ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC BÁCH KHOA
KHOA KHOA HỌC & KỸ THUẬT MÁY TÍNH

CÔNG NGHỆ PHẦN MỀM

Restaurant POS 2.0

GVHD: Lê Đình Thuận

Lớp: L05

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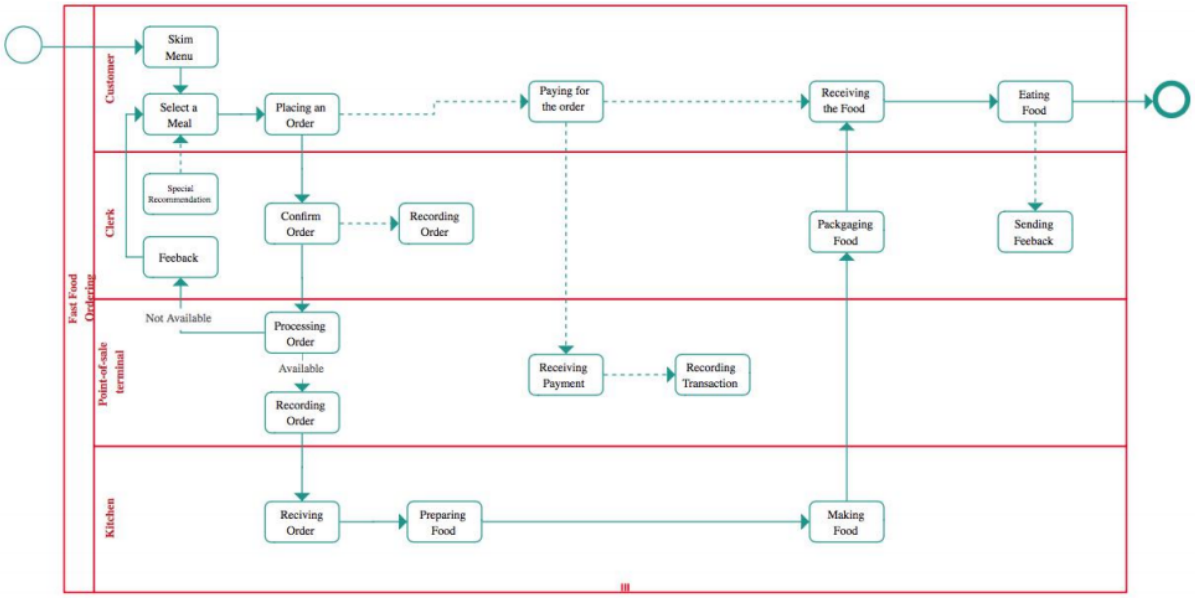
Tp. Hồ Chí Minh, Tháng 06/2020

Mục lục

Introduction to project

Point of sale (POS) or point of purchase is the time and place where a retail transaction is completed. At the point of sale, the merchant calculates the amount owed by the customer, indicates that amount, may prepare an invoice for the customer, and indicates the options for the customer to make payment. In restaurant business, POS systems often include table reservation, ordering food, alerts, billing, credit card processing and customer management. Even before the COVID-19 crisis, POS systems had gained traction across the industry. During the coronavirus pandemic, restaurants face greater peril than ever. Such systems are expected to increase business intelligence, reduce wasted effort and opportunity to scale to a large business. Moreover, the systems should support take-away options Our customers have multiple restaurants and have a need to develop a responsive web-based POS system that implement the current business flow as described below here (The current POS terminal can be replaced in this web-based solution)



The restaurant owners express several special demands for the new system:

- The system should allow non-direct contact between Clerks and Customers
- The system should be implemented using Web technology and QR code, so customers will not have to install apps
- The system should be usable from a mobile device, a tablet device or a normal computer/ laptop
- The system should be extendable to use in multiple restaurants in the future
- The current transactions is about 300 orders per day.

WORK ASSIGNMENT

Member	Work assignment
Nguyễn Hoàng Lâm	Login & Registration 1.3
Quang Chấn Vĩ	Task 1.1 & Payment 1.3
Nguyễn Đình An	Task 1.1 & Requirement 1.2
Nguyễn Thành Long	Food Ordering 1.3
Nguyễn Trần Hoàng	Requirement 1.2 & Use case 1.2
Lê Đắc Thường	Use case 1.2

1 Task 1: Requirement elicitation

1.1 Task 1.1.

1.1.1 Identify the context of this project.

A Restaurant POS system is a software that allows operators to start their own restaurant business. Due to the influence of the COVID pandemic, it is urgent to limit face-to-face communication, so this is the main reason why restaurant POS software was born: to not only be an intermediary between customers and employees but also help conveniently observe, check, and manage the restaurant's activities.

1.1.2 Who are relevant stakeholders?

- Customer
- Chef
- Restaurant Owner
- Clerk
- Shipper
- Restaurant manager

1.1.3 What are expected to be done?

- Friendly interface, easy to see, easy to use and manipulate for both customers and restaurant staff
- Customers can evaluate, share their own experience, and give suggestions for services and restaurants to perform better
- System adaptation to multiple devices
- Customer information must be safe and secure
- System response speed is fast
- The product search bar must include filter feature
- There are 2 ways that customer can log in: using a QR code as a guest or log in directly with your account
- The system has a customer support feature
- The system notify customers when the dish was finished
- When logging in to the system, customers can access it through 3rd parties such as Google, Facebook, Twitter
- When paying, customers can have many different payments methods

1.1.4 What are the scope of the project?

- The interface mainly consists of food images, therefore there is not too much text. You only have to do a few actions to successfully place an order
- The system will have a server to retrieve customer information, Customer account information can only be accessed by customers who have registered for that account.
- With phones, tablets, laptops with different browsers. The system must completely show basic functions as item selection, order confirmation, payment

- POS Store customer's invoice information include: unique identifier for each checkout, the names of the products being paid and our prices, total amount of the invoice, promotion code is applied to the invoice payment form (if any)
- For managers, POS can report sales, the list invoices, and the list of bills filtered for a specified determined date. In addition, POS can manage and adjust the list of restaurant staff and product catalog management
- The POS only keeps the necessary information of the product when presented in-app: product name, product type, product price
- POS has a membership system for customers who have registered as members. The customer information includes: Full name, Date of birth, Gender, Email, Phone number, Account name, Password. For customers who are not members, they will have none personal information. When logging in, member customers only need a phone number/email and password to get access to the system
- POS provides customers the ability to order on the application, manage the cart shop and do payment without the participation of staff (except when receiving invoices, which need to confirmed by staff)

1.2 Task 1.2.

1.2.1 Describe all functional and non-functional requirements of the desired system

FUNCTIONAL REQUIREMENTS

1. System usage
   - When customers want to use the system, customers have to log in to the system in 2 ways: log in with the QR code provided at the restaurant or log in with the registered account.
   - When logging in with an account: customers can enter their account name (or email) and access the password.
2. Registering an account
   - Customers who want to register as a member need to fill in the form to create an account with information including: Full name, Date of birth, Gender, Email, Phone number, Address, Account name, Password.
   - In addition, customers can register for an account through a third party system such as Google, Twitter, Facebook to automatically fill in the form with the providing information but still have to fill in the missing information.
3. Store:
   - When the customer successfully logs in, they will be directed to the store's website containing a list of products where they can search and select products. Customers can proceed to view dishes, choose dishes and pay here.
4. Online menu
   - The dishes displayed here are well-organized by different categories such as snacks, grilled dishes, hot pot dishes, ... and the customers can search for dishes.
   - When a dish is added by the manager, the customer's menu will be updated accordingly.
   - Customers can see the prices of the dishes displayed and have the feedback when they are using the menu.
5. Cart:
   - Each customer who logs in will be provided with a shopping cart to view the customer's current order process including dishes, the current total amount.

- In the shopping cart, customers can adjust the quantity of each item, delete the dish and have a note for the restaurant if any.
- In addition, customers can enter the promotion code in the cart to receive a discount.

