

Sample Answer of Week 1 and 2

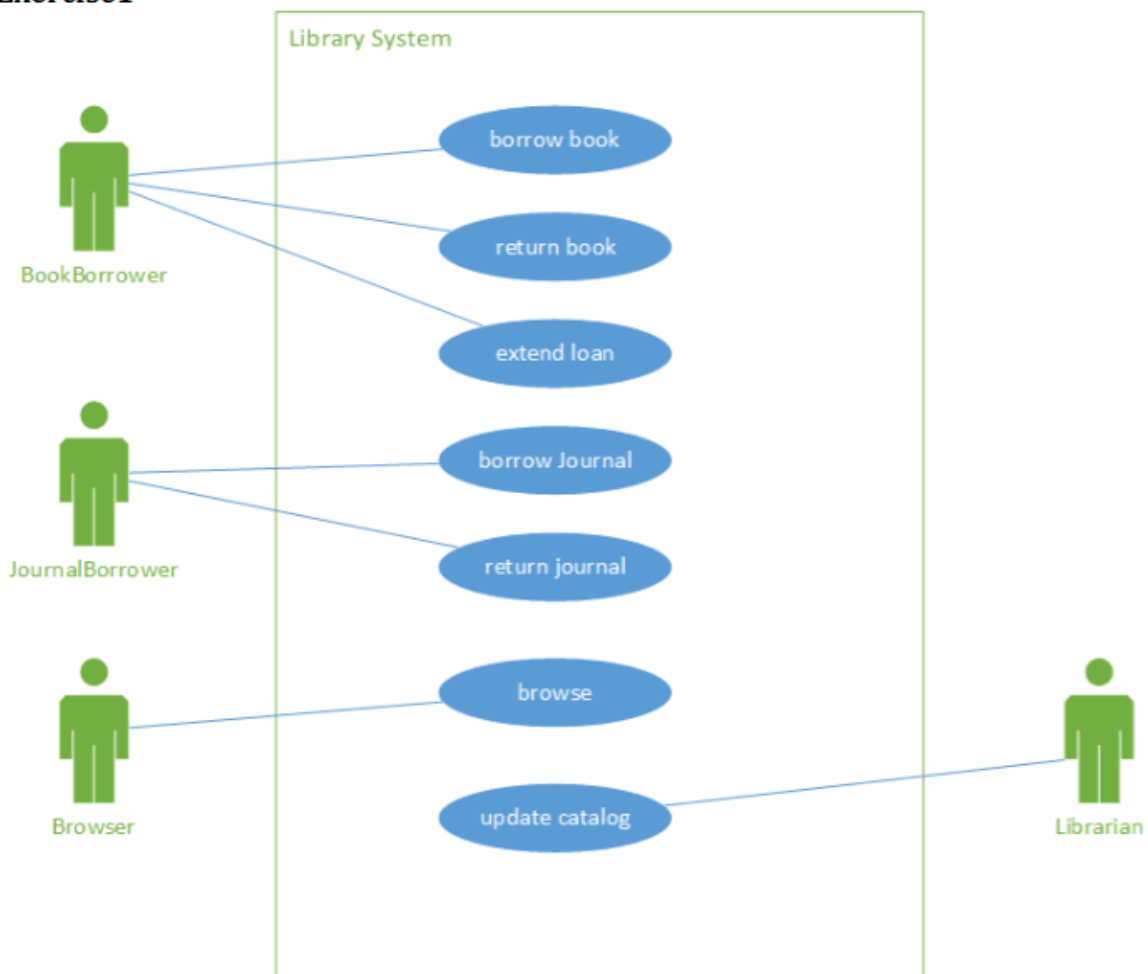
This part mainly depends on how the design is reasonable, and for all questions, there is no single answer. We only provide an sample answer for you, but it doesn't mean the answer is the most appropriate one.

Topic 1. Basic Exercise

Exercise 1:

Translate the following English statements into a representative use case diagram: Library System: The system shall have the following four types of actors: `BookBorrower`, `JournalBorrower`, `Browser`, and `Librarian`. A user playing the role of a `BookBorrower` shall be able to borrow a book, return a book, and extend the loan of a book. A `JournalBorrower` shall be able to borrow a journal and return a journal. A `Browser` shall be able to browse, and a librarian shall be able to update the catalog.

