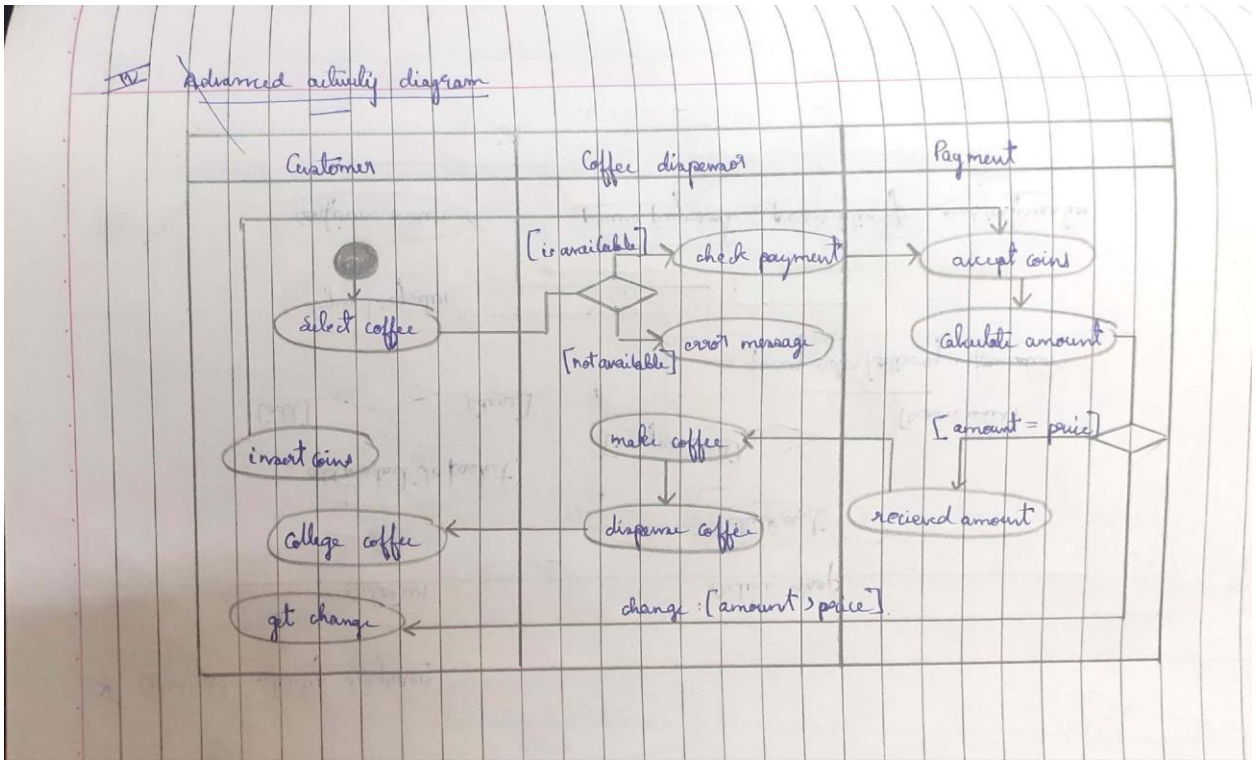




The above sequence diagram gives us the steps involved in dispensing a product from the coffee machine. First an enquiry for the product is made and if available the coins are inserted and calculated ,if correct the product is dispensed .

4.7 Activity Diagram





The advanced activity diagram has three swimlanes i.e customer,coffee dispenser and payment. The customer can select coffee ,insert coins,get

change and collect coffee. The coffee dispenser checks for payment and makes ,dispenses the coffee. The payment lane accepts coins, calculates the amount and gives back the change.

5. Online Shopping System

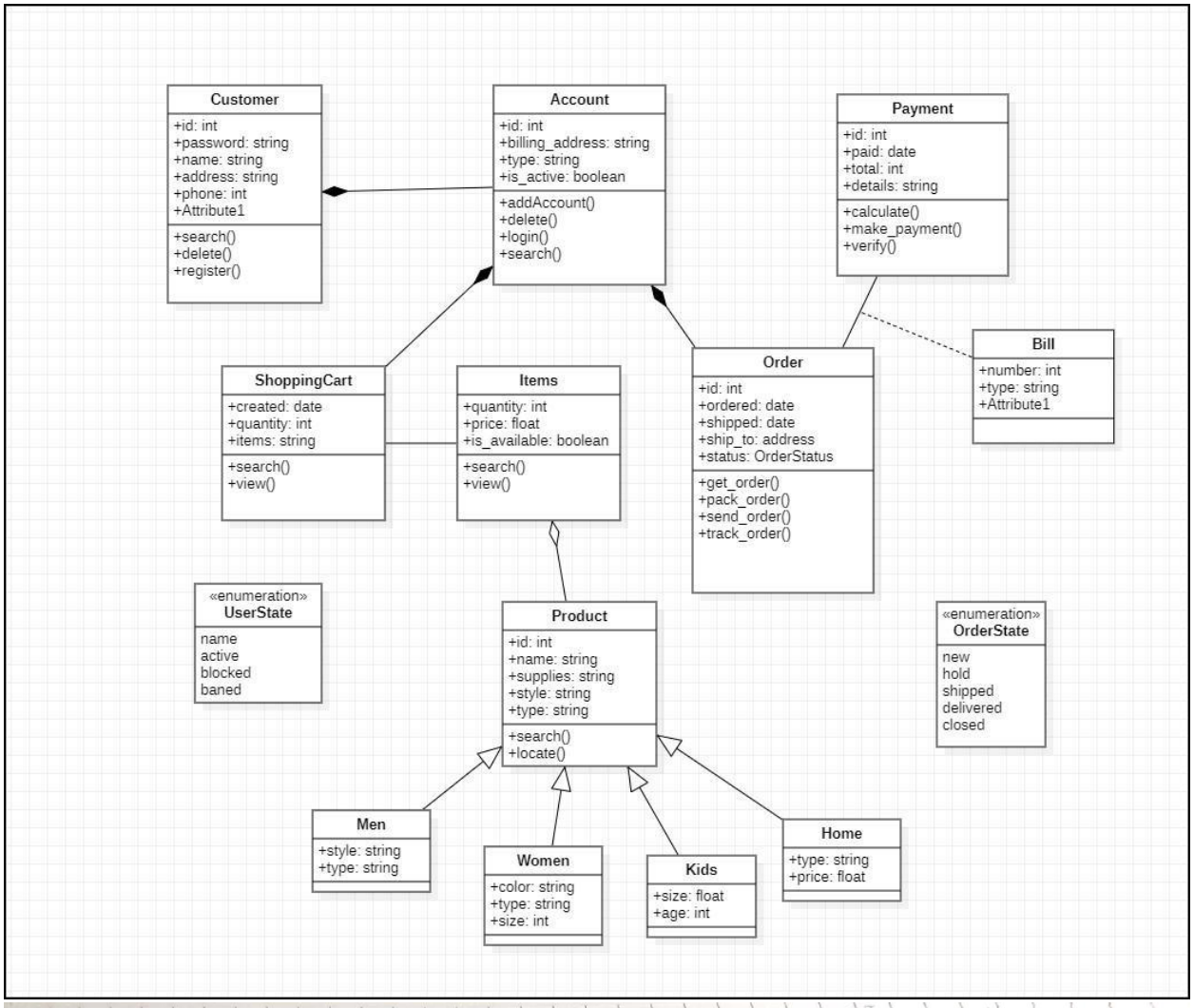
5.1 Problem Statement

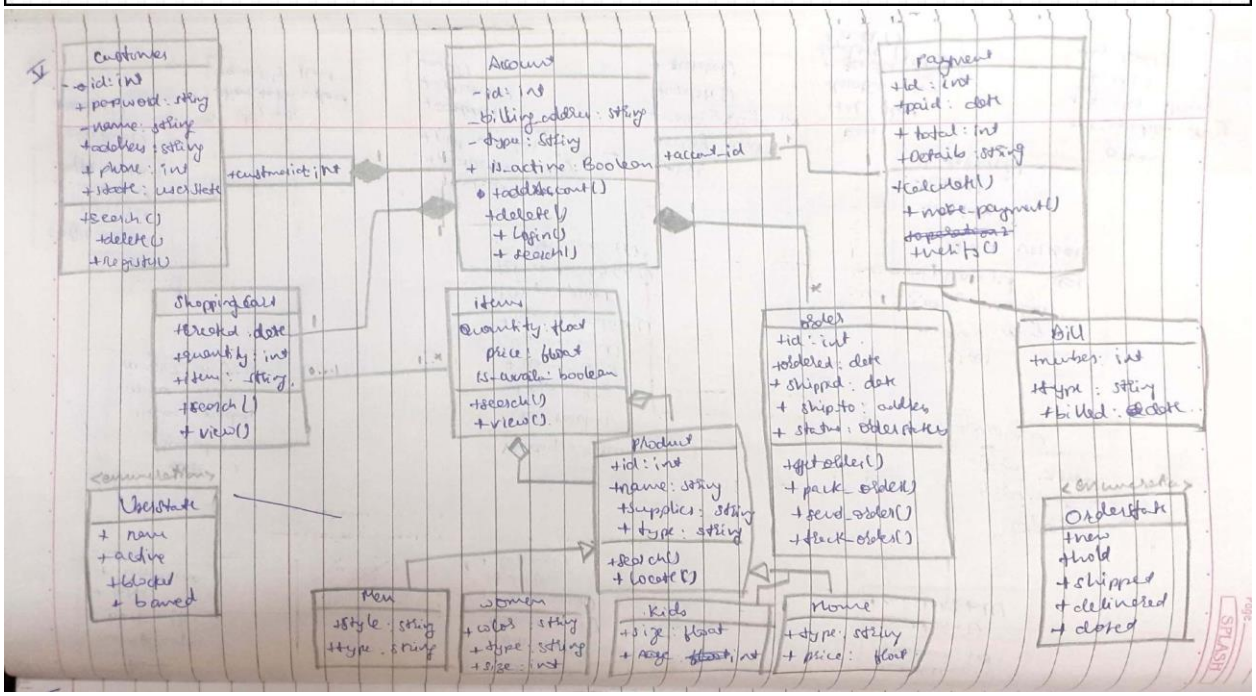
The Online Shopping System for all kinds of products web application is intended to provide complete solutions for vendors as well as customers through a single way using the internet. It will enable vendors to setup online shops, and customers to browse through the shop and purchase them online without having to visit the shop physically. The administration module will enable a system administrator to approve and reject requests for new shops and maintain various lists of shop category.This system allows the customer's to maintain their cart for add or removing the product over the internet.

5.2 Software Requirements Specification

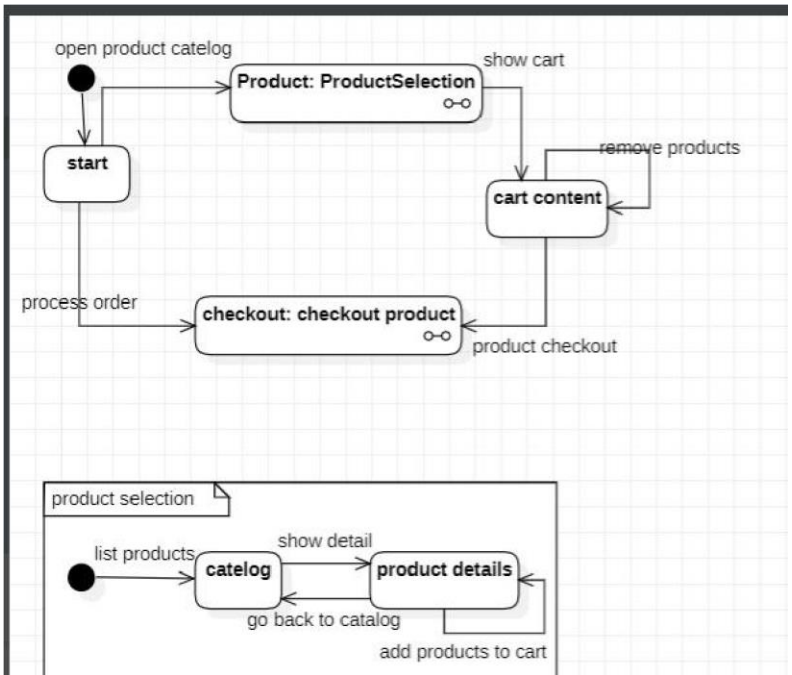
- The customer must have an account in the online website where he/she can purchase products. If a customer wants to buy the product then he/she must be registered, an unregistered user can't go to the shopping cart.
- Customers login to the system by entering valid user id and password for the shopping.
- Changes to cart means the customer after login or registration can make an order or cancel the order of the product from the shopping cart.
- The products sold for customers are sold for various categories like men,women,kids and home products.
- Customers can view all available products ,compare them and make a choice for purchasing the products.
- For customers there are many type of secure billing will be prepaid as a debit or credit card, post paid as after shipping, check or bank draft. The security will be provided by a third party like Pay-Pal etc.
- After the payment or surf the product the customer will logged out.

5.3 Class Diagram





The online shopping system has customers who must have an account in the online website where he/she can purchase products.If customer wants to buy the product then he/she must be registered, unregistered user can’t go to the shopping cart.Customer login to the system by entering valid user id and password for the shopping.The products sold for customers are sold for various categories like men,women,kids and home products.After the payment or surf the product the customer will logged out.