6. Support using the system:
   - When customers have problems using the system, there will be a support function right on the main page.
7. Customer information:
   - Customer information will be stored in the database with: Full name, Date of birth, Gender, Email, Phone number, Address, Account name, Password.
   - Customers can view their own personal information and adjust the information: Full name, Date of birth, Gender, Email, Phone number, Address, Account name, Password.
8. Product information:
   - Information for each product stored in the database includes: product code, product name, product description, product type, raw material price, and selling price. However, when shown in the menu for customers to choose: only the product name, product description, product type, selling price are displayed.
9. Confirm cart:
   - When the customer confirms the cart, the system will check the existing cart to make sure the chosen products are available in stock.
   - After the customer confirms the cart, a clerk is required to check the cart and confirm to create a new order and proceed with the payment and order processing.
10. Method of receiving goods:
    - When the customer confirms the cart, the customer will choose a method of receiving the goods including: serving at the shop, taking away, home delivery.
    - With Delivery method, only customers who log in as a member are allowed to use it.
11. Payment
    - Customers can use 2 methods: prepay and pay after receiving the goods.
    - When paying, customers can pay for orders in three ways: Cash, credit card, internet banking.
12. Orders:
    - After the staff confirms the order. The order will appear in the system with information including: order number, order status, processed dishes, item status.
    - Only sales staff, chefs, delivery staff can change order status.
    - Delivery staff can print invoices to attach to orders when delivered to your home.
13. Feedback system
    - After confirming the order, customers can evaluate and reflect on the restaurant service.
14. Notification bell
    - When each dish is complete, there will be immediately a notification to customers and sales staff.
15. Using the system for employees and managers
    - Employees will choose to log in for employees and enter employee code and password to log in and use the system.

16. Using the system for Shippers
    - Shippers will be provided with information about the invoice to deliver via app.
17. Management system
    - The manager has the following functions: employee management, product catalog management, revenue check, inventory management, history check.
18. Register to use the system for the store for managers and store owners.
    - They will enter the area used by the restaurant owner to select the plan package, proceed to fill in the necessary information to register the service for the restaurant.

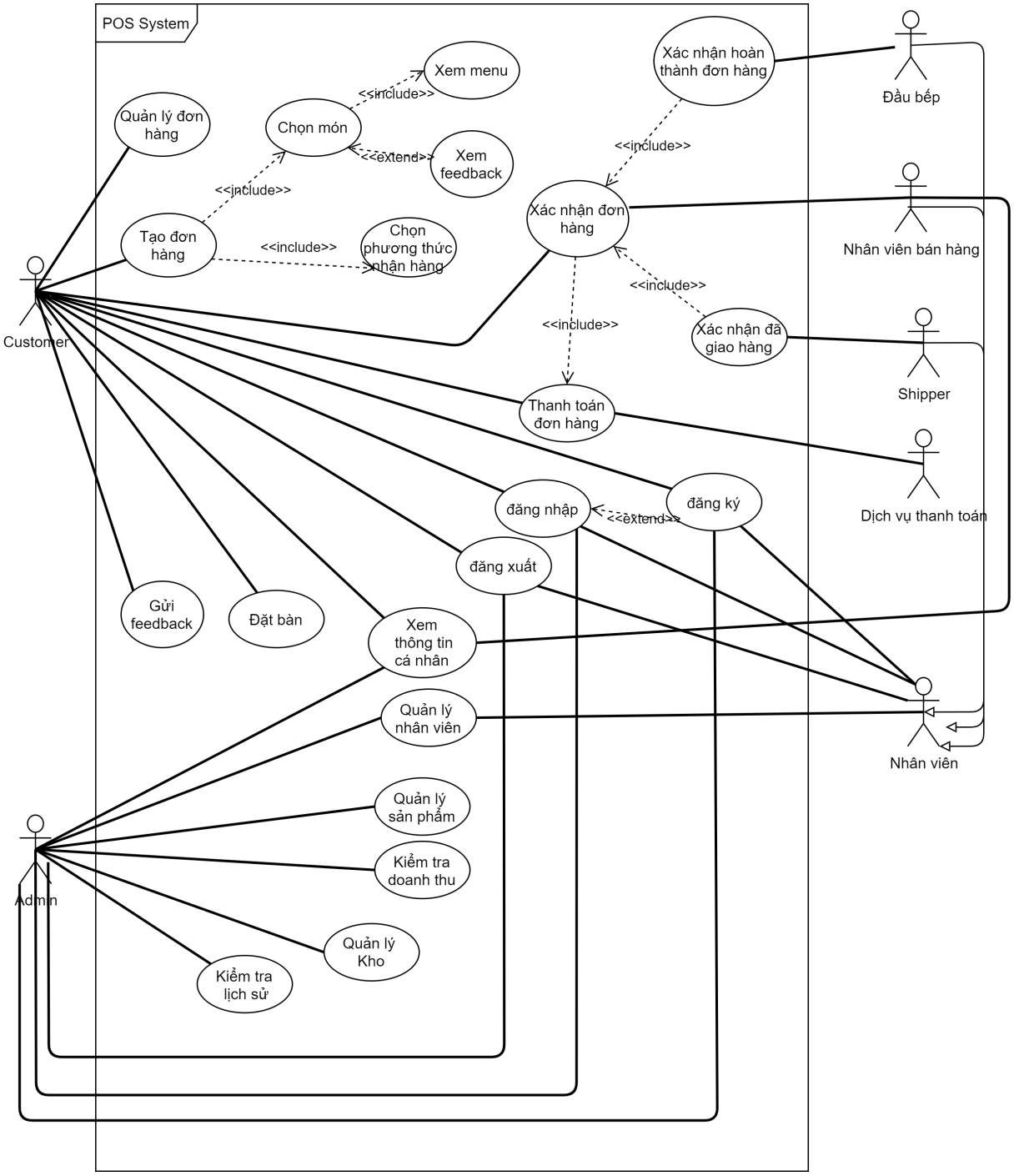
NON-FUNCTIONAL REQUIREMENTS

1. Usability Requirements:
    - Customers and employees can use the system by themselves, the system does not contain many operations.
    - Customers can complete food orders only with the system without interacting with staff (except for direct payment)
    - Only customers and staff, restaurant managers can use the system.
    - When using, customers can change the language (Vietnamese - English) to use the system.
2. Efficiency Requirements:
    - The response speed of the system must be fast.
    - When confirming the cart or updating the menu, the timeout should not exceed 1 minute.
    - The maximum number of orders in a day is 300 orders / day.
    - The maximum waiting time is 15 minutes and there is a notification if the customer waits too long.
3. Dependability Requirements:
    - The system always works from 7am - 10pm daily, the same time the store opens - closes.
    - System interface works stably. When there is an interface error, it will be handled within 2 days.
4. Security Requirements:
    - When logging in with an account, each account is assigned a unique identifier, so it can only be accessed with the corresponding account and password. The access information when filling out will be encrypted.
    - For customers logging in with a QR code, the customer will log into the system as a guest and will be limited to some features such as booking a table, viewing personal information,...
5. Maintainability Requirements:
    - All source code, development processes and related documentation will be controlled through the control system.
    - All source code is developed and modified according to the standards and rules of the programming language used.
    - You can always backup data when the system crashes to prevent customers from being affected.
6. Portability Requirements:
    - Any mobile device, tablet with internet can access the system's login screen.
    - With laptops, any browser can be accessed with the system.

7. Organizational Requirements:

   - Invoice status includes: in progress (default when created), completed, in progress (applied for delivery), received
   - When ordering food at the table, need to scan the QR code (general) to use the system, choose to enter the table number when paying.
   - For customers who only choose to take out, they still use the same QR, but must choose a takeout method to pay
   - When customers register for an account, they will have a fixed identifier corresponding to the member code
   - Each invoice will have a different identifier
   - Restaurant staff will have different identifiers

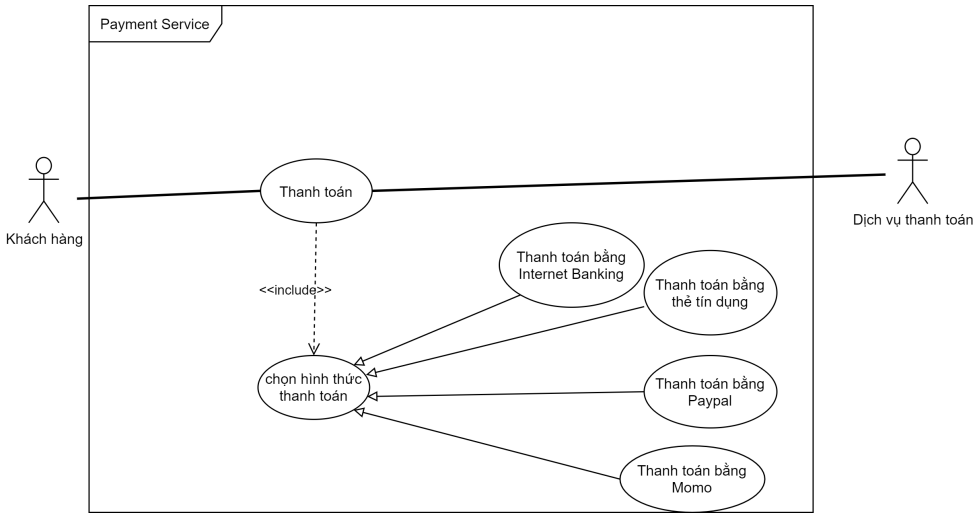
1.2.2 Draw a use-case diagram for the whole system