Exercise1

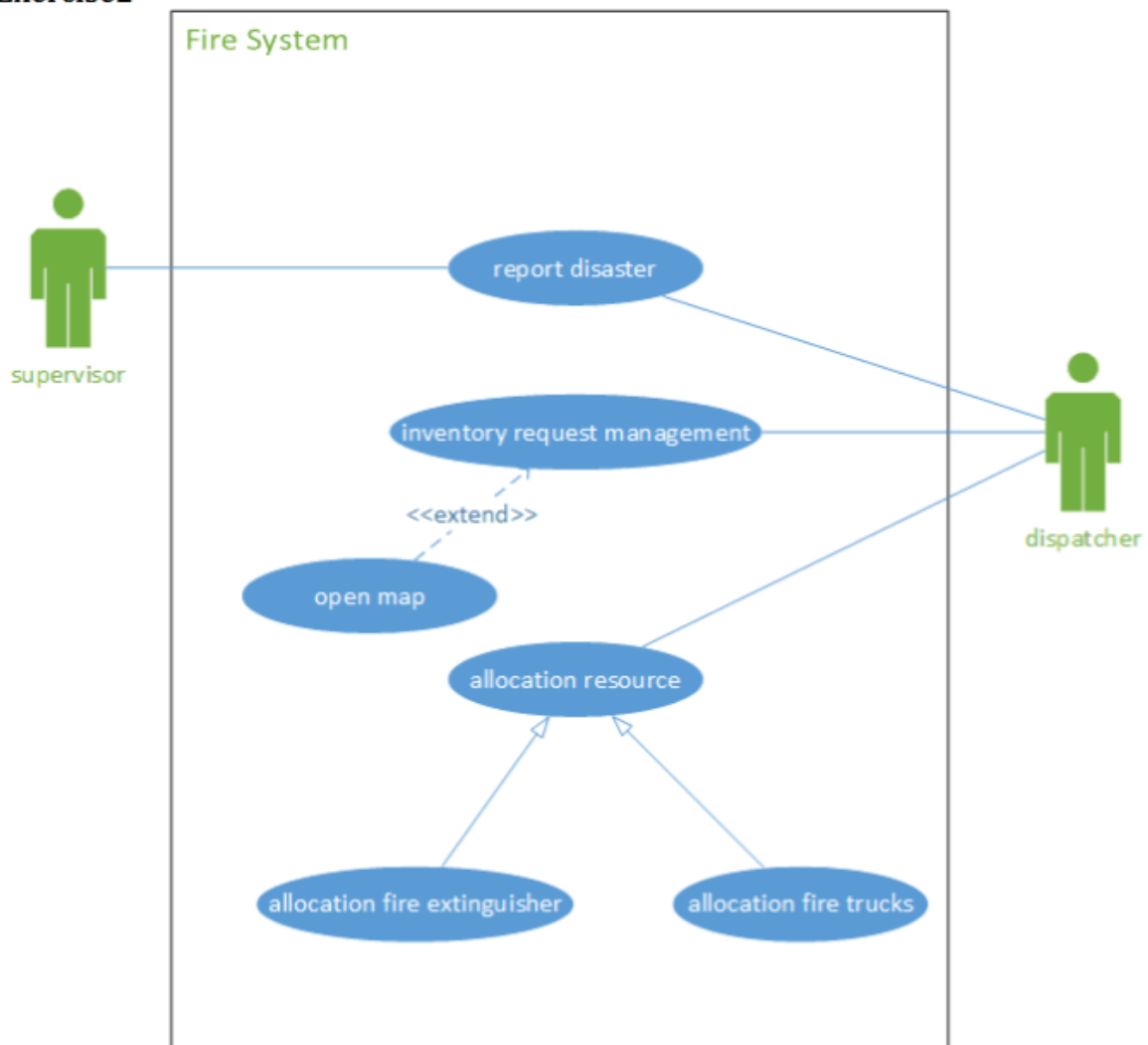


Exercise 2:

When a fire occurs, the **supervisor** needs to report the disaster, and then the system will automatically send the disaster to **dispatcher**. After the **dispatcher** receives the report, he can send the fire resource allocation request to the system according to the fire situation and accident location. In this step, the **dispatcher** may choose to open the map finding the specific location of disaster. At this point, the system will automatically calculate whether to meet the needs of **dispatchers**. When the fire resources in the inventory information database meet the needs of the dispatcher, the dispatcher can allocate the corresponding fire resources including allocating fire extinguishers and allocating fire trucks.