5.4 State Diagrams

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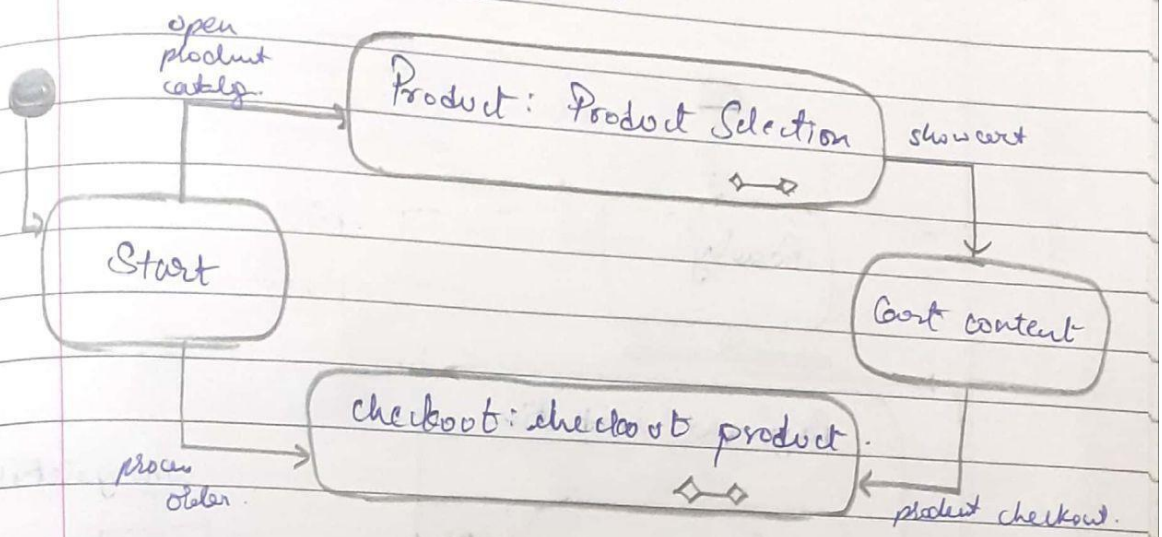
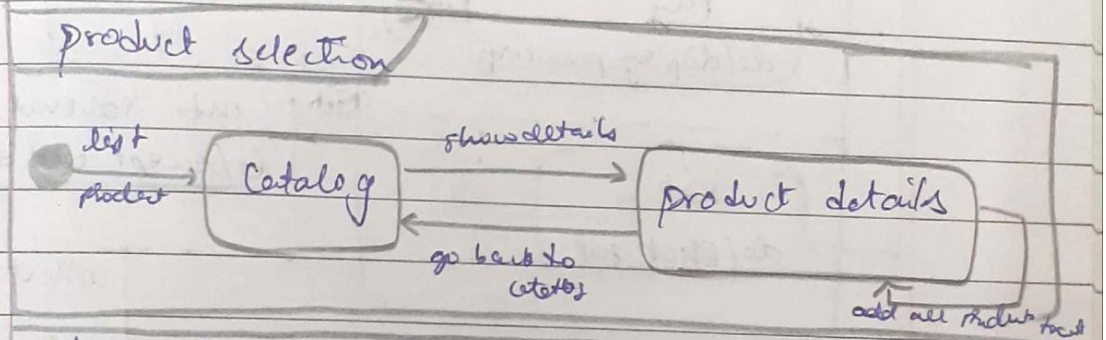
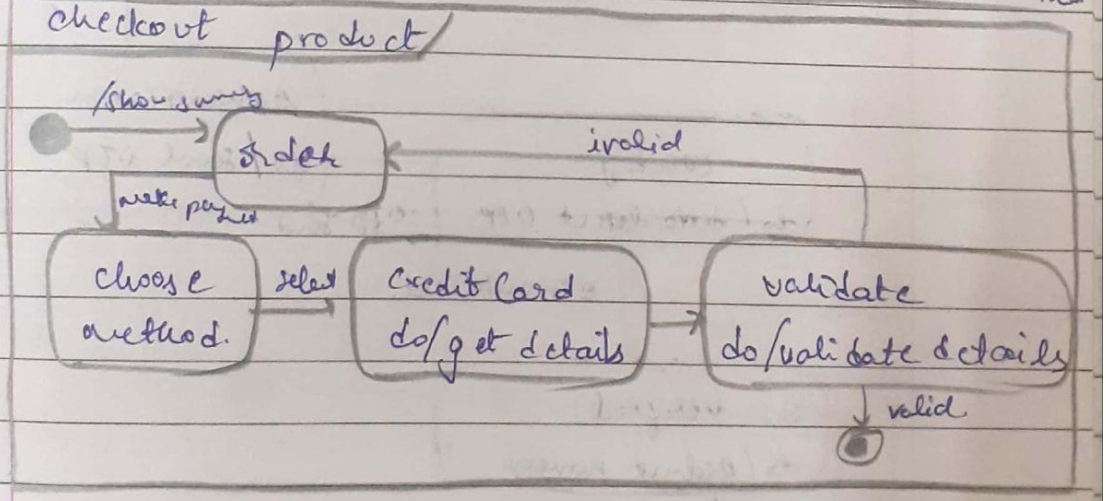
V Advanced State Diagram

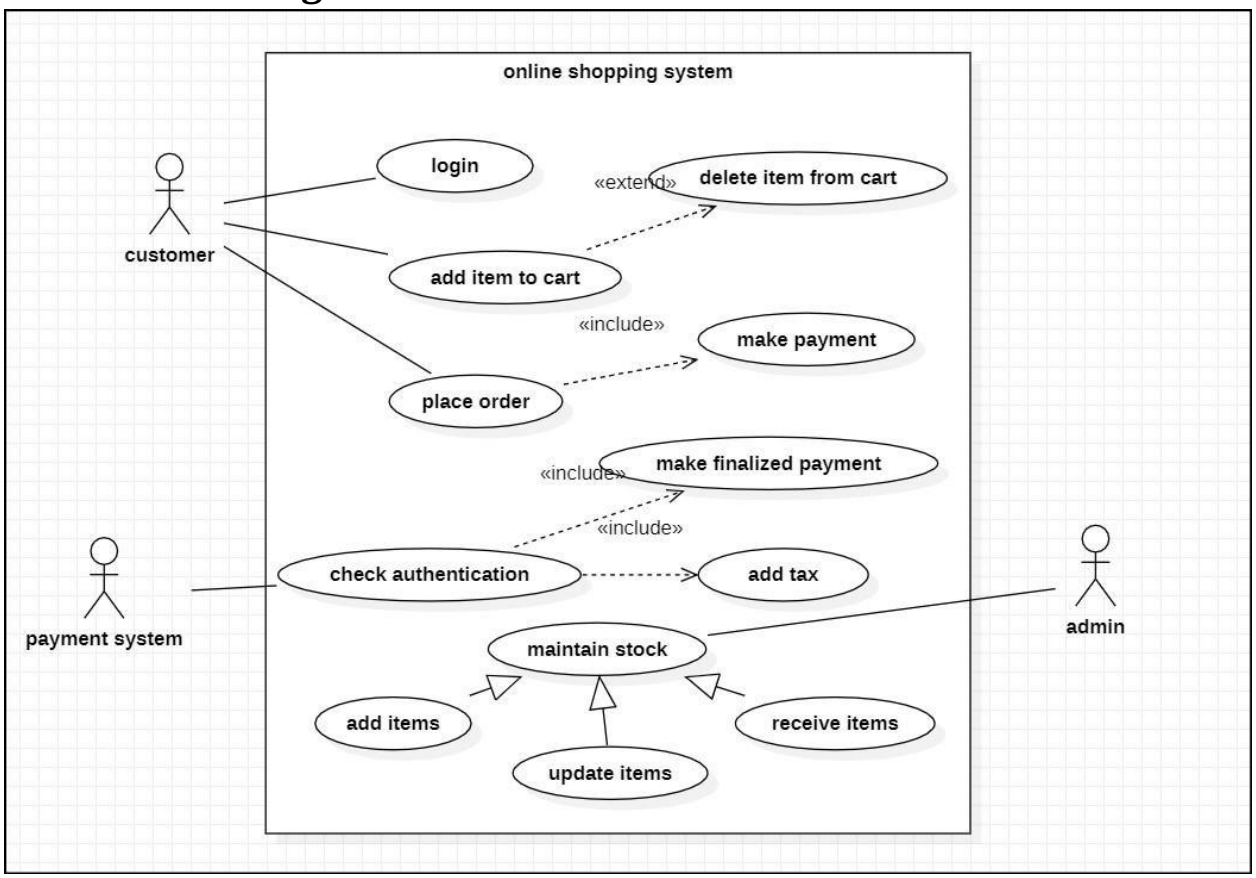




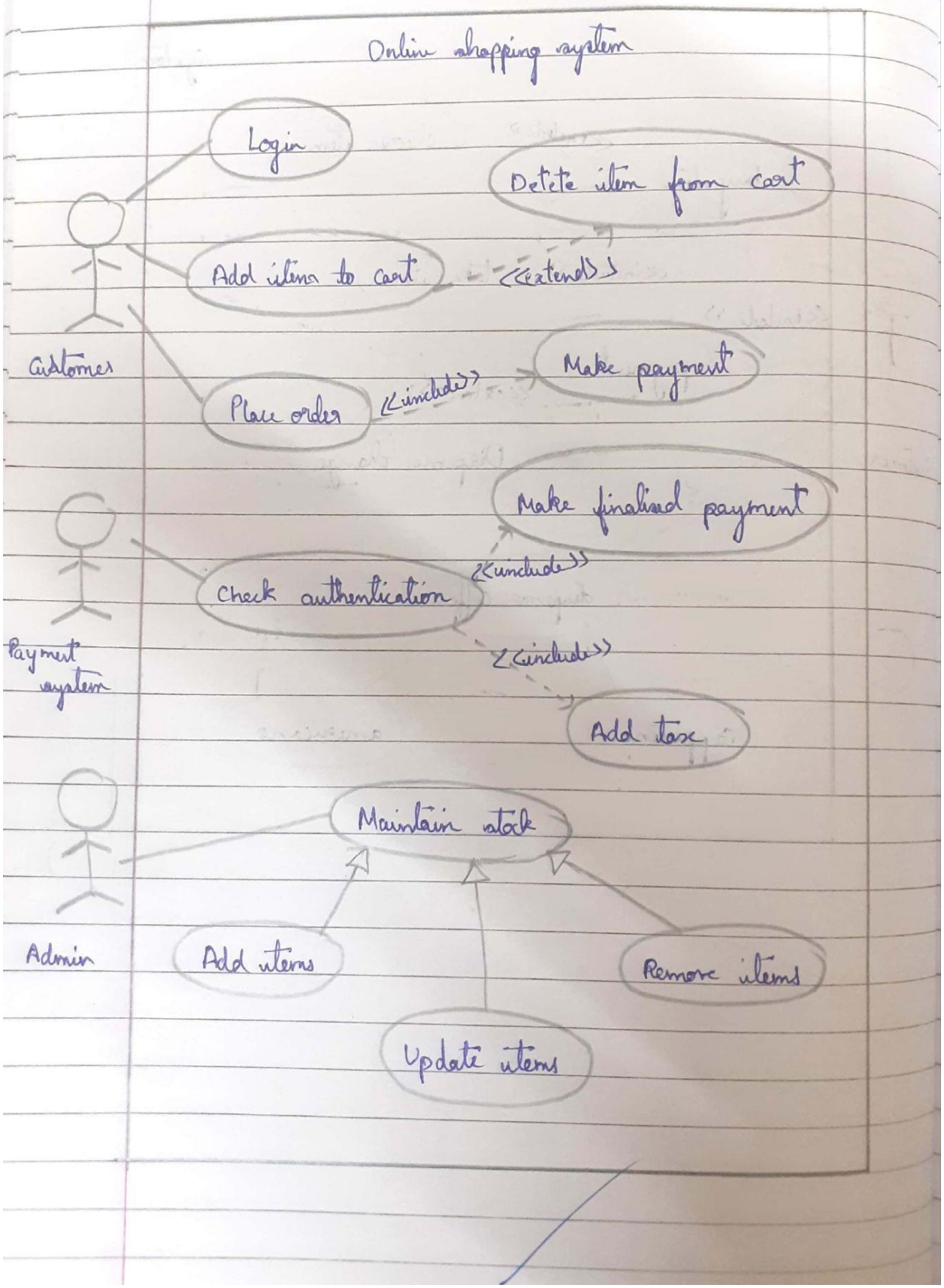


The advanced state chart diagram has states explaining the product purchase and payment. It has two sub machines i.e product selection and checkout product. Product selection allows us to select products and add them to cart. Checkout product has states explaining the payment methods and validating the methods.