1.3 Task 1.3.

1.3.1 Draw PAYMENT SERVICE features use-case diagram and describe the use-case using a table format

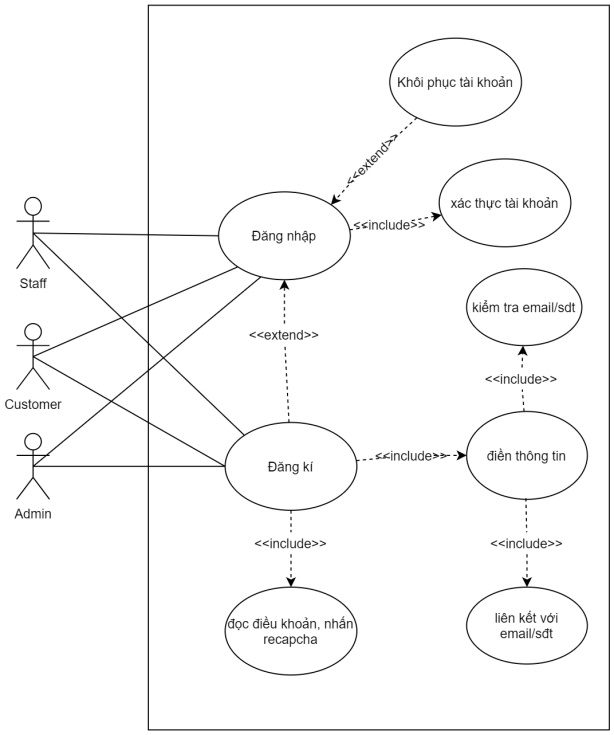
Usecase Name	Payment Service
Usecase Overview	The customer will proceed to pay for his invoice
Actors	Customers, Payment Services
Precoditions	The customer is at the checkout page of the website after completing the order.
Trigger	Customers press the payment button on the web
Main scenario	1. Customer presses the payment button to make payment 2. Customer chooses a payment method
Extensions	
Sub-variations	2a. When a customer fails to make a payment, the Payment Service will redirect the user to choose a payment method
Postcondition	Successful customer payment



1.3.2 Draw LOGIN and REGISTRATION features use-case diagram and describe the use-case using a table format

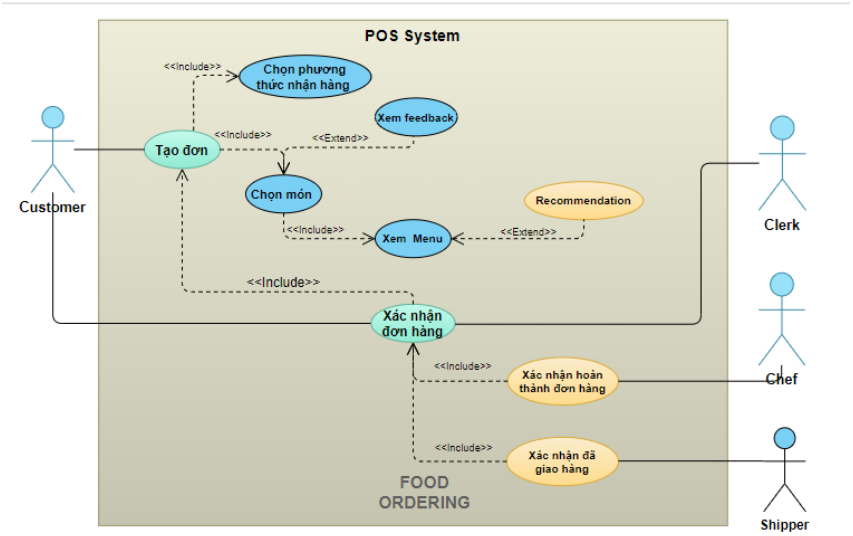
Usecase Name	Login
Related use case	Registration
Actors	Staff, Admin, Customer
Precoditions	User already has an account.
Main scenario	1. ScanQR User or go directly to the web login page 2. Users login phone number/email and password
Extensions	2a. The account verification system checks whether the account exists or not 2b. If the user forgets the password, the user can recover the password, the password will be sent to the user by message via phone number/email. 2c. If the system confirms that there is no phone number/email, the user will use the use case to register
Sub-variations	-
Postcondition	User successfully log in to system and will be directed to the main page

Usecase Name	Registration
Related use case	Login, Password recovery
Actors	Staff, Admin, Customer
Precoditions	User does not have an account.
Main scenario	ScanQR users or go directly to the web login page 1. Users choose to register for an account 2. Users enter required restaurant information 3. Users link account with phone number or email 4. Users reads terms and chooses recapcha
Extensions	3a. If the system confirms the error information, ask the users to fill it again 3b. If the users only has a phone or email, can only enter 1 of the above 2 information 3c. If the system checks the email/phone number that was used to create the account 3c1. Request to enter another email/phone number 4a. User can only link 1 of the 2 above information
Sub-variations	
Postcondition	User successfully registers an account and will be directed to login page



1.3.3 Draw FOOD ORDERING features use-case diagram and describe the use-case using a table format

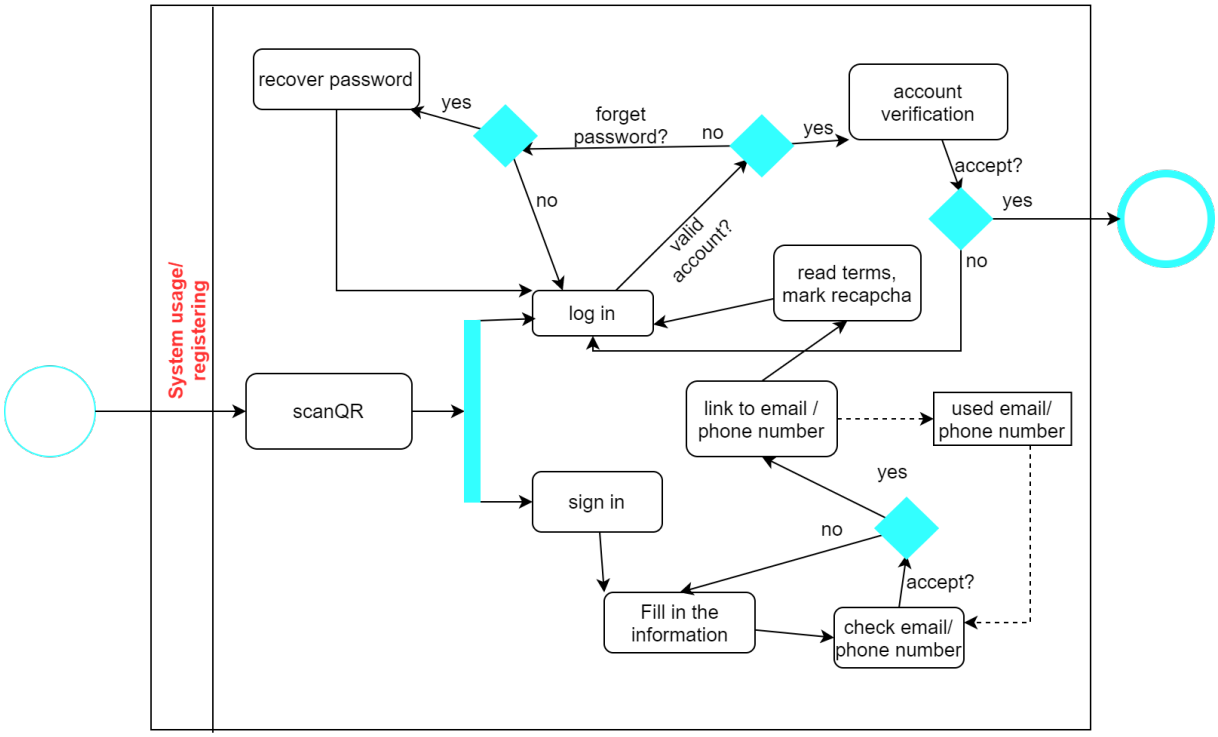
Usecase Name	Food Ordering
Actors	Customers, Clerk, Shipper, Chef.
Precoditions	Scan QR or Login
Main scenario	1. Customers create order to be able to choose dishes and choose the type of method food ordering. 2. Customers will choose dishes based on the Restaurant's menu 3. After the customer has selected the dish, they will confirm the order and Restaurant staff will also confirm the order on the Restaurant side. 5. After the confirmation of the order, the chef will process it and confirm when it is completed and the delivery staff will delivery and confirm after the order is delivered
Extensions	-2a: During the customer's selection of goods, the dish will be given some suggestions ideas (combo, promotion, ..) -2b: During the process of customers choosing dishes, they can see the feedback of food you want to choose.
Sub-variations	-3a: If the customer finished the dish but that dish, the restaurant does not respond to the order, cancel the order and send feedback back to the customer. Large goods Customers can proceed to choose again (step 2).
Postcondition	Customer will be announced if the food is ordered successfully