There are two actors in this use case diagram: **supervisor** and **dispatcher**. You need to find the use cases and the relationship of these use cases. Please begin to finish this use case diagram.

Exercise2



2. Topic 2 Basic Exercise

Exercise 1

According to the code framework below, please design the corresponding class diagram:

```
public class School {
    private List<Department> departments;
```

```

public void SetUpDepart(){
    departments.add(new Department());
}

}

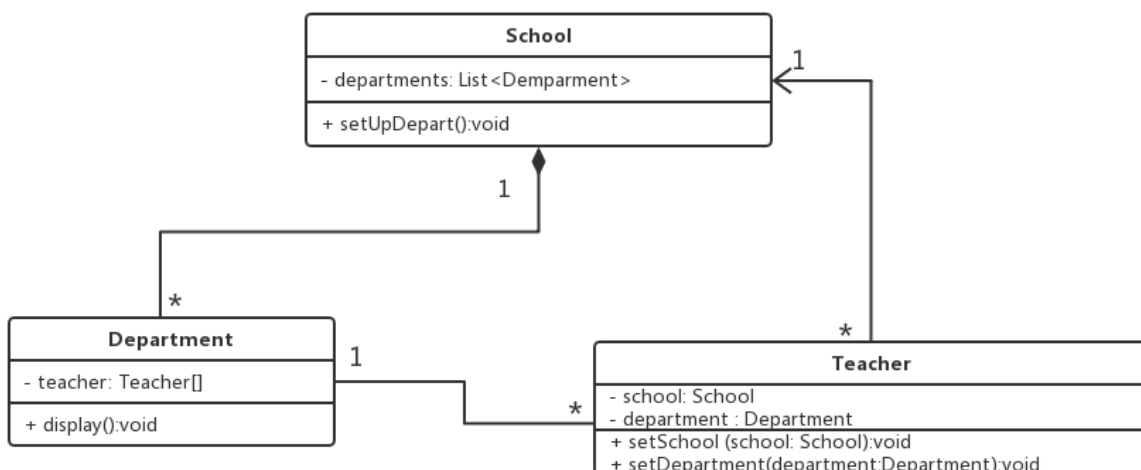
public class Department{
    private Teacher[] teacher;
    public void displayTeacherName(){
    }
}

public class Teacher{
    private School school;
    private Department department;

    public void setSchool(School school){
        this.school=school;
    }
    public void setDepartment(Department department){
        this.department=department;
    }
}

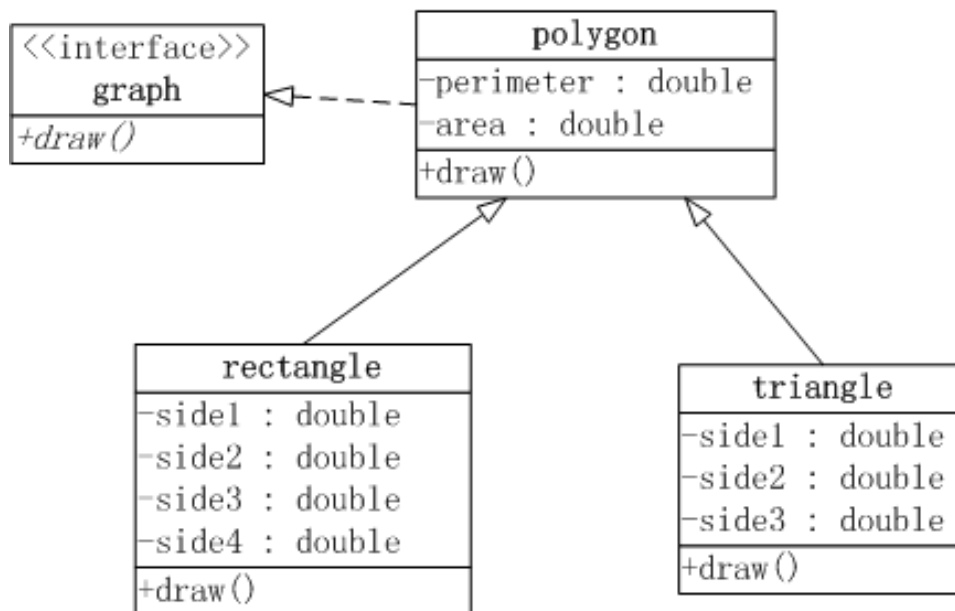
```

Answer:



Exercise 2

According to the class diagram below, please design the corresponding code framework.