5.5 Use Case Diagram



Advanced use Case diagram



Actors:

Customer: a person who uses the online shopping system

Supplier : person who supplies products

Use Case:

view product details : displays all product details

Place order : order the items present in the cart

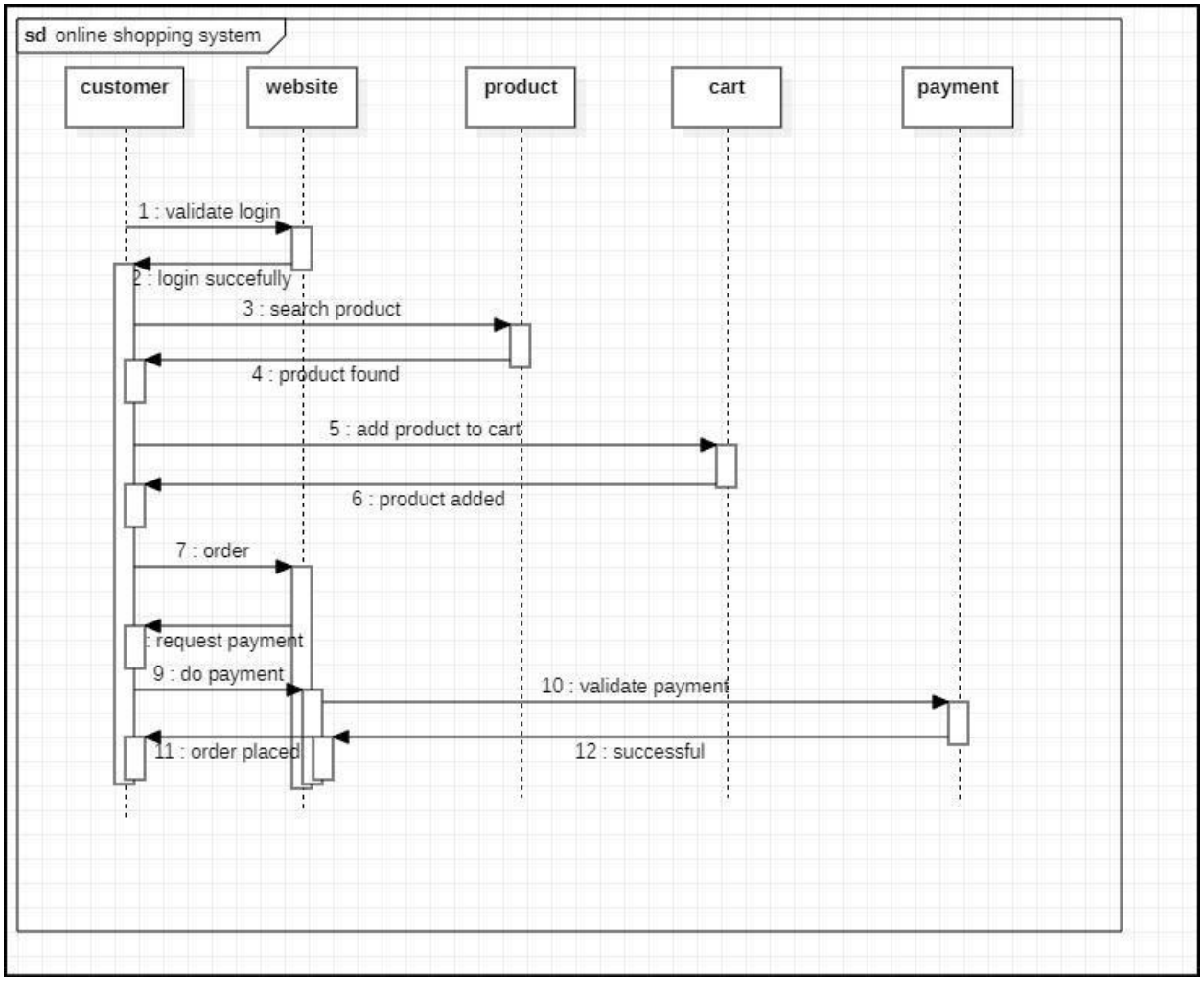
Make payment : accepts payment for the products purchased

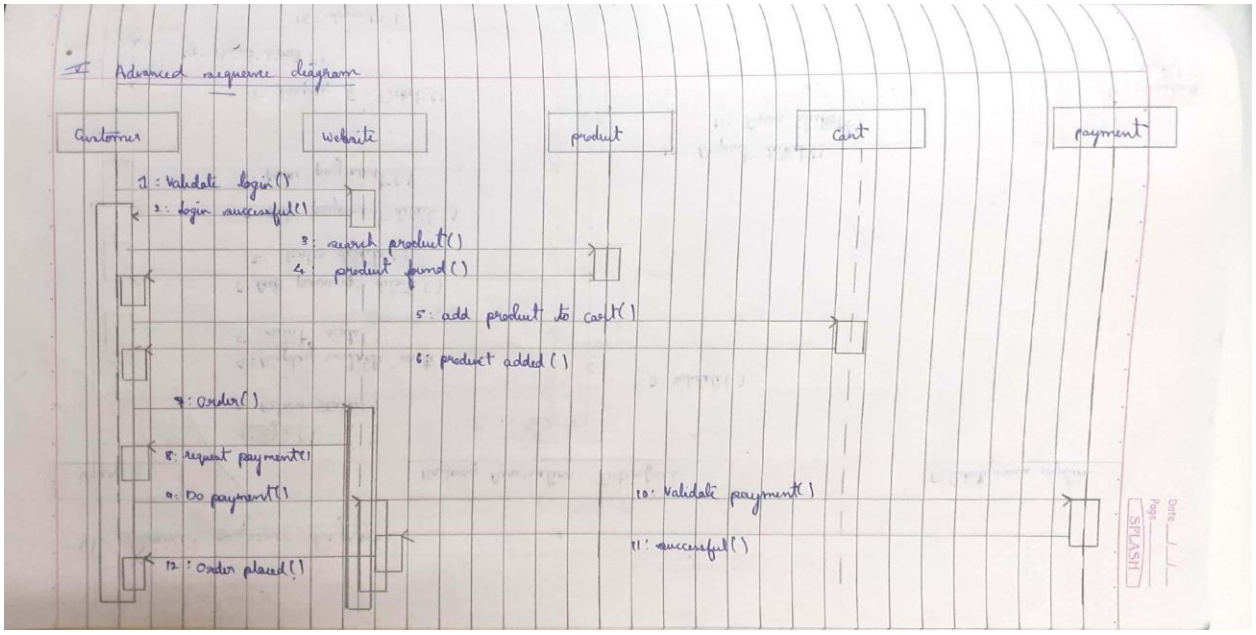
Deliver product : delivery of the product is handled

Supply Product : product supply is maintained

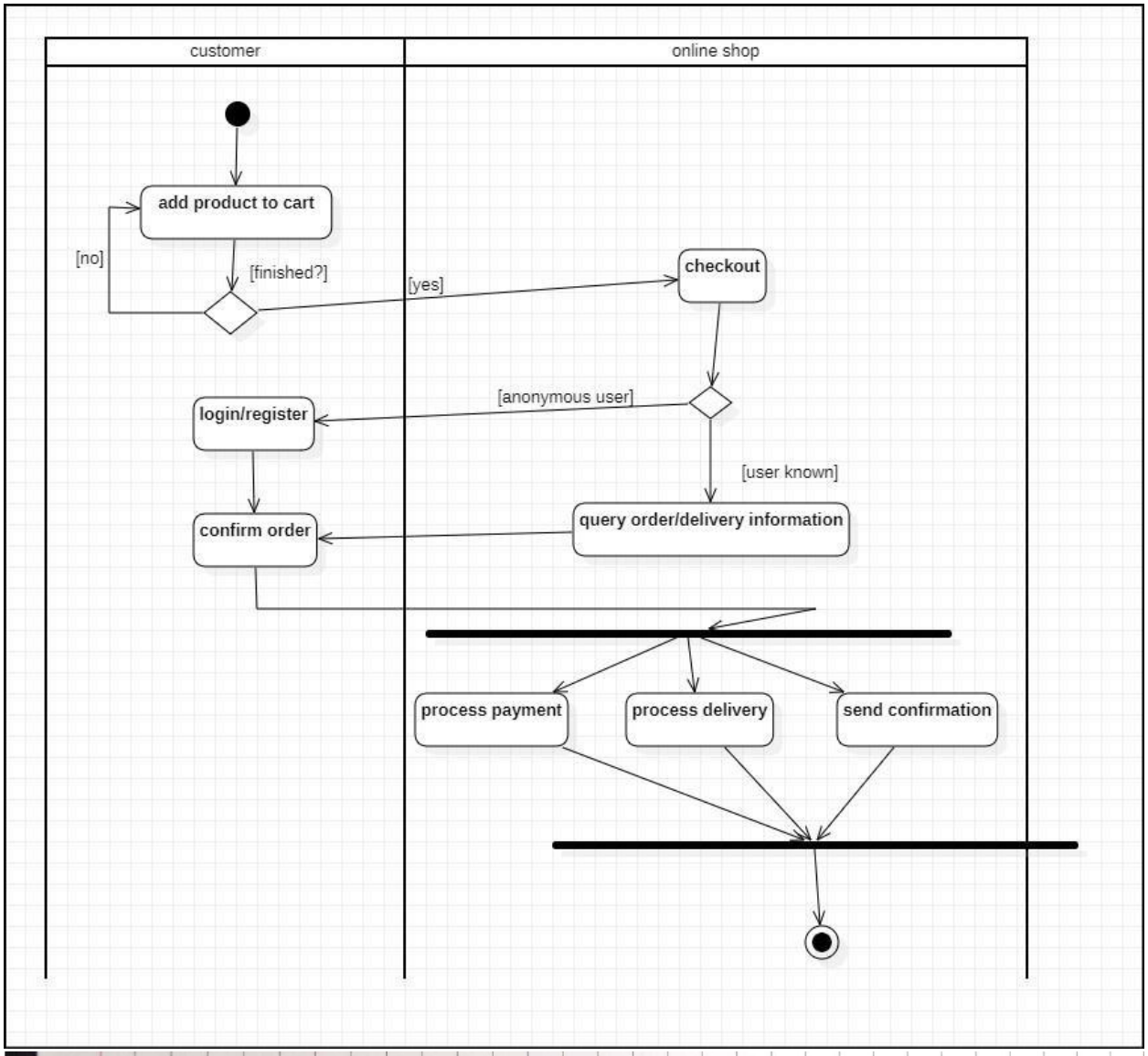
Maintain Stock : stock availability is checked

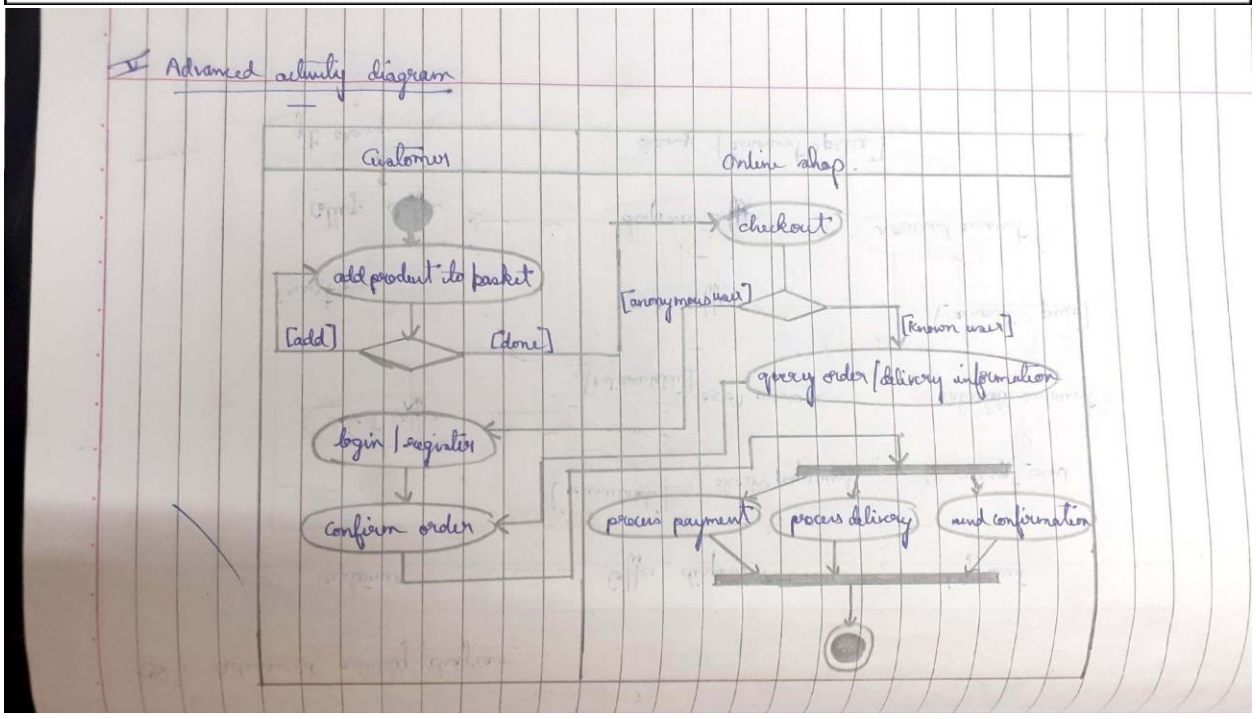
5.6 Sequence Diagram




Advanced sequence diagram
Customer
Website
product
Cart
payment
1 : Validate login()
2 : login successful()
3 : search product()
4 : product found()
5 : add product to cart()
6 : product added()
7 : Order()
8 : request payment()
9 : Do payment()
10 : Validate payment()
11 : successful()
12 : Order placed()
Date
Page
SPLASH

5.7 Activity Diagram





the advanced activity diagram has two swimlanes i.e customer and online shop. The customer can add the product to the basket and login/register and confirm the order. The online shop can checkout the products,deliver,process payment and send confirmation to customer