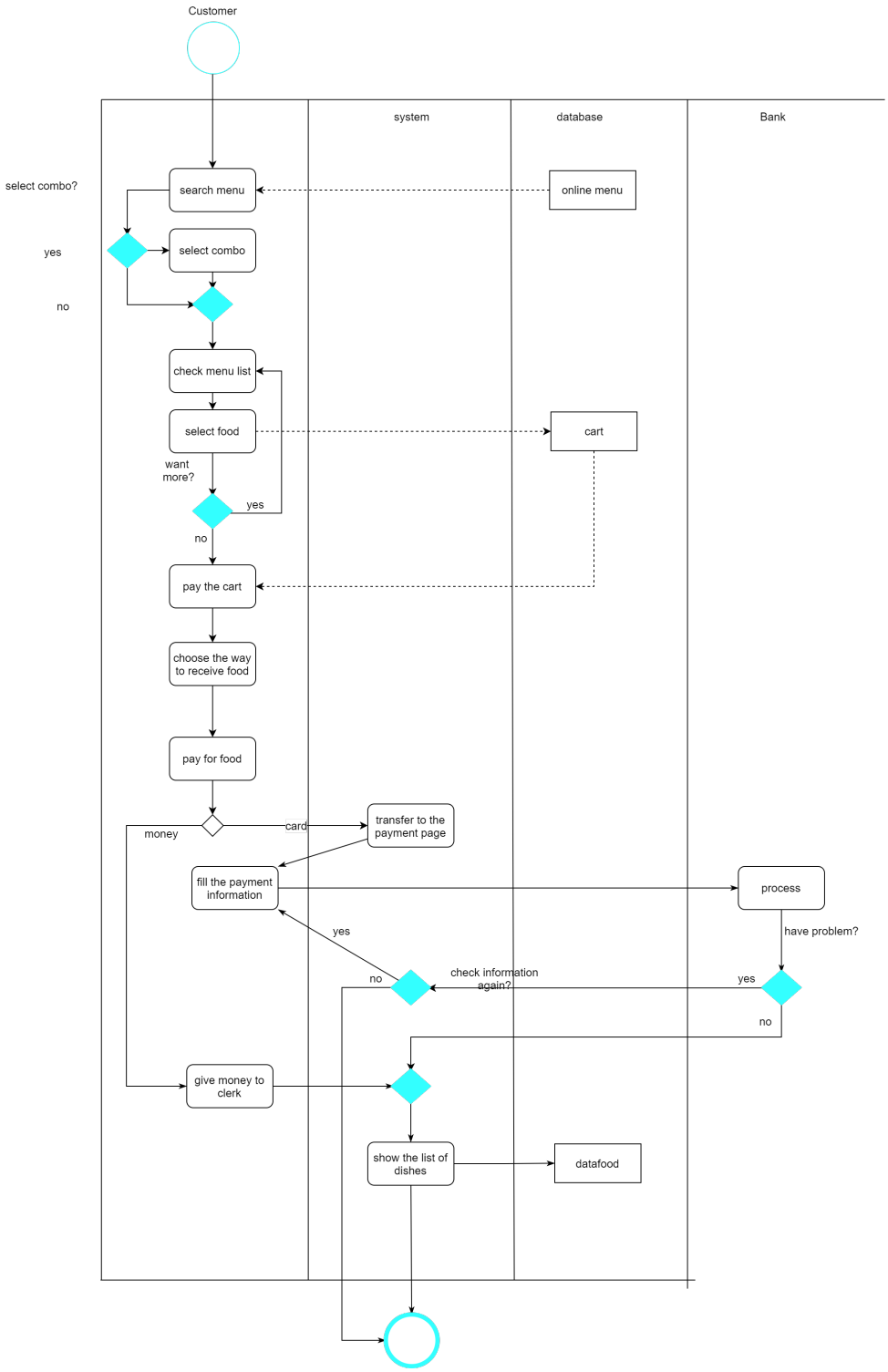
2 Task 2: System modelling

2.1 Task 2.1: Draw an activity diagram to capture Major (not all) functional requirements of the desired system

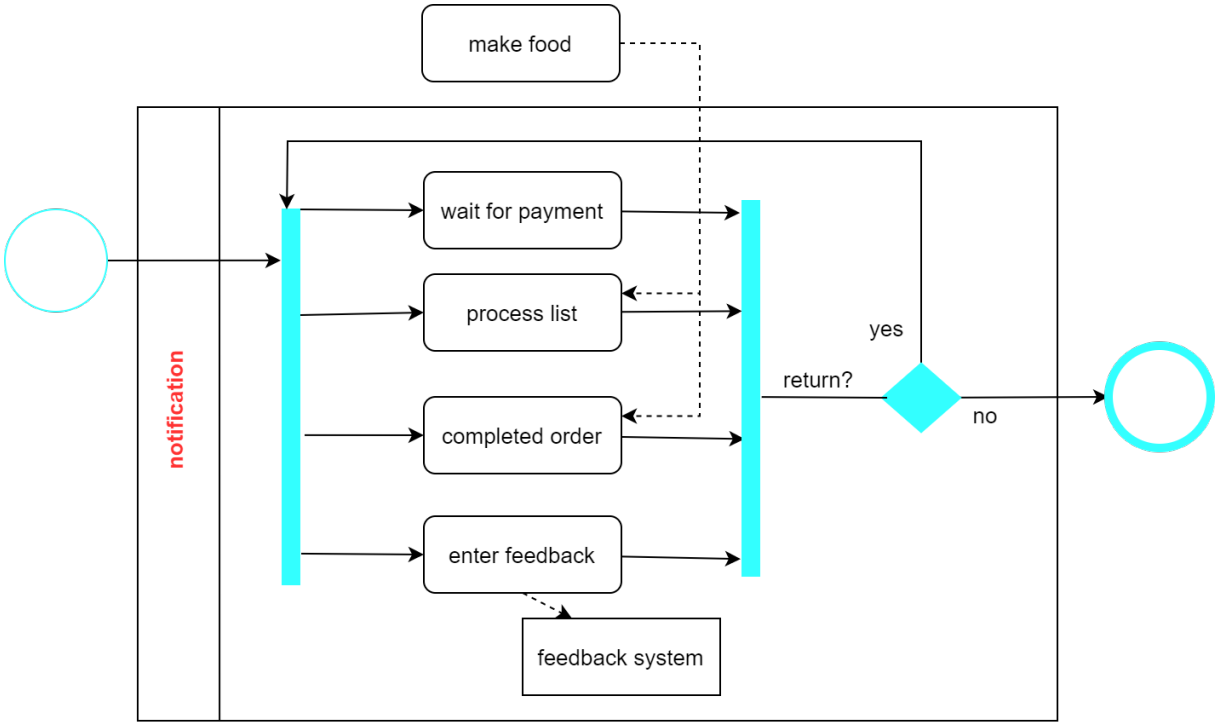
2.1.1 Log in and Sign up