Answer:

```

public interface graph{
    public void draw();
}

public class polygon implements graph{
    private double perimeter;
    private double area;

    @Override
    public void draw(){}
}

public class triangle extends polygon{
    private double side1;
    private double side2;
    private double side3;
    public void draw(){}
}

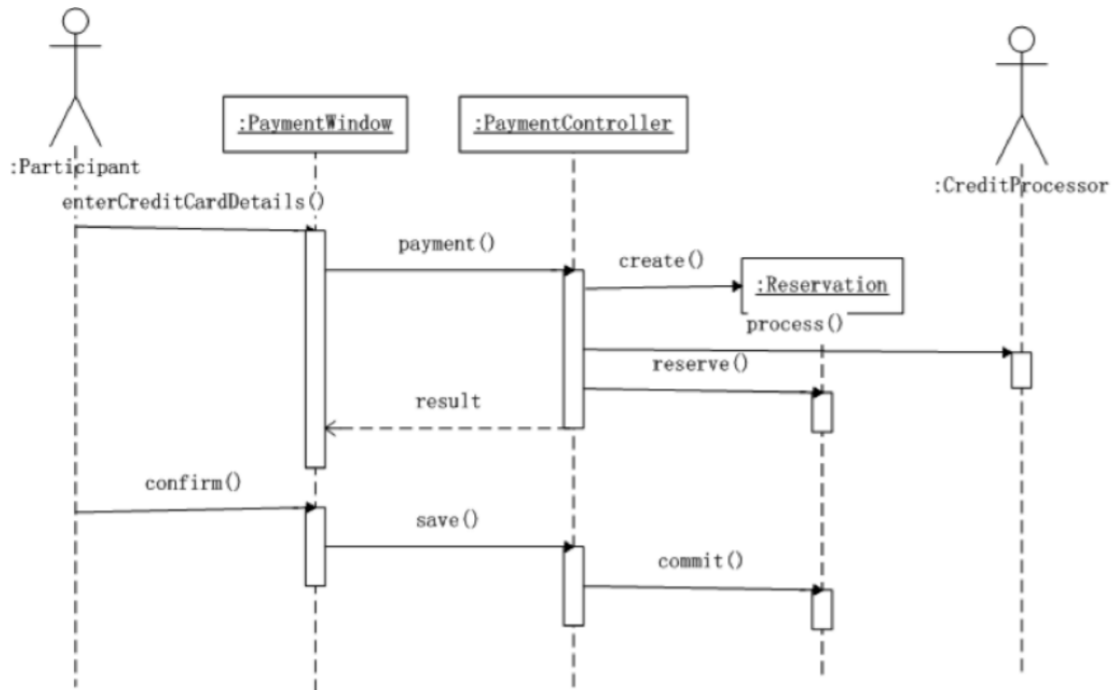
public class rectangle extends polygon{
    private double side1;
    private double side2;
    private double side3;
    private double side4;
    public void draw(){}
}
  
```

3. Topic 3 Basic Exercise

Exercise 1

According to the sequence diagram below, please writing down the following question.