6. Railway Reservation System

6.1 Problem Statement

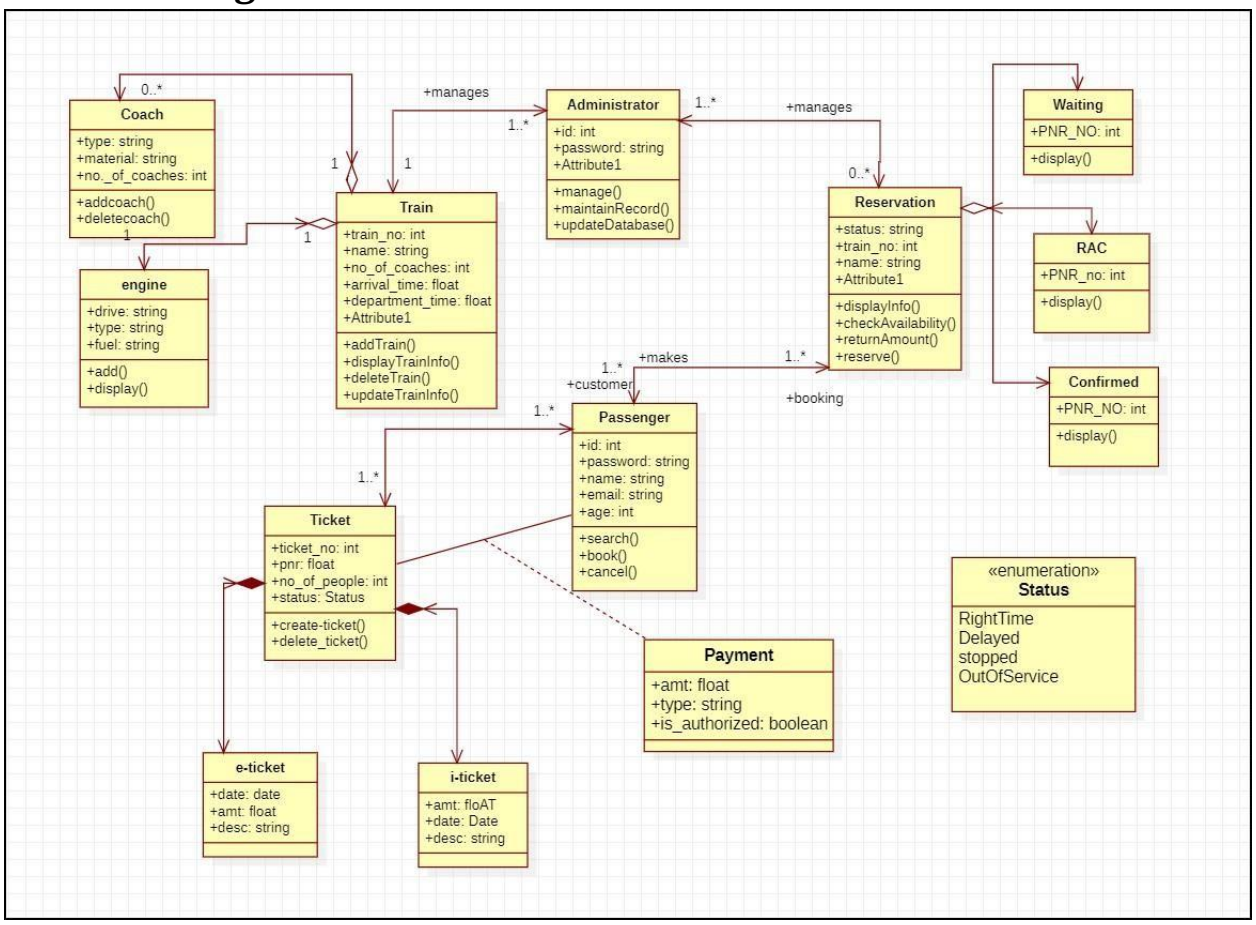
Railway Reservation System is a system used for booking tickets over internet.Any Customer Can book tickets for different trains.Software has to be developed for automating the manual reservation system of railway.The system should be standalone in nature.It should be designed to provide functionalists like booking of tickets in which a user should be able to applied for tickets of any train and of any class.The software takes the current system date and time as the date of issue and calculates the amount to be paid by the user. It also provide the functionality of cancellation of tickets.

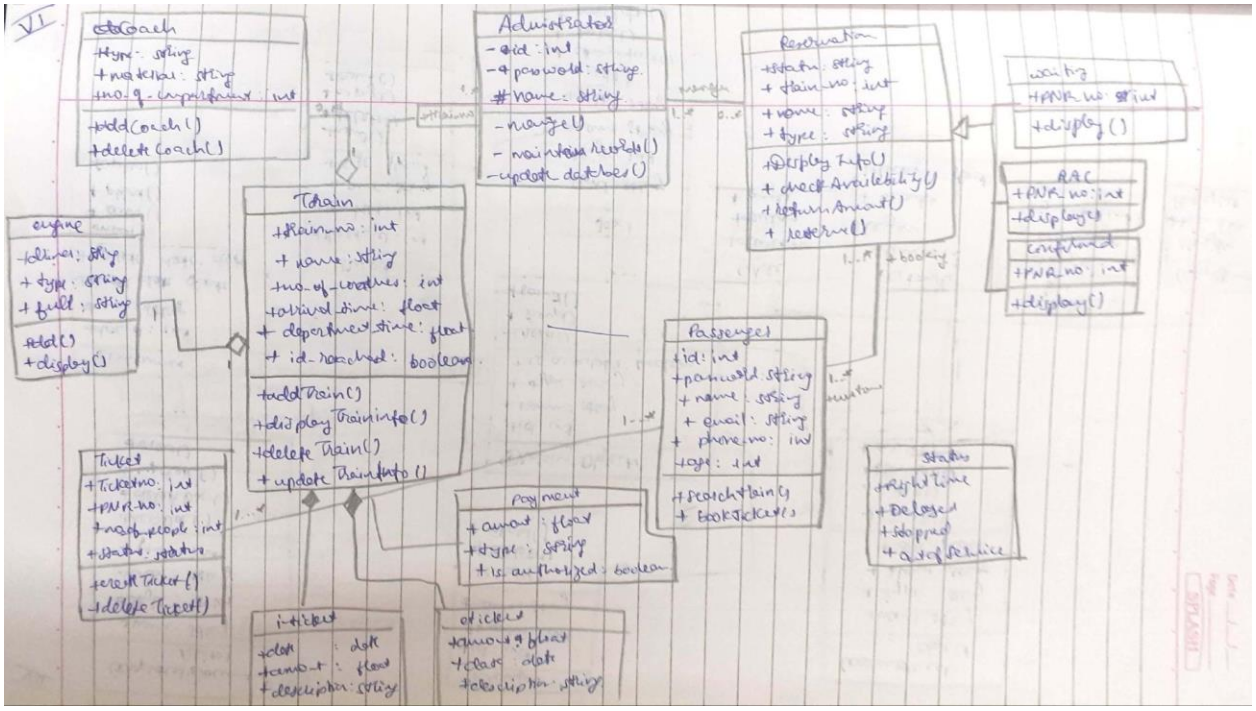
6.2 Software Requirement Specification

- Each user should have a user id and a password.Record of the users of the system should be kept in the log file. Provision should be made for full backup of the system.
- The customers can view the trains available at any day,the cost and number of tickets available for any train.
- Customer can book a ticket only if the tickets are available.Customer searches for the availability of tickets then if the tickets are available he books the tickets by initially filling details in a form.
- Tickets can be booked in two ways by i-ticket or by e-ticket booking.
- In case of i-ticket booking customer can book the tickets online and the tickets are couriered to Particular customer at their address.But in case of e-ticket booking and canceling tickets are booked and canceled online sitting at the home and customer himself has to take print of the ticket but in both the cases amount for tickets are deducted from customers account.
- For cancellation of a ticket the customer has to go to the reservation office then fill in the cancellation form and ask the clerk to cancel the ticket then the refund is transferred to the customer account.

- After booking a ticket the customer has to checkout by paying fare amount to the clerk.
- The system displays the details of the train of which the user enters the name.The information is saved and the corresponding updating takes place in the database.

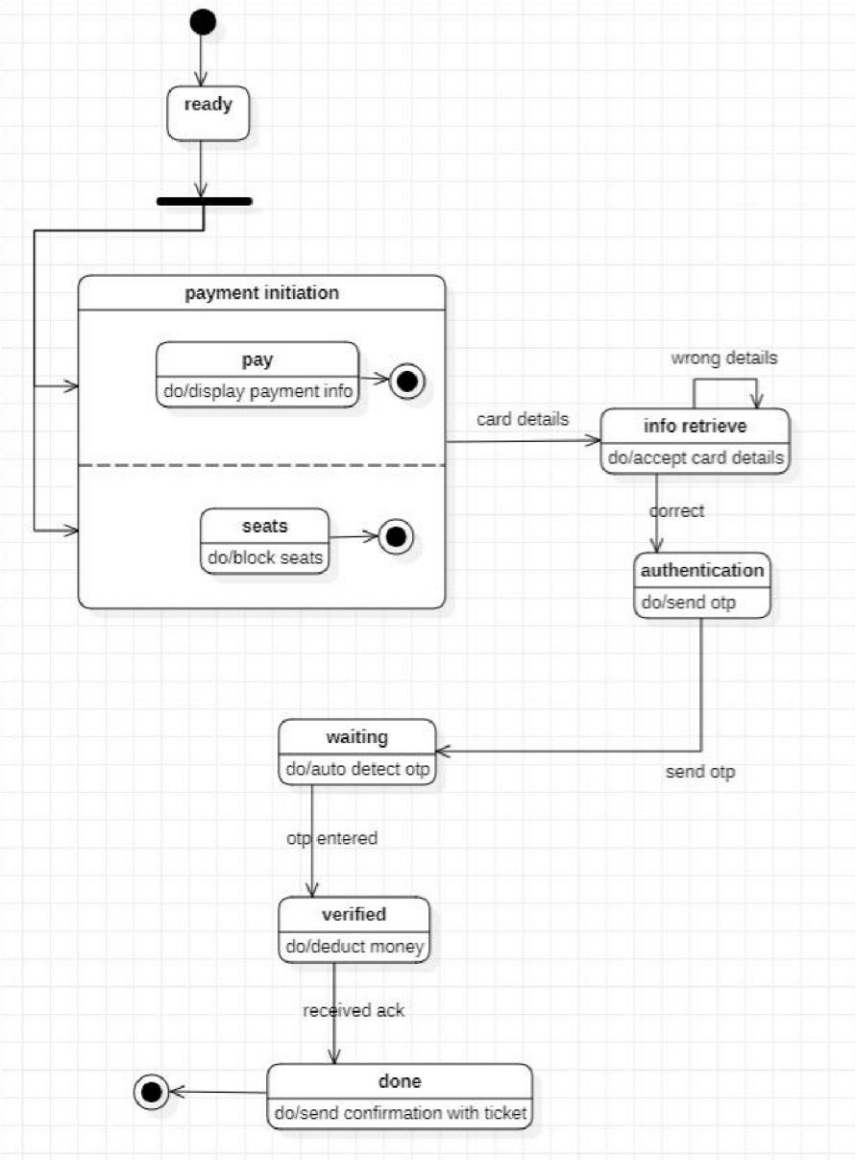
6.3 Class Diagram



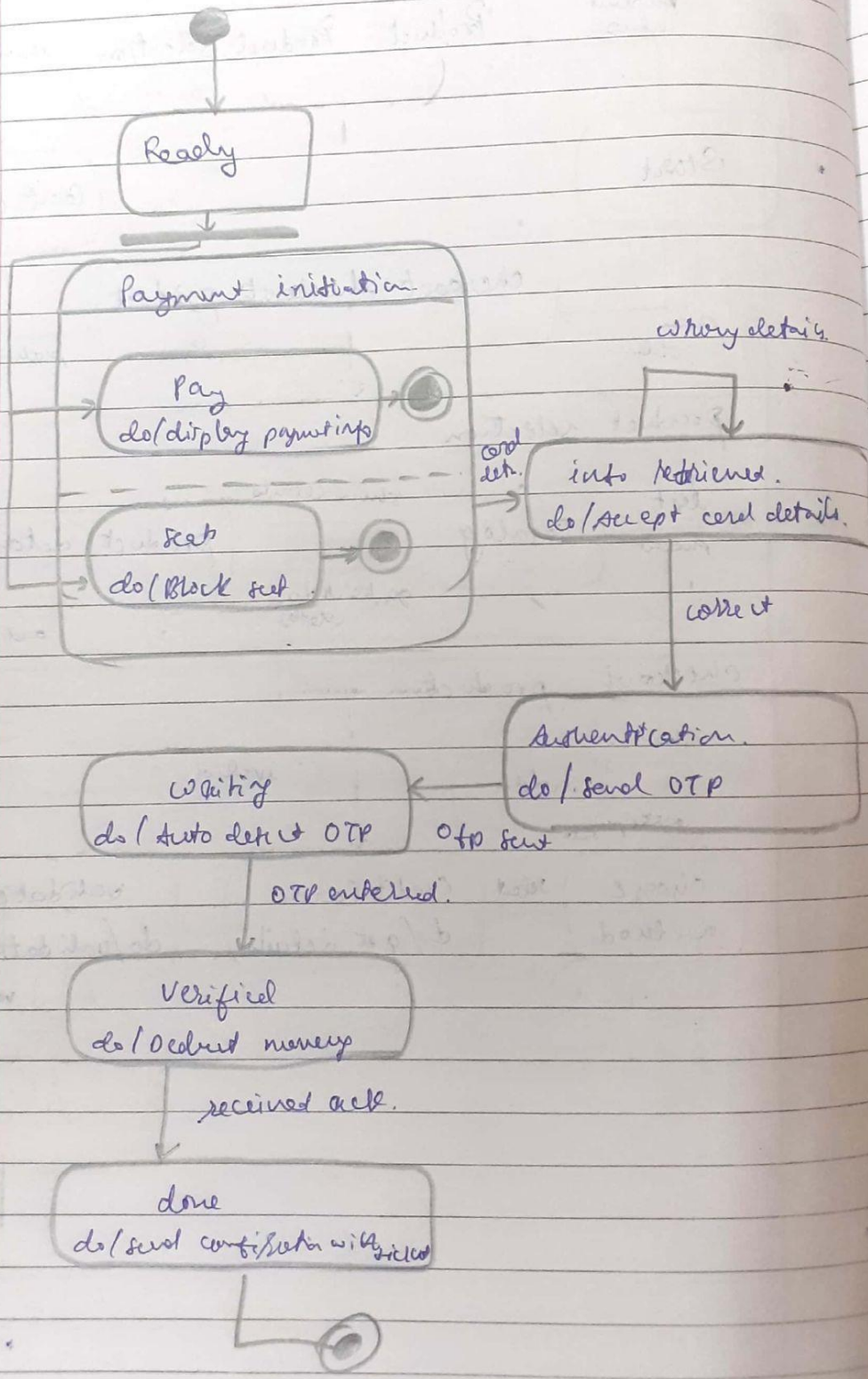


The admin manages the trains and reservations related to the railway reservation system. There are three types of reservation, I.e RAC,waiting and confirmed.The passengers with a reservation goes to one or the other reservation.A train consists of coaches and engine.A passenger pays for the ticket booked .Tickets can be booked in two ways by i-ticket or by e-ticket booking.