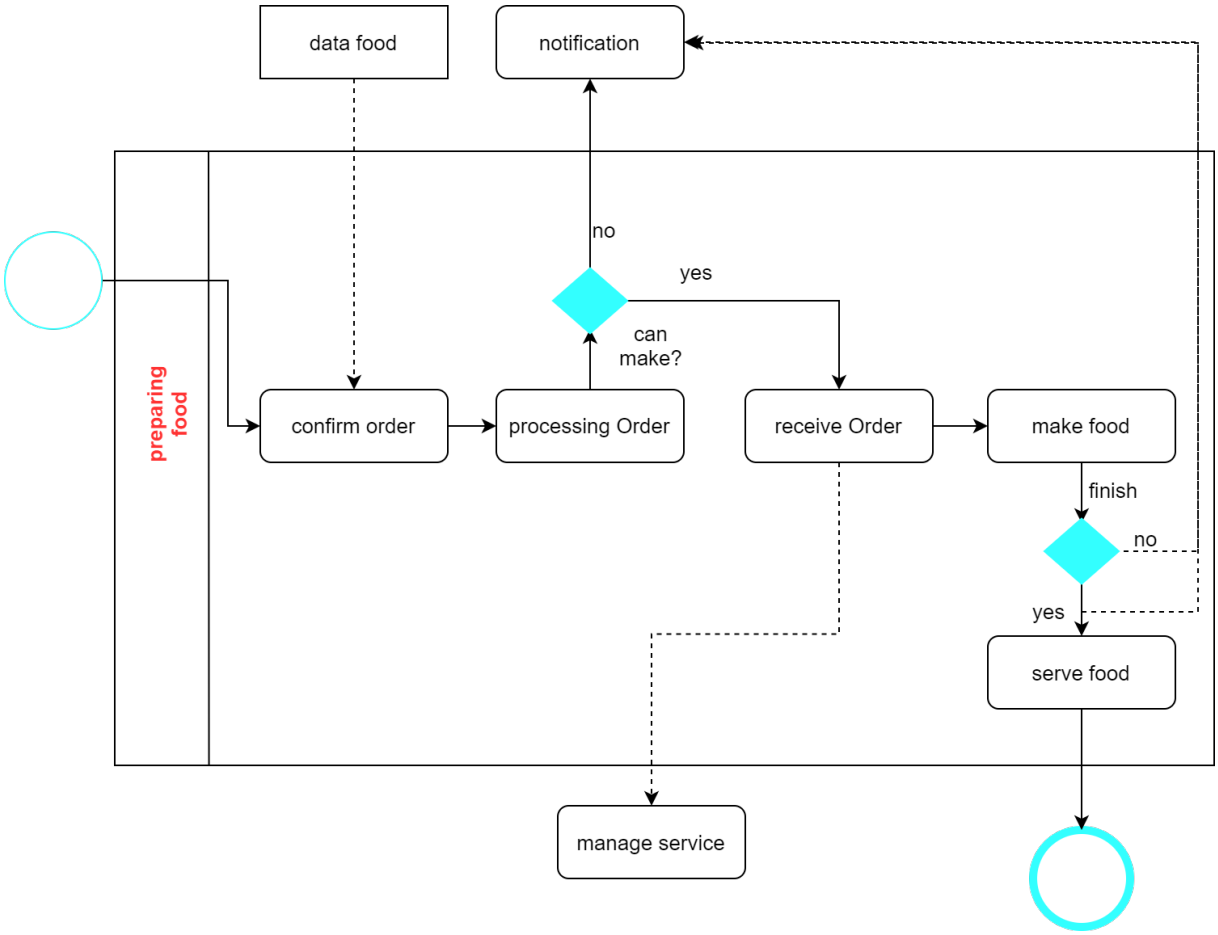
2.1.2 Ordering and Payment



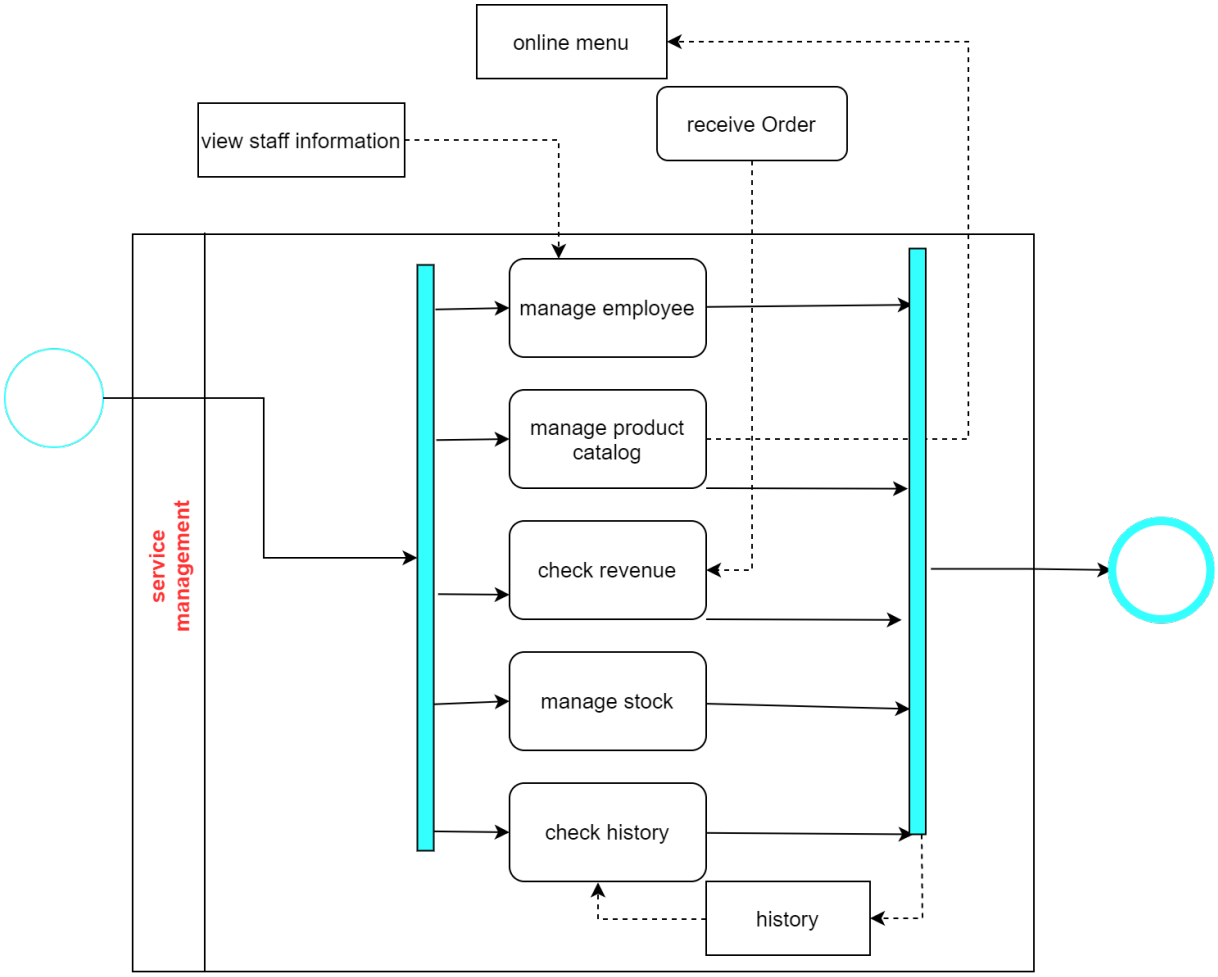
2.1.3 Notification



2.1.4 Prepare food

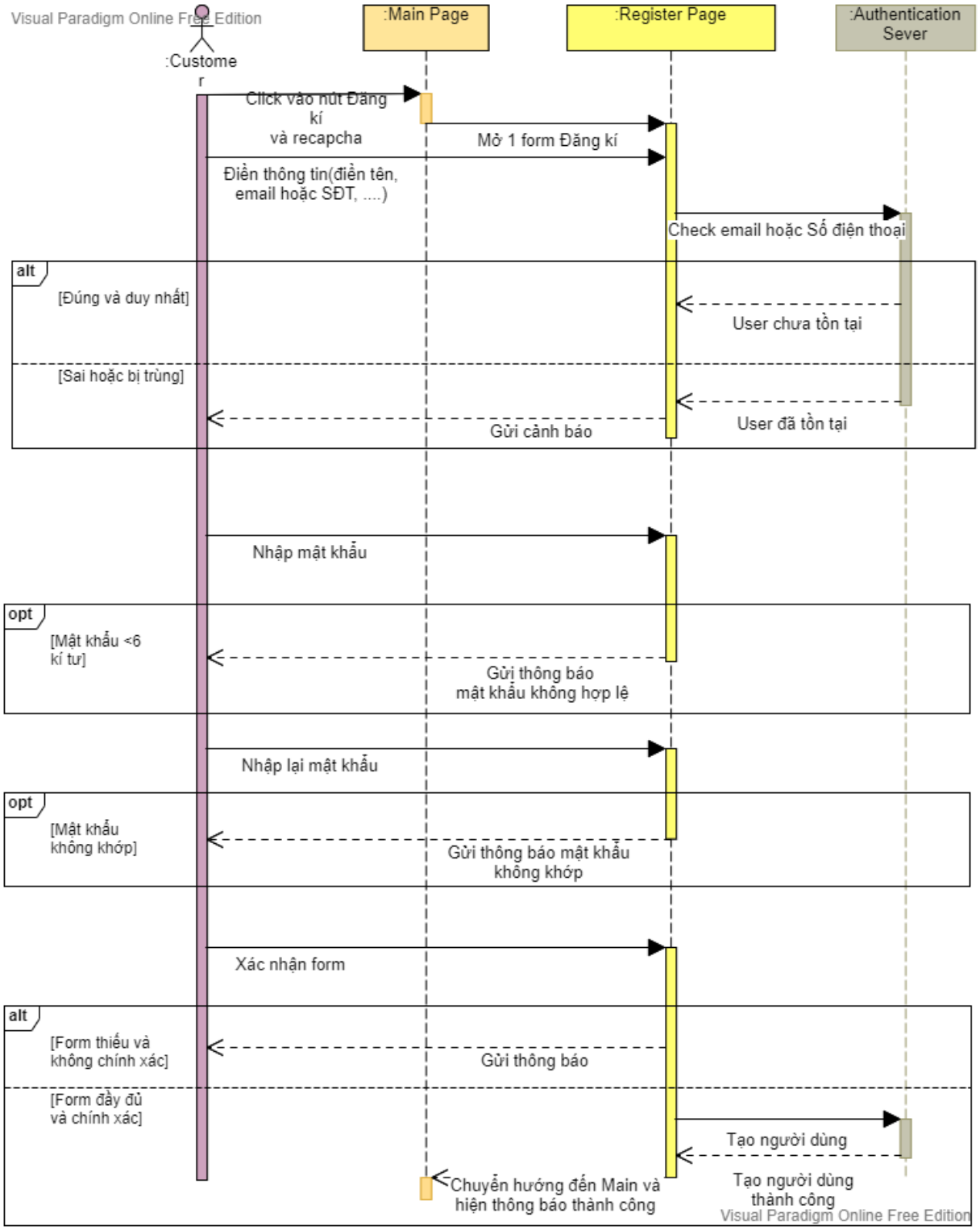


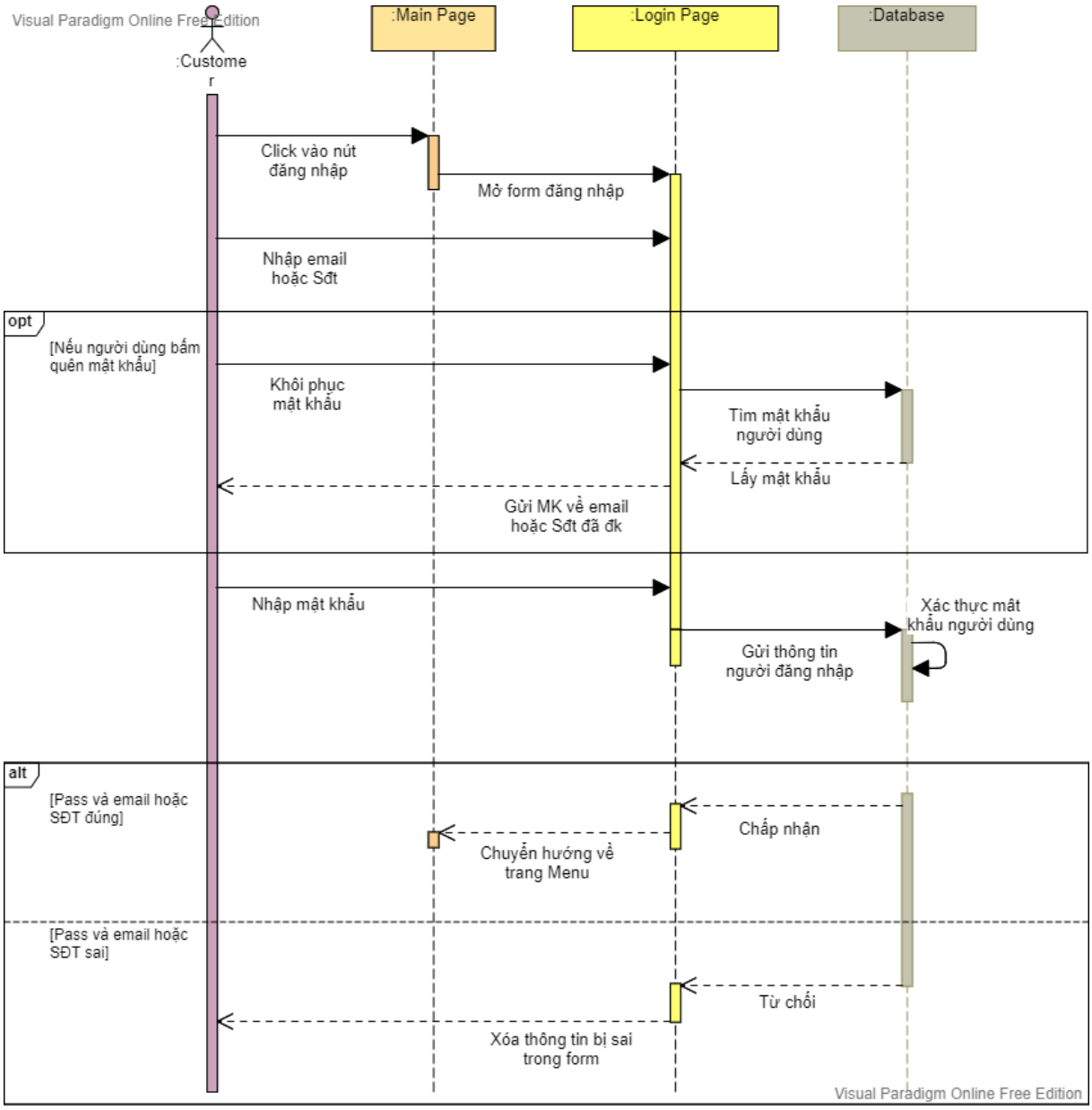
2.1.5 Manager


online menu