1. List all the method should be defined in `PaymentController` class.
2. List all the method can be invoked by `PaymentController` class



Answer:

Define: `payment()`, `save()`

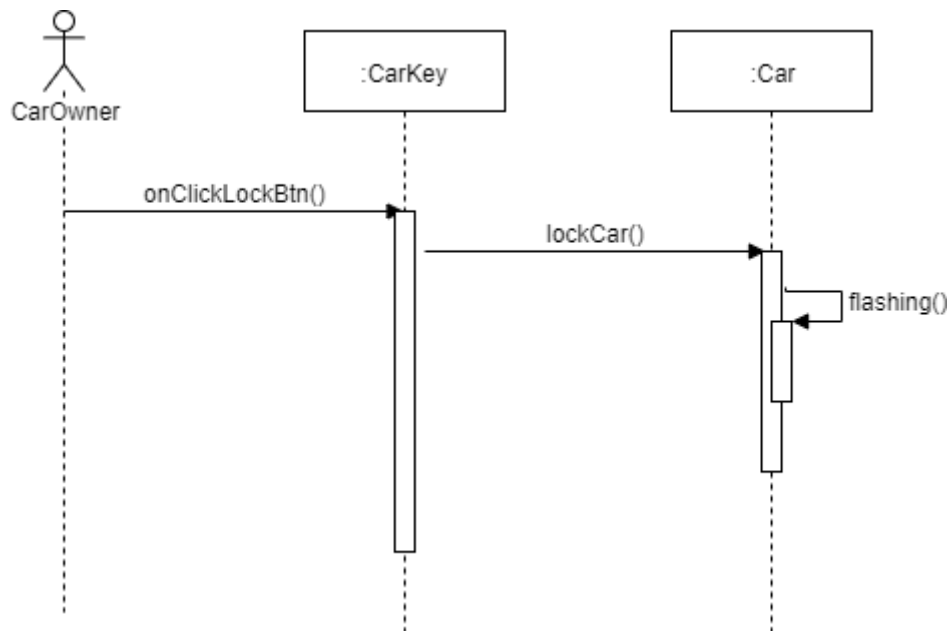
Invoke: `process()`, `reserve()`, `commit()`

Exercise 2

The process of remote lock: When the owner presses the "lock car" button in car key, the car will automatically be locked. In the process of locking, by flashing the lights to tell the owner the process finished.

In the process there are 3 classes or actor: `CarOwner`, `CarKey`, `Car`

Answer:

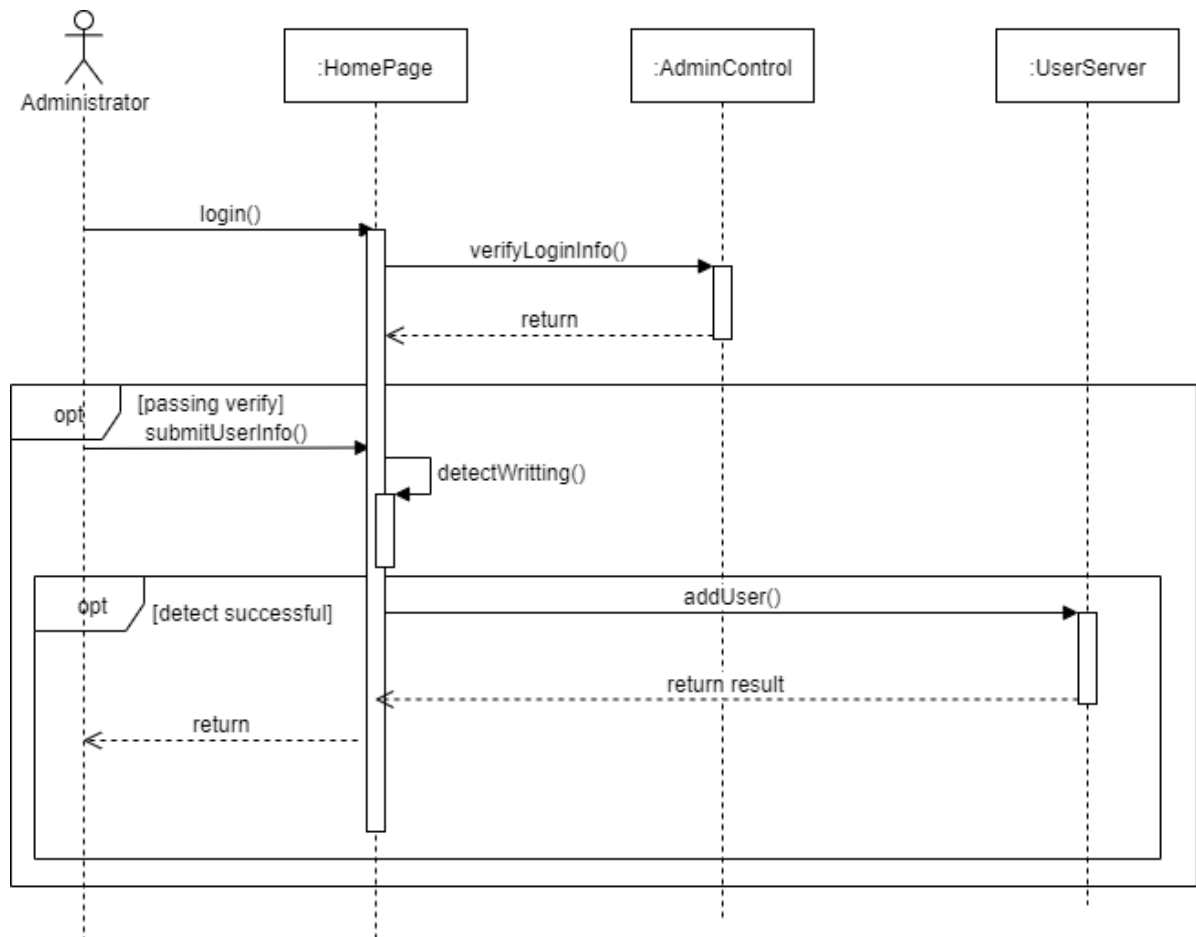


Exercise 3

Translate the following English statements into a representative sequence diagram. The process of adding a user:

Before using the system, the administrator requires to fill in the login information in home page. After submitting the login information, the home page sends the information to the administrator control unit for authentication. After verifying, the administrator can add user from system home page. When adding user into server, the system needs to determine whether we filled is to meet the writing requirements in home page, and the user can be created and written into user server after satisfying this condition. After finishing all the operation, the system will return a successful message in home page to tell the user the process is successful.

In the process there are 4 classes or actor: Administrator, Homepage, AdminControl, userServer