6.4 State Diagram

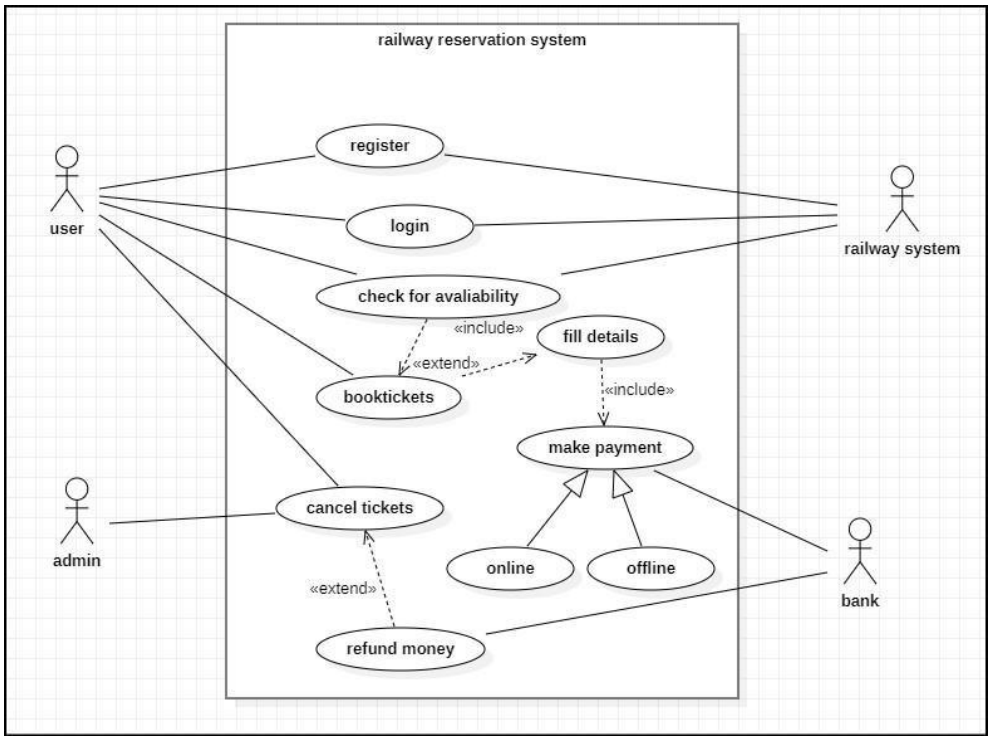


VI Advanced state diagrams:



The advanced state diagram has states for paying the ticket.from the ready state the user goes to payment initiation after which the card details are accepted and an OTP is sent to the registered mobile number. On verification the money is deducted and ticket is sent to the customer

6.5 Use Case Diagram



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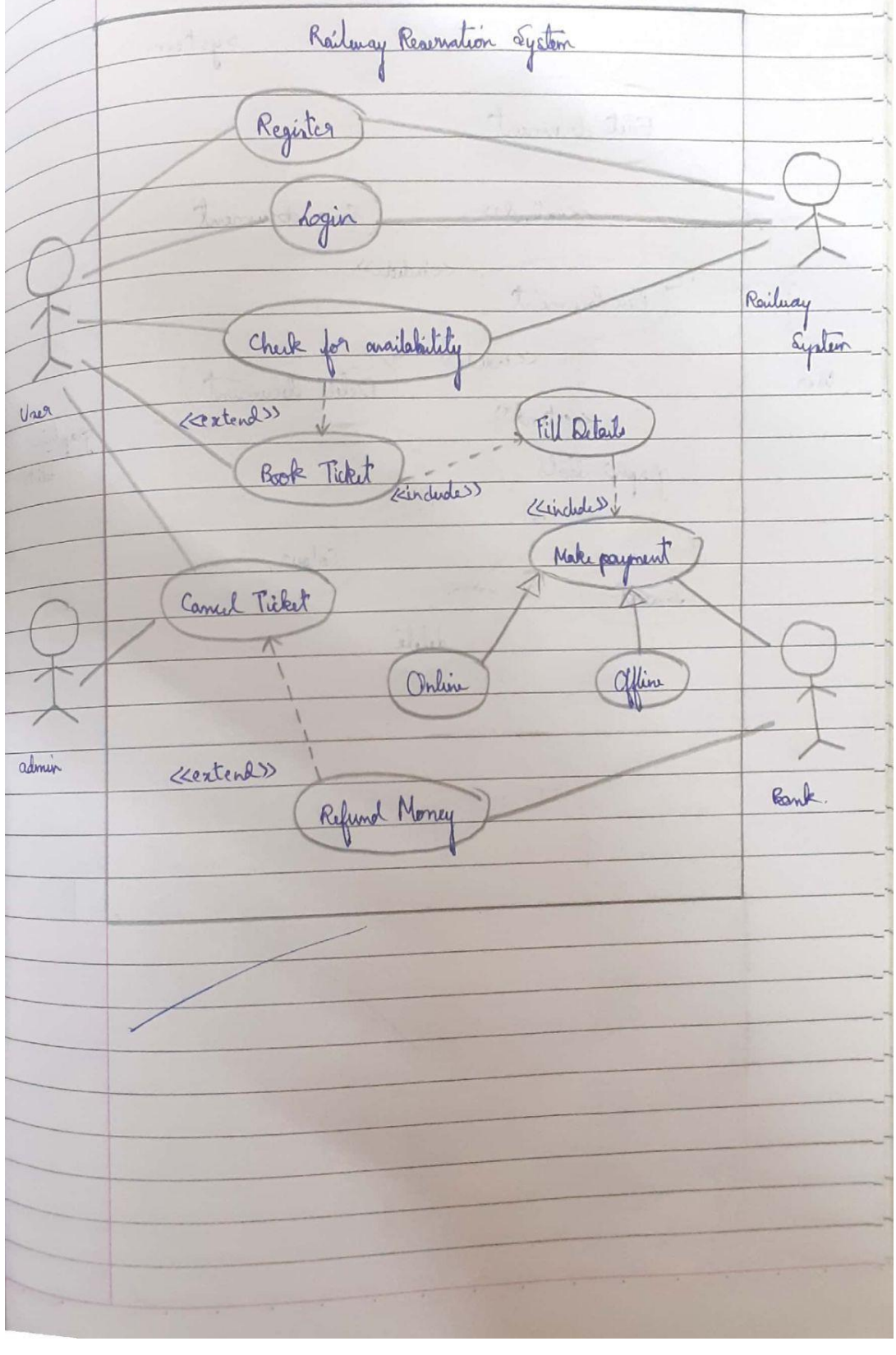
11 Advanced use case diagram



Actors:

User: uses the railway reservation system.

Admin: manages all information

Railway System: System that is used for

train ticket reservation.

Use Case:

Register: The first time a user has to create an account in the railway system.

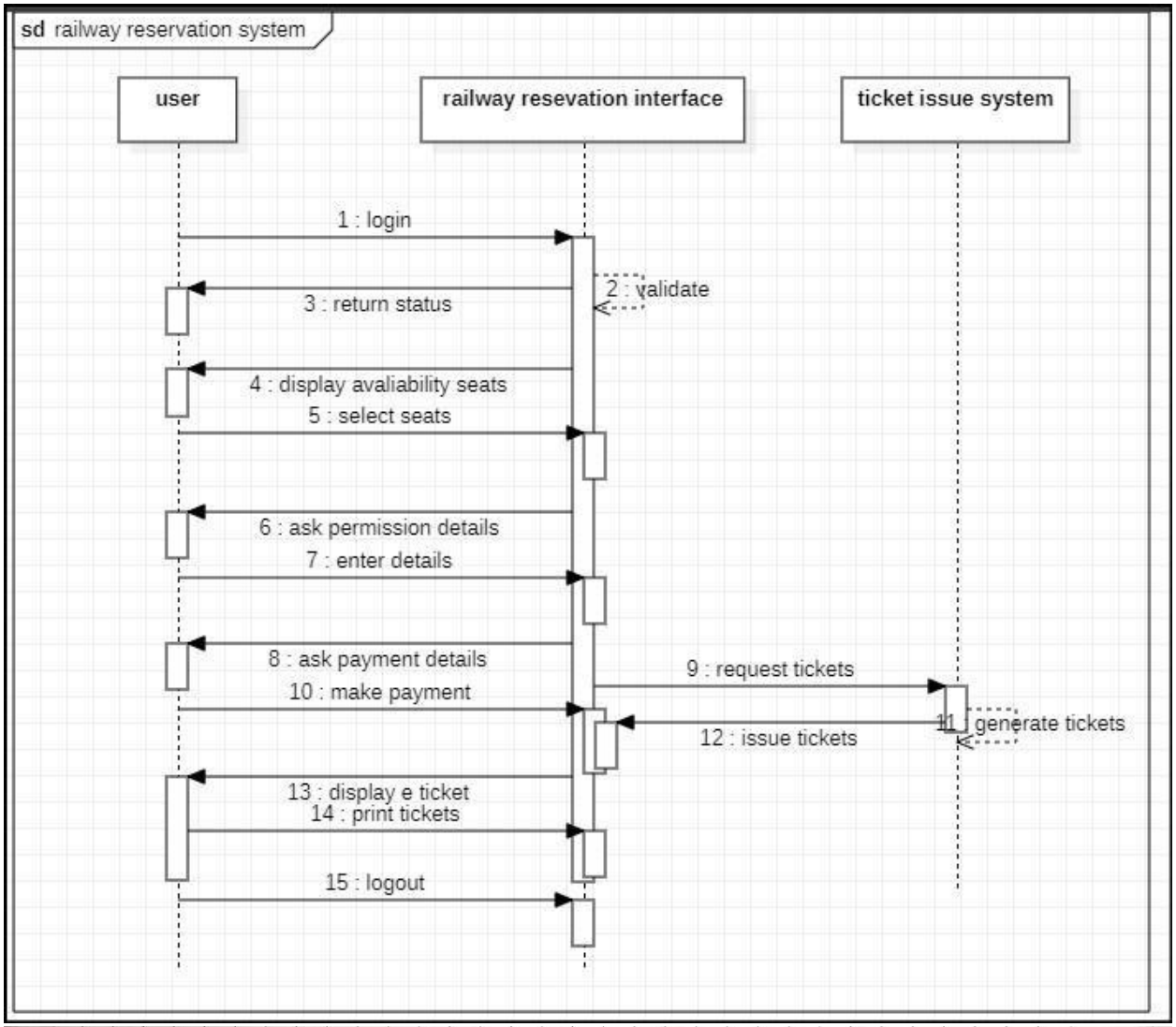
Book Ticket: Users can select the type of coach and no of seats and book the ticket.

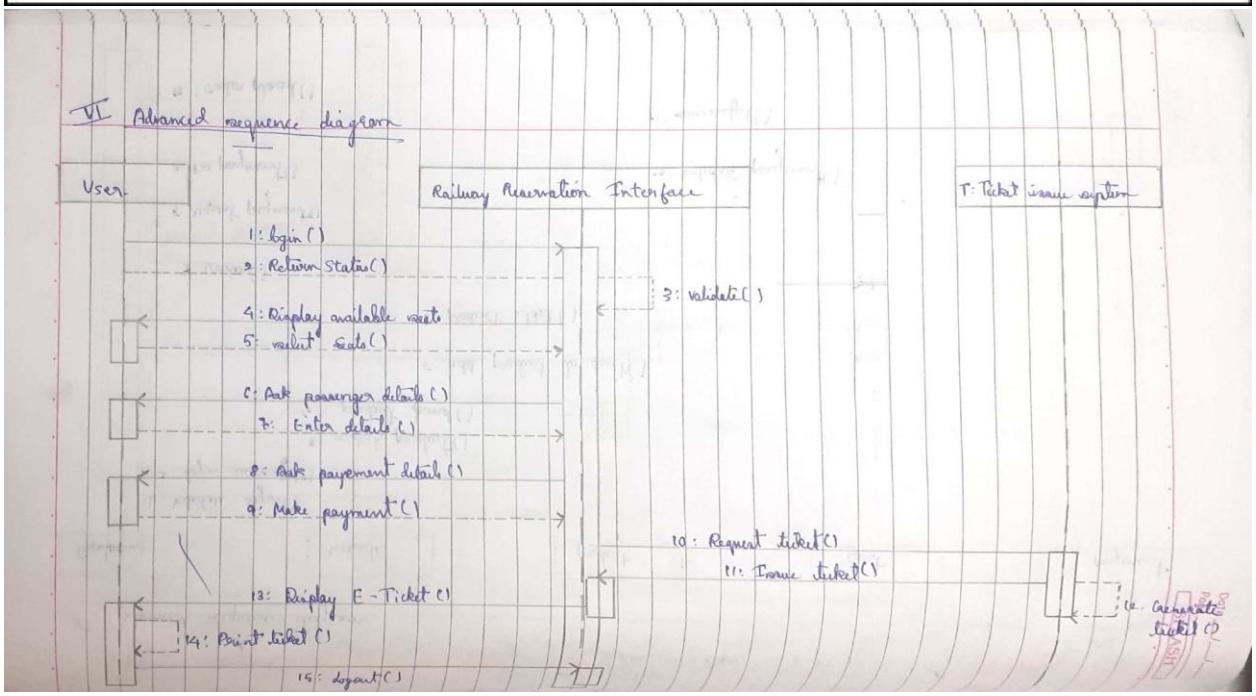
Make payment: System displays the payment details. User can make his payment.