receive Order
view staff information
manage employee
manage product catalog
check revenue
manage stock
check history
history
service management

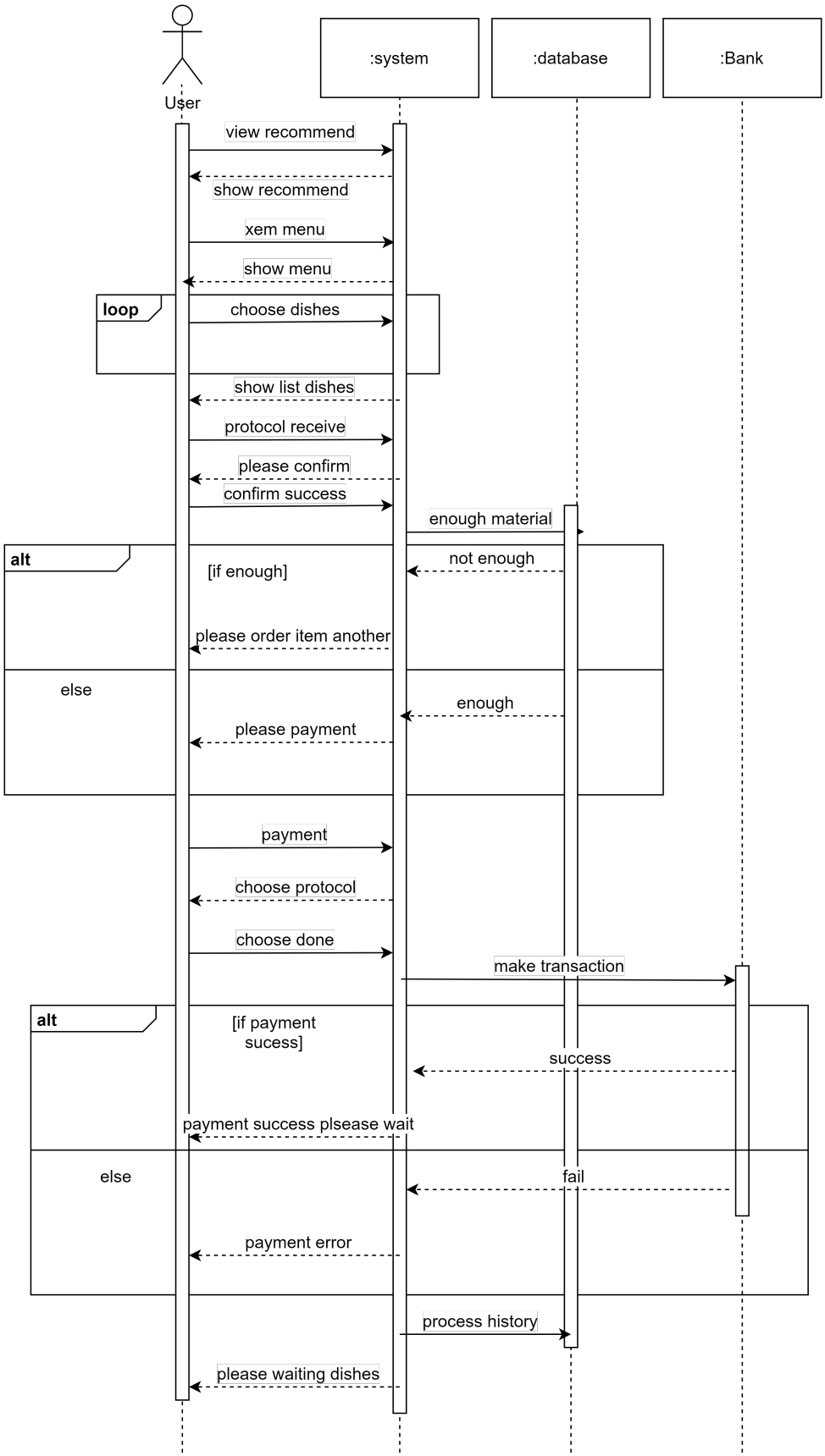
2.2 Task 2.2: Draw a sequence diagram for use-case in Task 1.3