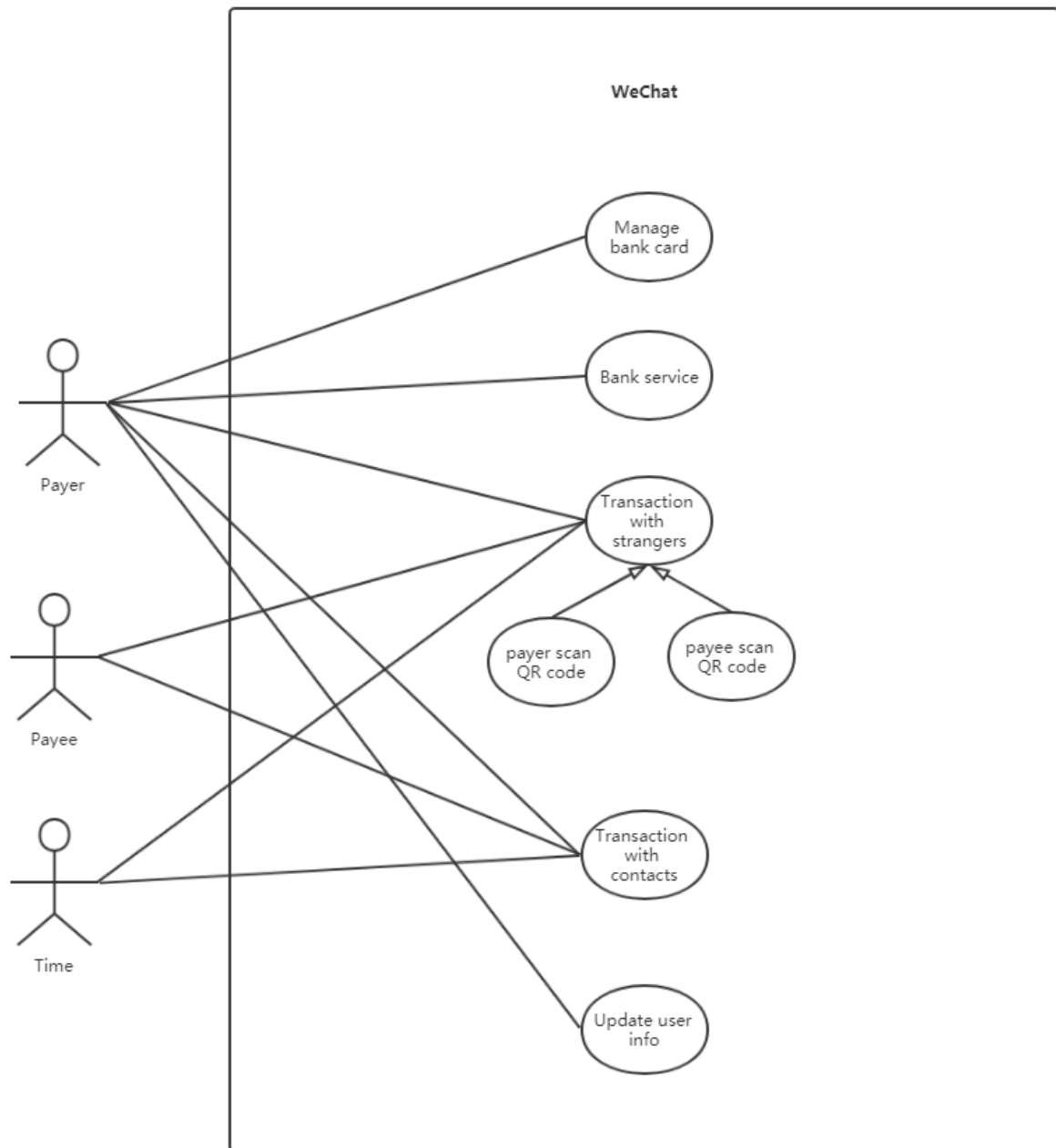
4. Comprehensive Exercise

4.1 WeChat Payment:

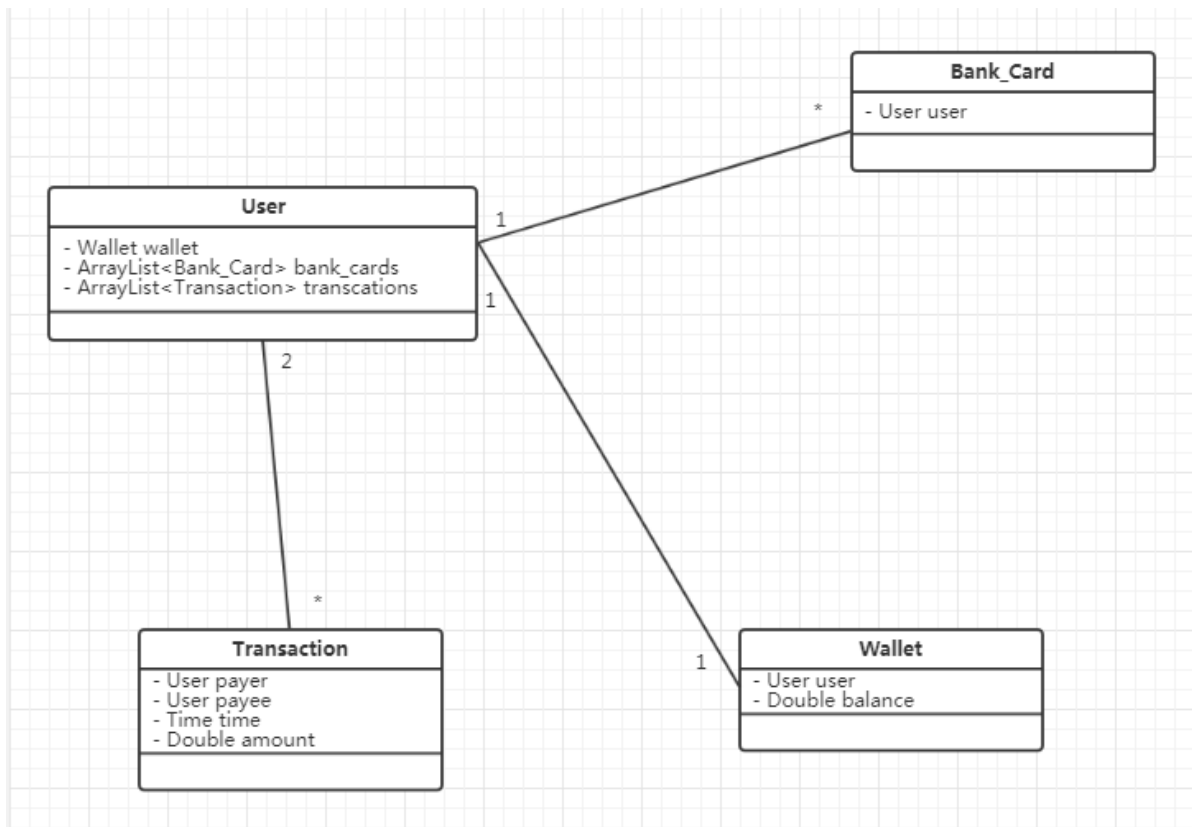
Mobile payment is very popular in China. Many people use [wechat](#) as their third-party payment platform. The following description is a simple design of its payment function.