Cancel Ticket: Users can cancel the ticket . The amount will be refunded.

Verify login credentials: The admin verifies the user details, if it matches with the details in the database then he allows access to the system.

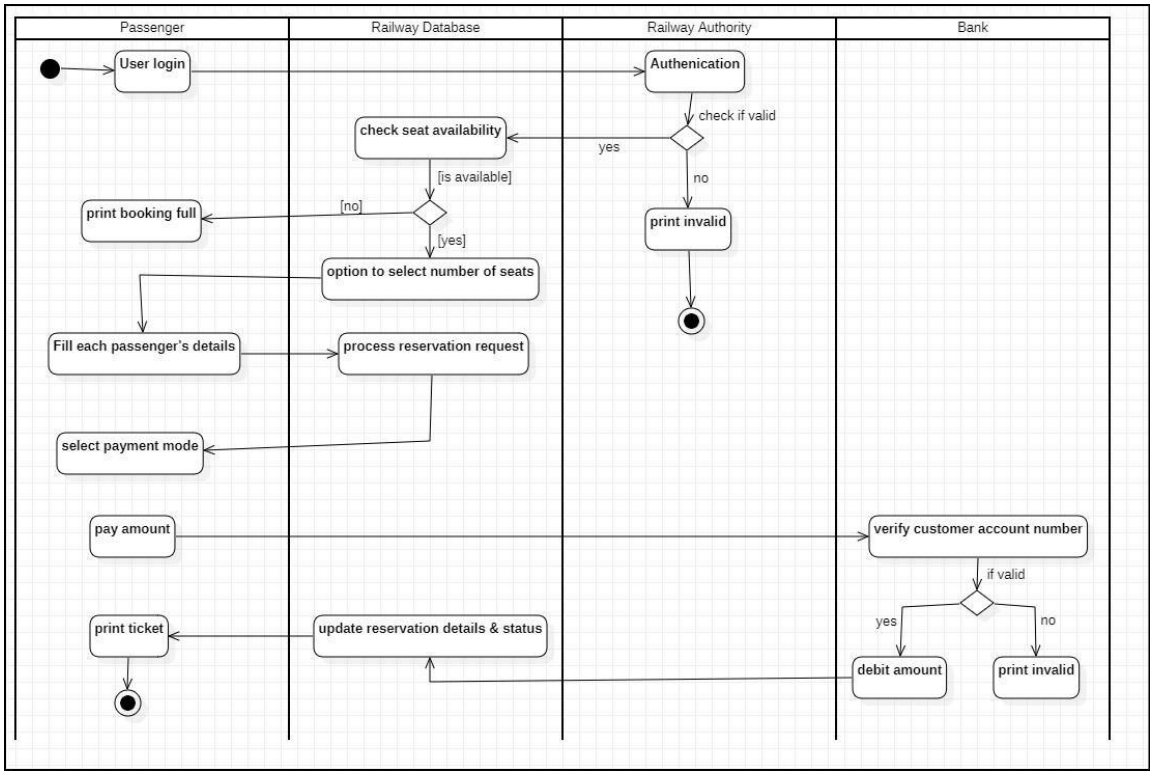
6.6 Sequence Diagram

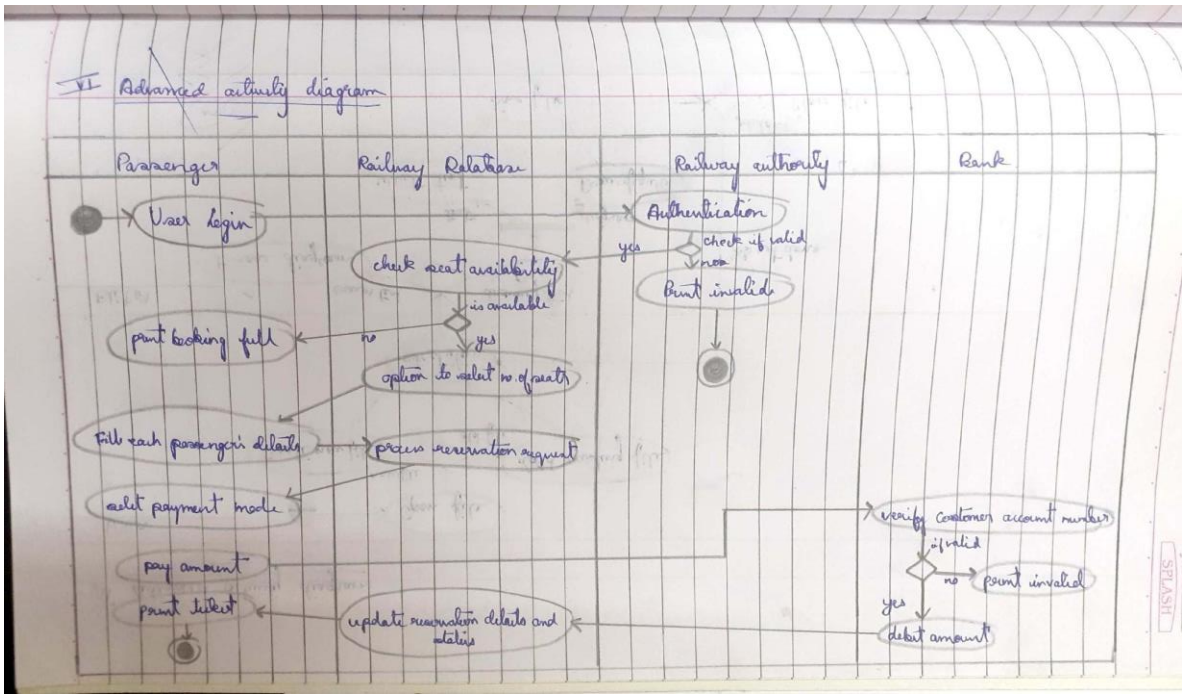




Users log into the railway reservation system. Admin verifies the login details. System establishes secure communication. User checks for availability of trains . Admin updates the train details. System displays the train details. Users book tickets. System displays payment details. User makes the payment. System issues the e-ticket. User logs out.

6.7 Activity Diagram





The scenario considered for the reservation of a seat in a train. Here the user can login with correct credentials and check for the seats available. Once the user selects a seat, he can select a payment option if the seat is available. After payment, he can print the tickets.

7. Graphics Editor

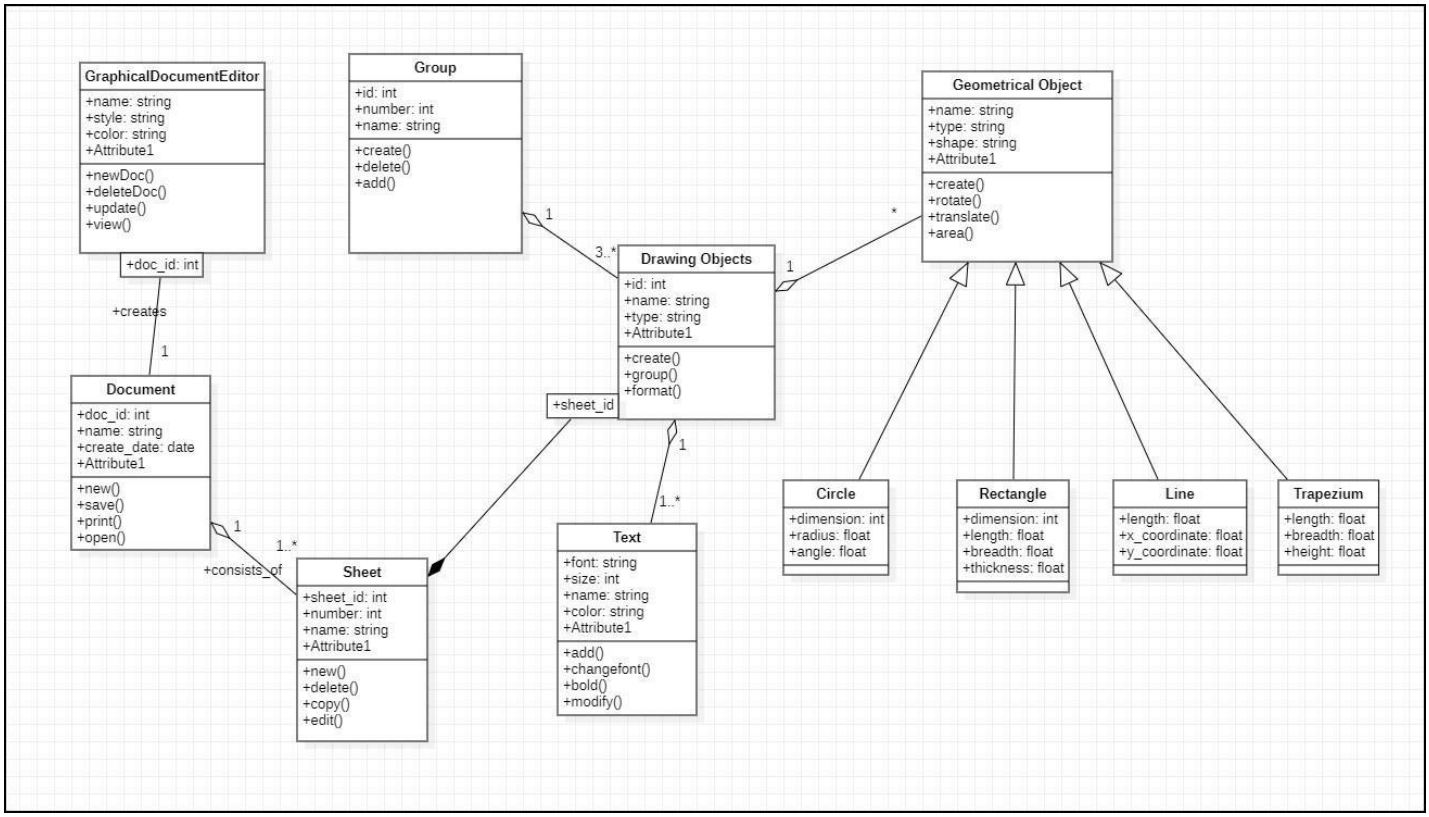
7.1 Problem Statement

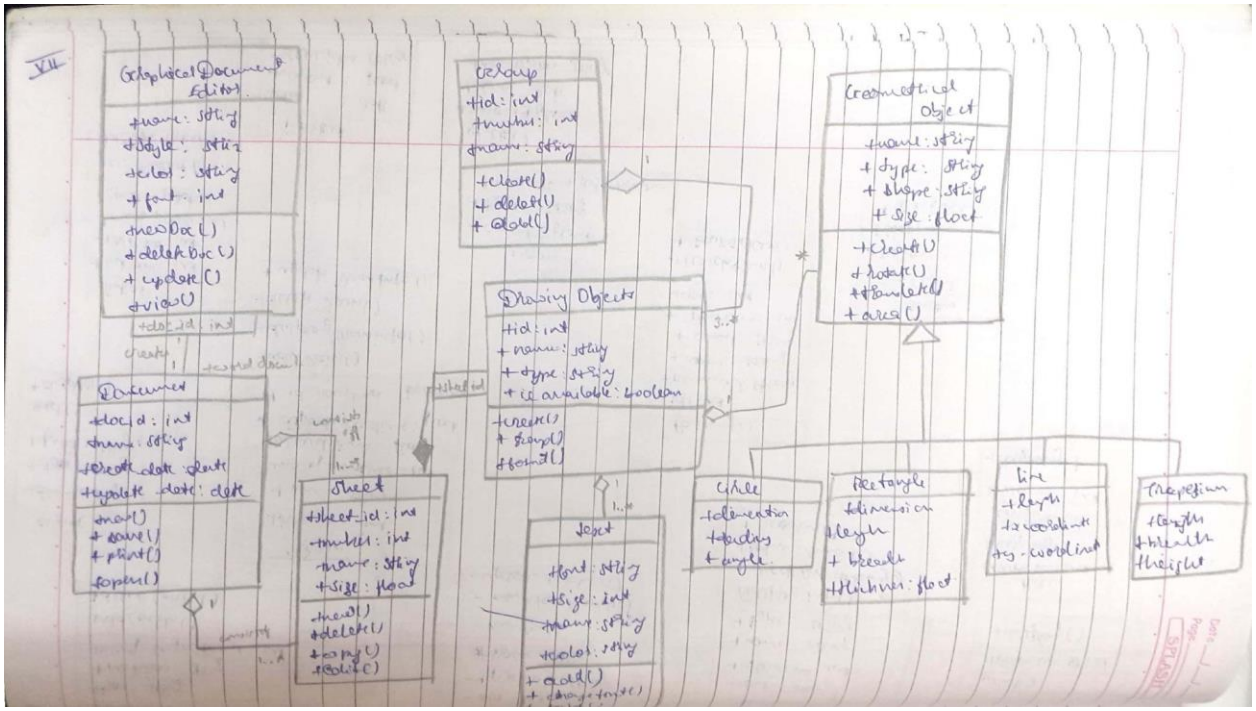
The graphics editor provides an Application Programmer's Interface that enables a programmer to develop their own graphical model editor for a specific type of model. This API in turn, relies on extending the Eclipse Graphical Editing Framework to provide an environment in which the editor functions, and the programmer can create a graphical editor and palette of shapes in order to modify an underlying model.the graphical editor provides an interface with which the programmer implements said editor for a given underlying model. Such an instance of the graphical editor allows a user to drag objects from a specified model into a working graphical diagram.