2.2.1 Sign up and Log in

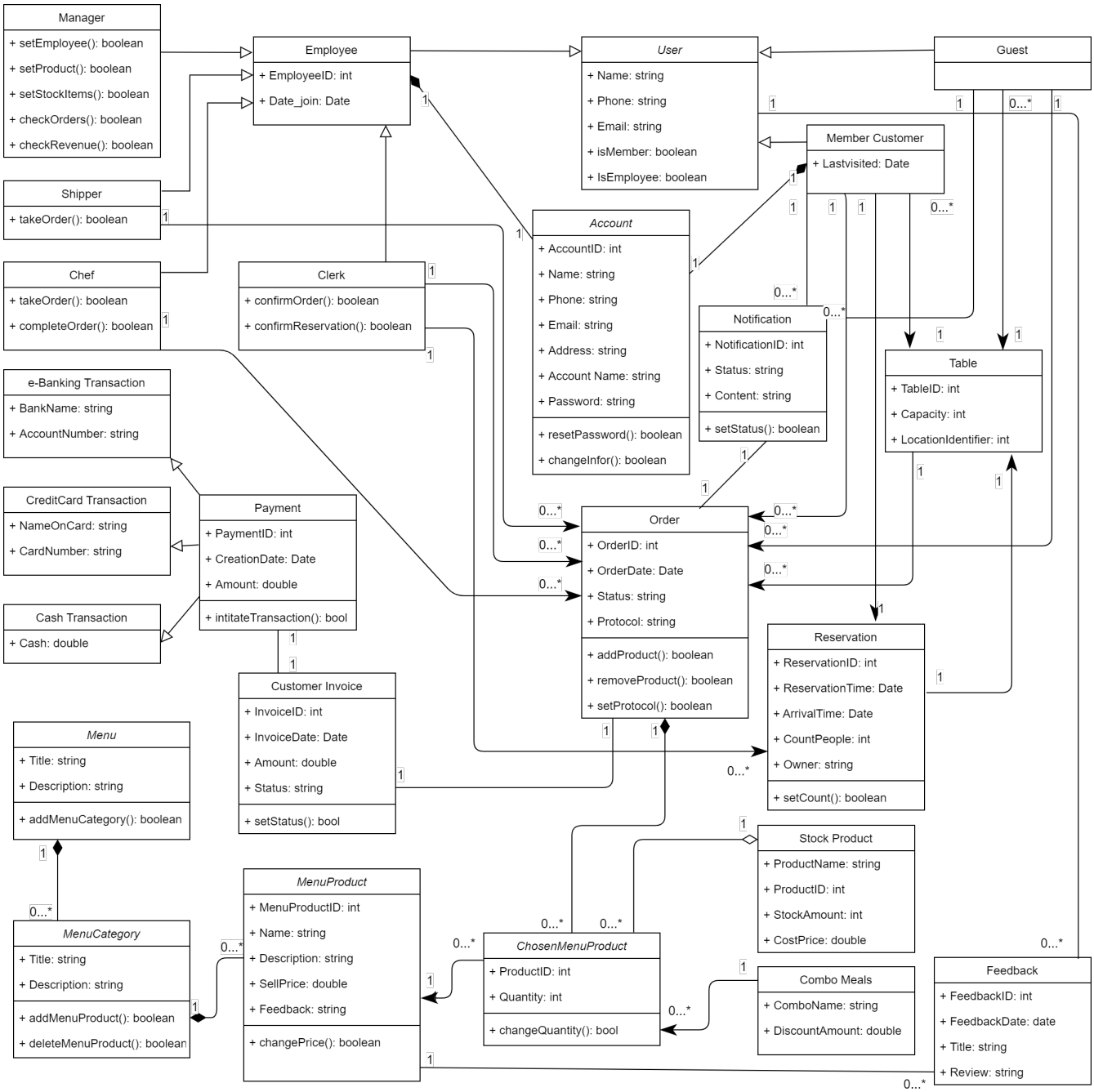



Visual Paradigm Online Free Edition
:Custome r
:Main Page
:Login Page
:Database
Click vào nút đăng nhập
Mở form đăng nhập
Nhập email hoặc Sđt
opt
[Nếu người dùng bấm quên mật khẩu]
Khôi phục mật khẩu
Tìm mật khẩu người dùng
Lấy mật khẩu
Gửi MK về email hoặc Sđt đã đk
Nhập mật khẩu
Xác thực mật khẩu người dùng
Gửi thông tin người đăng nhập
alt
[Pass và email hoặc SĐT đúng]
Chấp nhận
Chuyển hướng về trang Menu
[Pass và email hoặc SĐT sai]
Từ chối
Xóa thông tin bị sai trong form
Visual Paradigm Online Free Edition