7.2 Software Requirement Specification

- The graphical editor consists of a graphical document editor which can be used to create new documents,delete documents,update or view the document.
- The graphical document editor consists of many documents,where each document can be saved,opened,printed or create a new one
- A document is made up of many sheets which can have graphics included in them. Sheets have multiple numbers of drawing objects,which can be created, grouped or formatted.
- The programmer must provide implementations of functions that draw objects and their connections, as well as functions that add and remove connections. The latter function will be handled by a specific event listener. Any changes made in real-time to the underlying model will also be updated in the diagram through a separate event listener
- The user can also add and remove connections between these objects as needed using the palette supplied, thus modifying the underlying model.
- Each sheet contains drawing objects, including text, geometrical objects and groups.A group is simply a set of drawing objects.
- A geometrical object includes circle, ellipse, rectangles, lines and squares,trapeziums which are identified by their respective constraints.

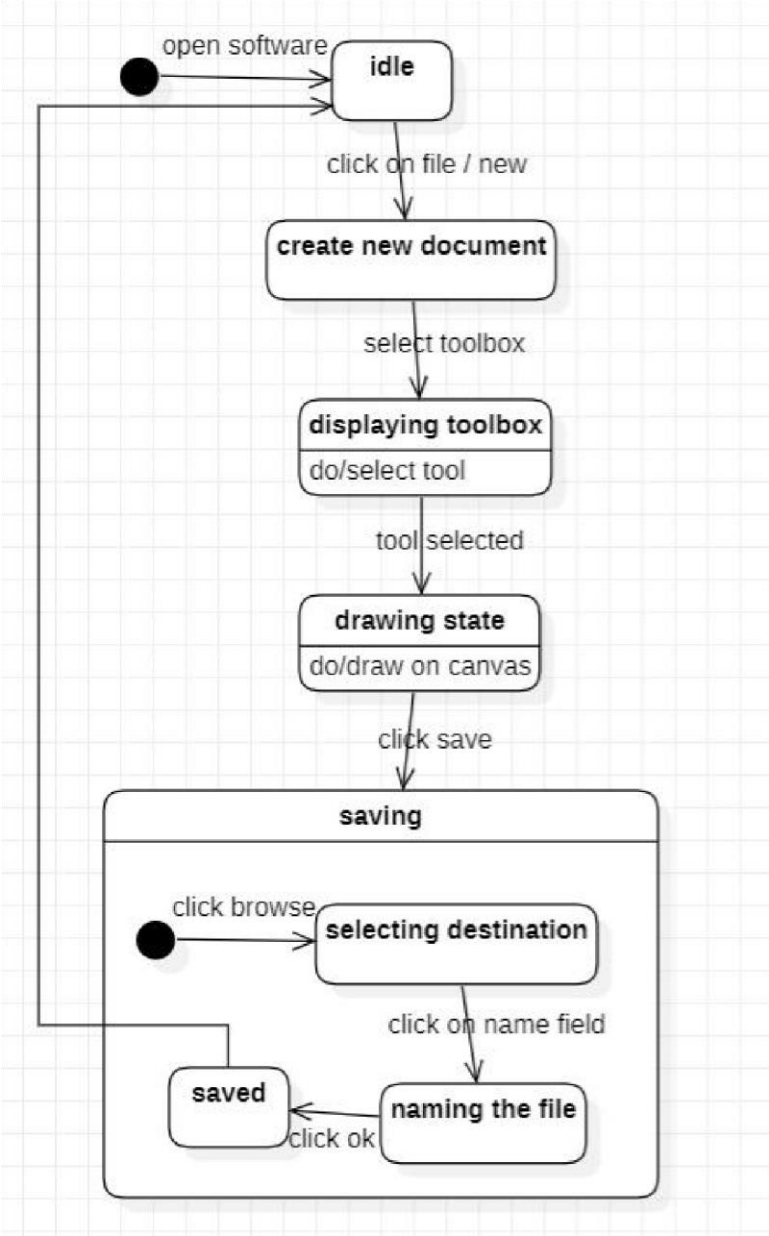
7.3 Class Diagram





The graphical editor has documents consisting of several sheets. Each sheet contains drawing objects, including text, geometrical objects and groups. A group is simply a set of drawing objects. A geometrical object includes circle, ellipse, rectangles, lines and squares.

7.4 State Diagram



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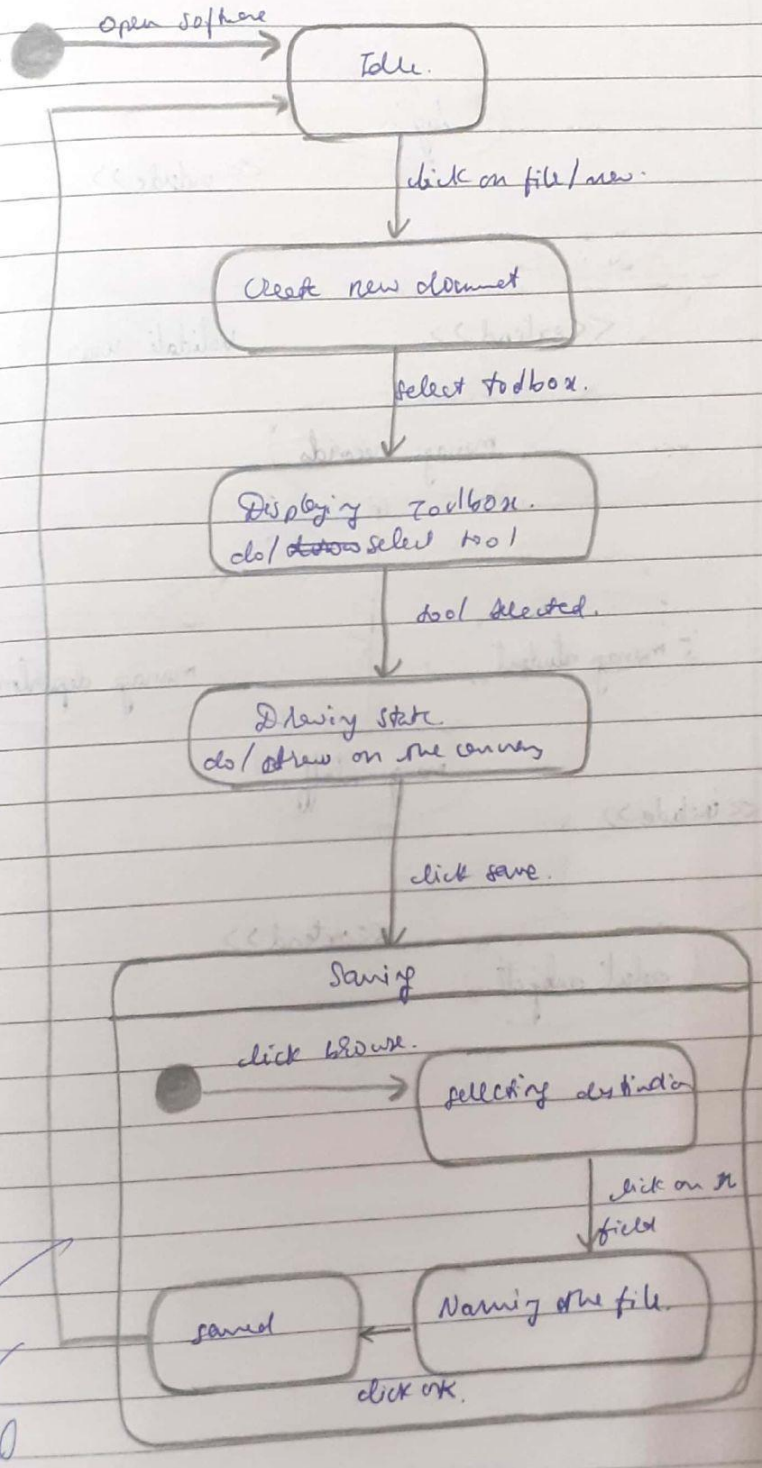
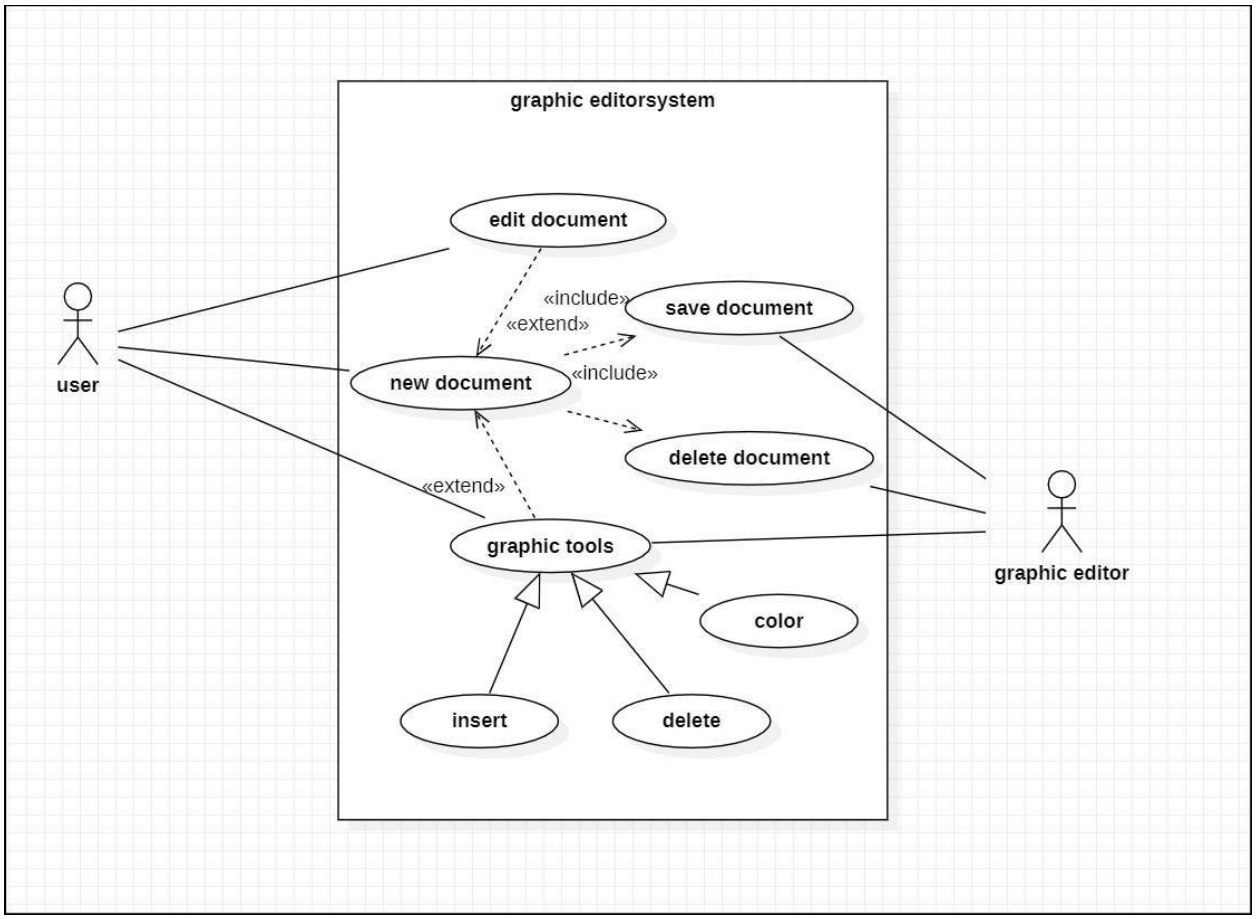
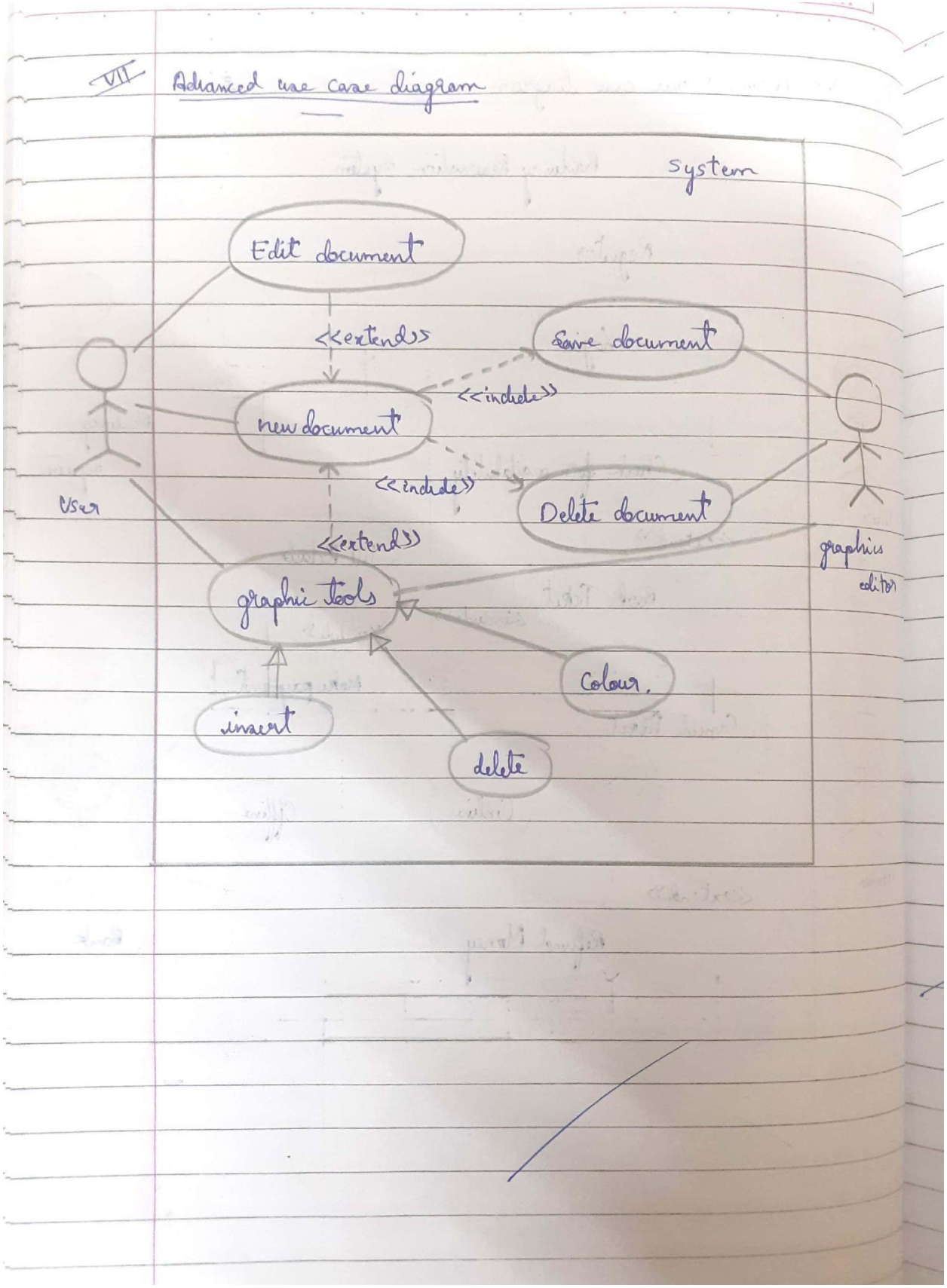
VII Advanced State diagram:-



The advanced state diagram gives the states involved in making and saving a graphic file.first the user selects a new document and draws graphics. If there is a mistake he can erase and select a color from the color palet. He can then save the file created. The advanced state diagram had a composite state called saving where the user can save the file in their desired location.

7.5 Use Case Diagram





Actors :

User: the person who uses the graphic system

Graphics system: manages the system

Use case:

Create document : performs creation of new document

Edit document: performs editing of document

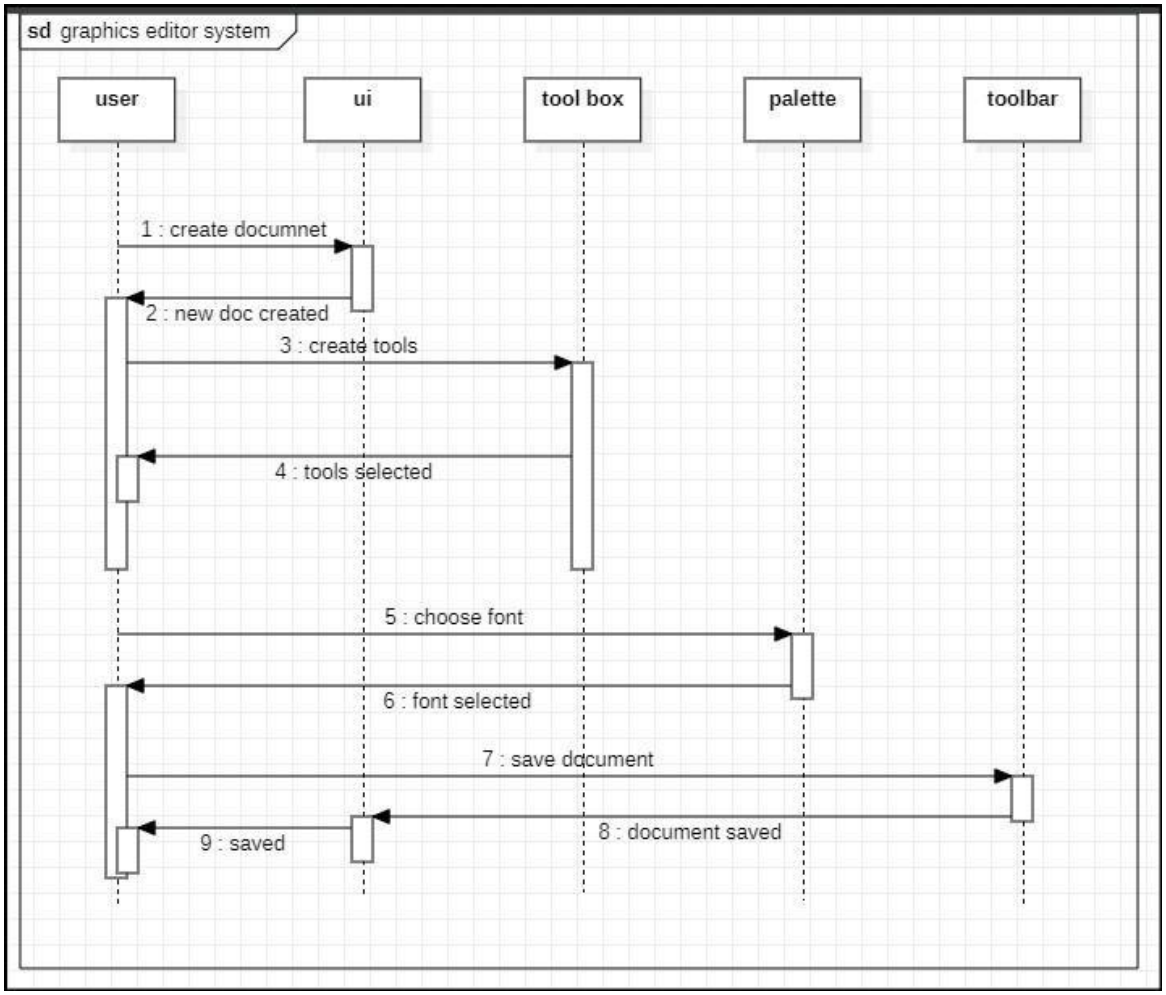
Display toolbox: displays the available tools

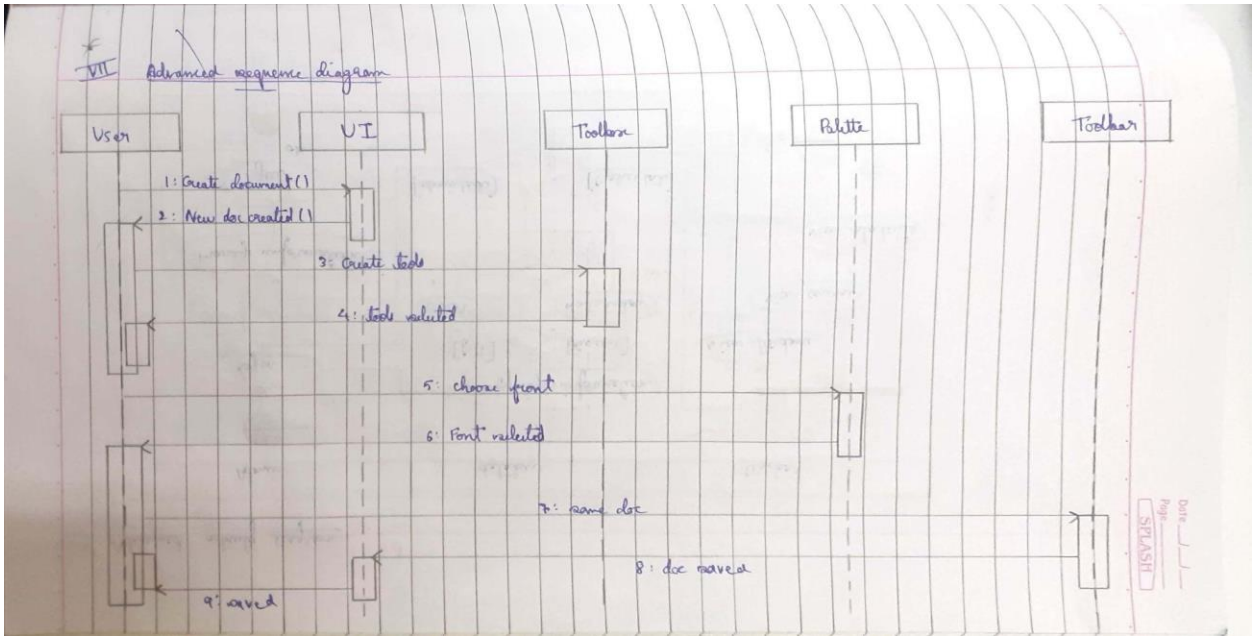
Add graphic object : insert a new graphic object

Choose tools from toolbox : allows user to choose tools

Delete document : Permanently deletes the document

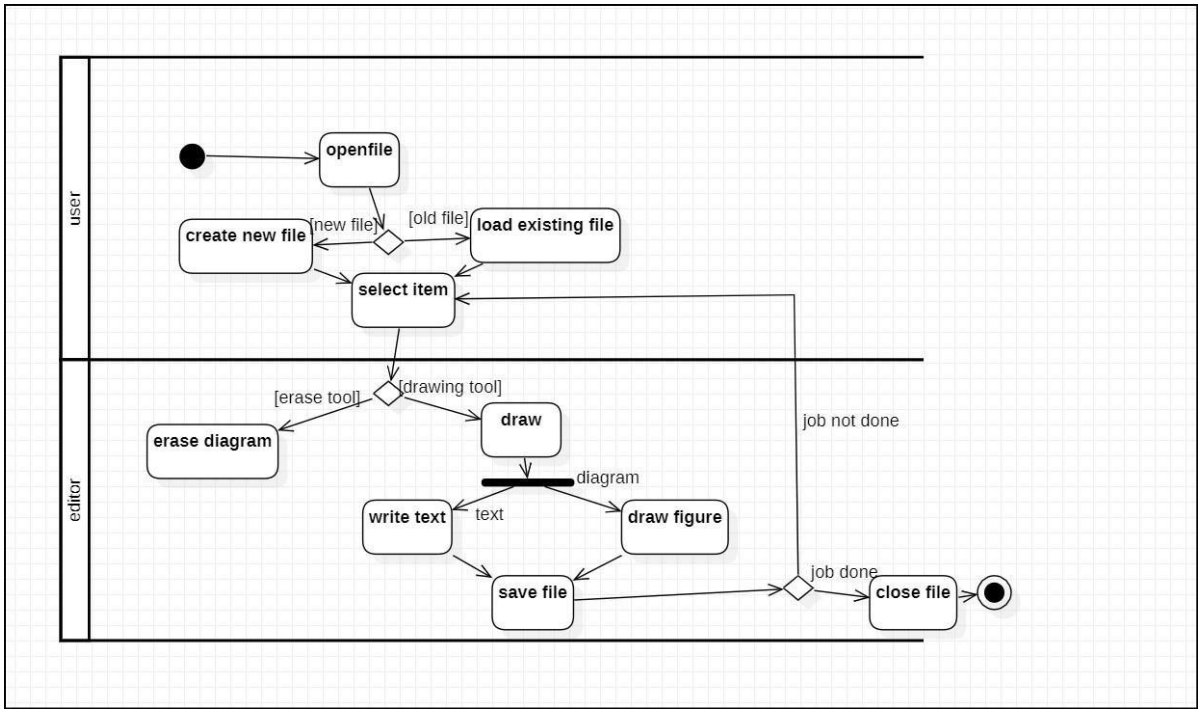
7.6 Sequence Diagram

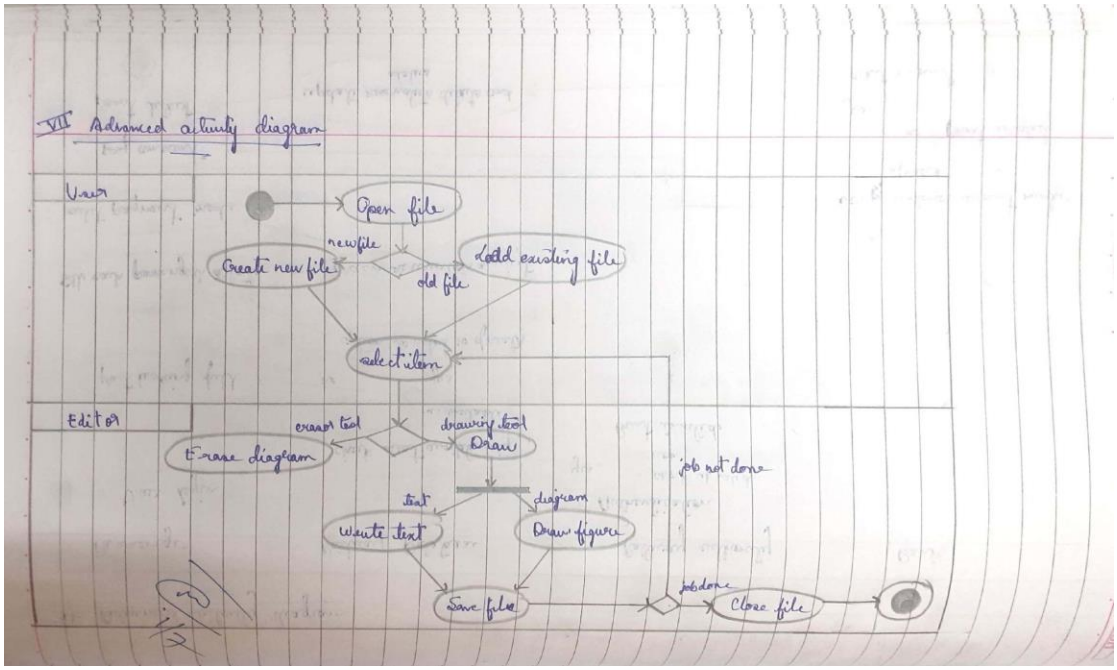




The above scenario depicts how a user creates a new document and also creates a new tool along with selecting it. The user has the facility to change the font and select it . Later after use he can save the document, and the saved message is sent.

7.7 Activity Diagram





The advanced activity diagram gives the states involved in making and saving a graphic file. The user selects a new document and draws graphics,saves the file and closes it.