2.2.2 Ordering and Payment



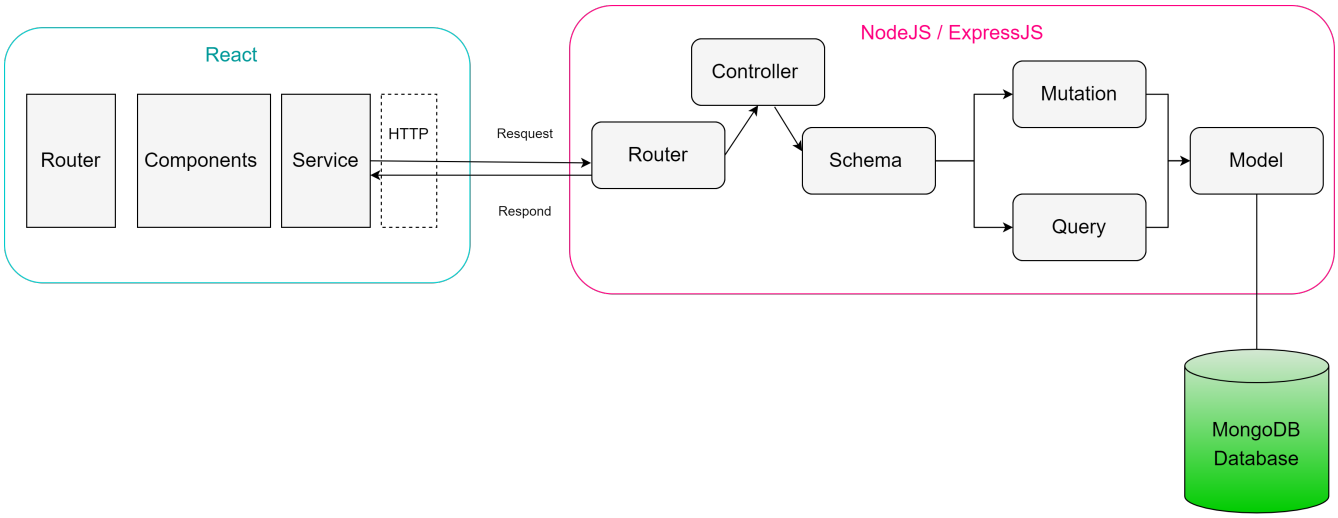
2.3 Task 2.3: Draw a class diagram

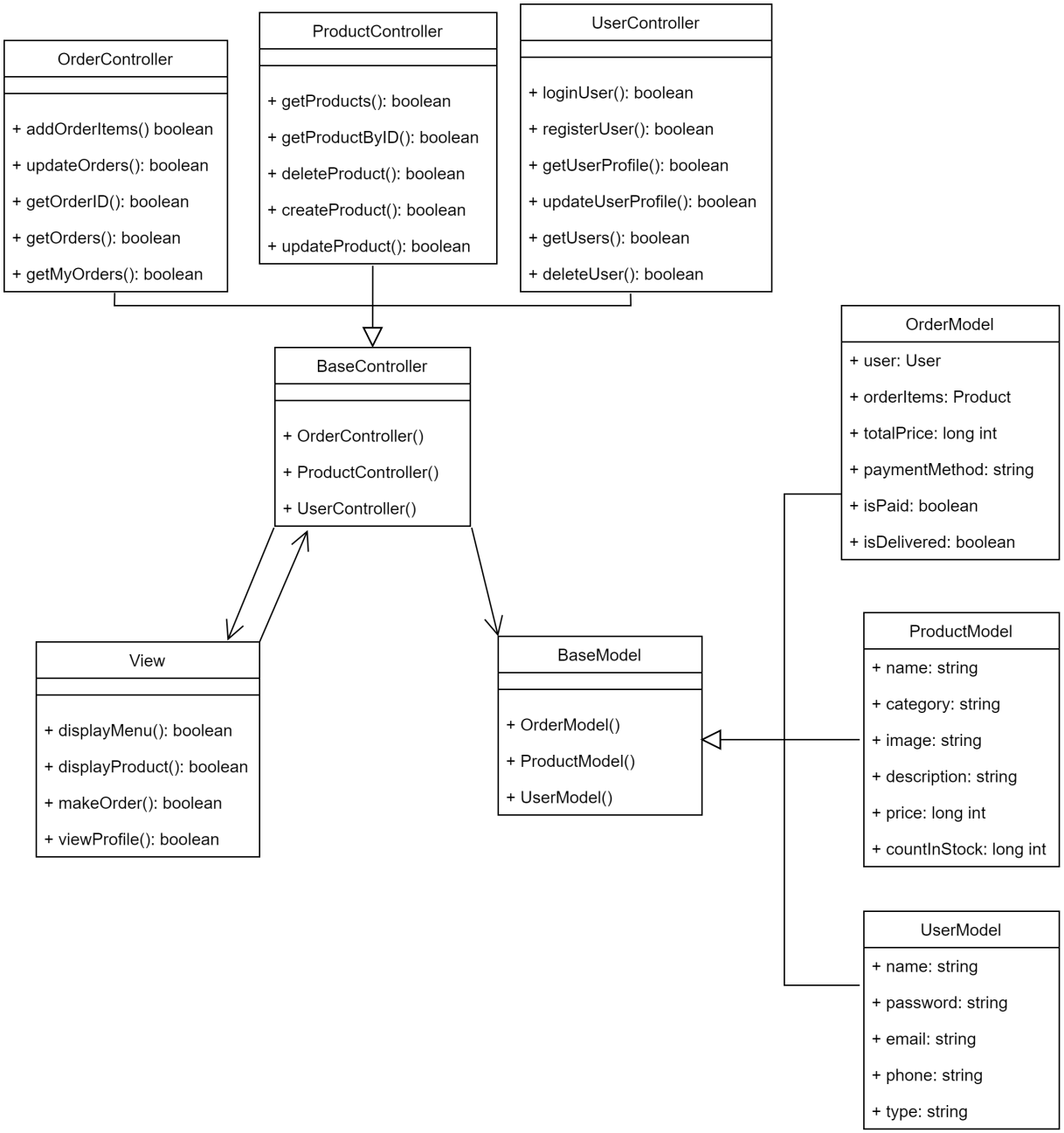


3 Task 3: Architecture design

3.1 Task 3.1. Describe an architectural approach you will use to implement the desired system

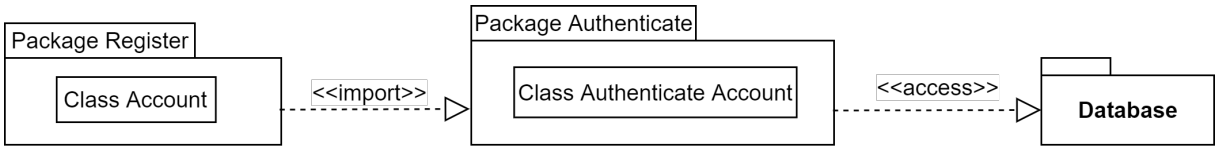
The software architecture describes the different components of the application, and the relation between them. In this restaurant POS 2.0, we follow Model – View – Controller (MVC) architecture. To implement this, we apply the MongoDB - Expressjs - React - Nodejs (MERN) technology stack. The view is generated in the browser using ReactJS, which communicates with the backend, which have routes to direct to different controllers. These controllers will access to schema, which in turn, calls the right mutation or query. The model takes care of accessing and retrieving the data from MongoDB. The following two images are the structure of MERN stack and the MVC architecture.



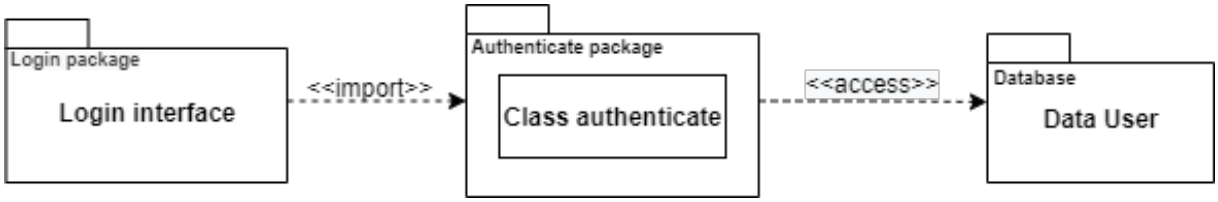


3.2 Task 3.2. Draw an implementation diagram for Major (not all) functional requirements

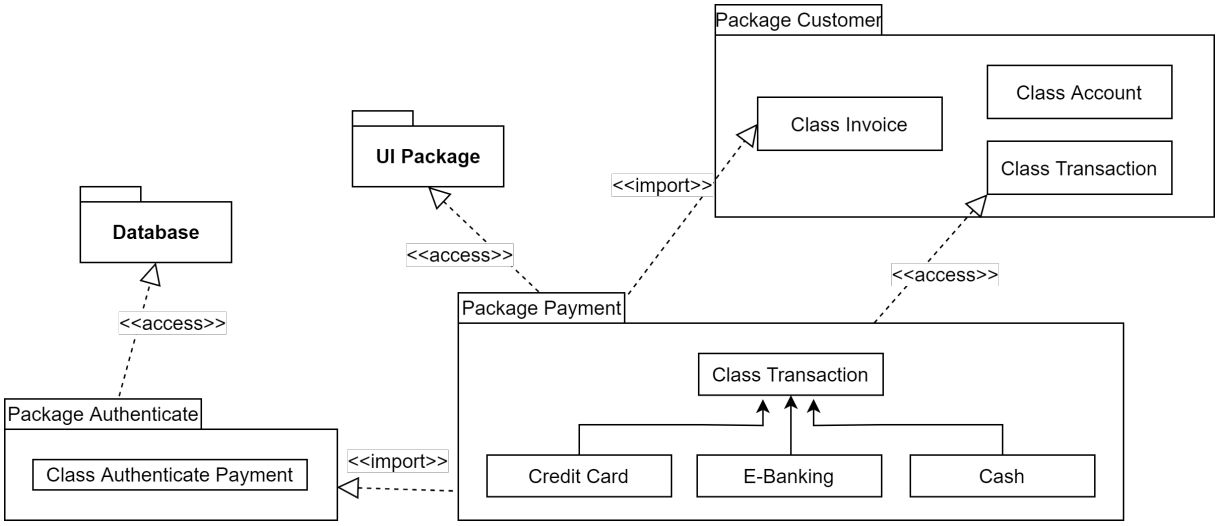
3.2.1 Feature Register



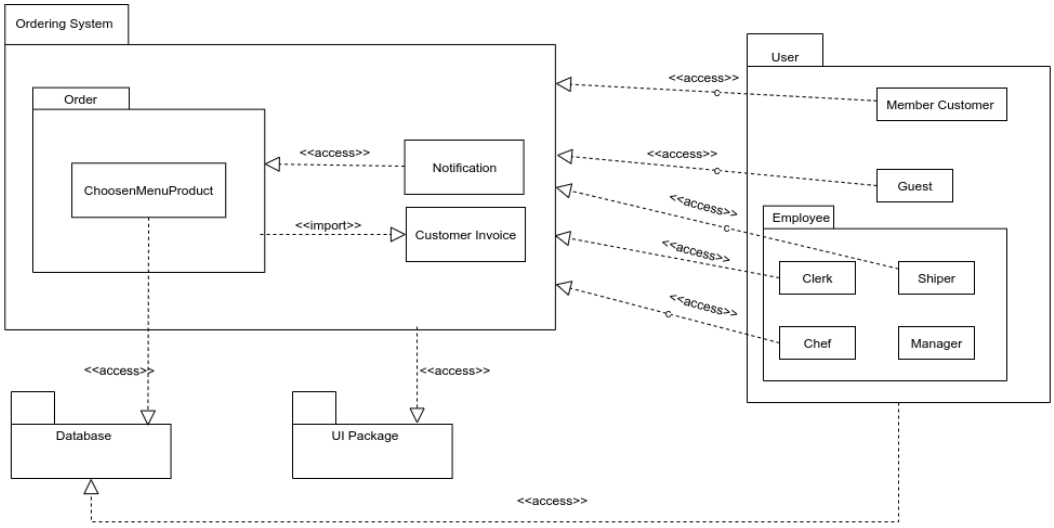
3.2.2 Login



3.2.3 Feature Payment



3.2.4 Order Food



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[Kir] Kirill Fakhroutdinov, *UML Use Case Diagrams,* September 2021, <https://www.uml-diagrams.org/use-case-diagrams.html>