You can do multiple operations in [wechat](#) pay, including checking how much balance you have in your wallet, adding bank cards to recharge or withdraw, looking up transaction history, sending lucky money to your contacts, and making payment to strangers by a QR code. In last case, we have two ways of transaction, either the payer scanning the QR code of payee's or the payee scanning the QR code of payer's. In addition, user also can change his nickname, password or other information.

Question 1: Draw an use case diagram according to the above scenario



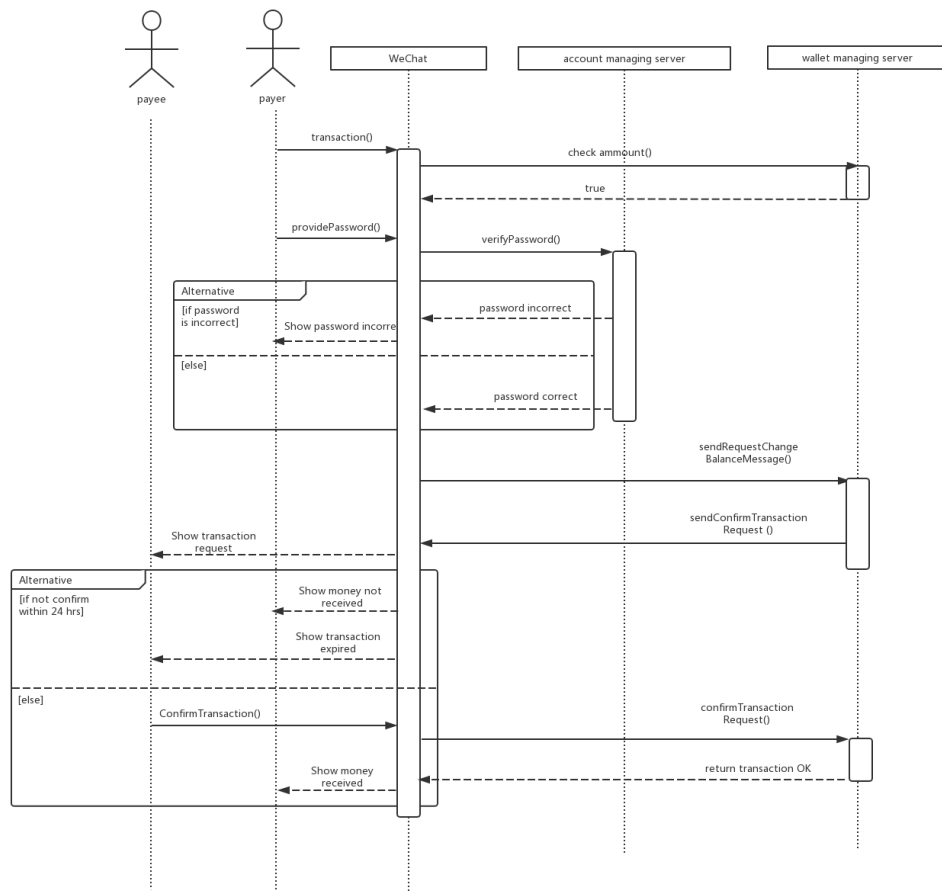
Question 2: Class diagram: Finding out entity class according to your design, and given the class diagram. In this section, you can only provide the class name, necessary attributes, and the indicate the relationship between those classes.



There are two type of servers: one is used to manage account information, including payment password, another is used to manage user wallet, which is responsible for handling money transaction. When transferring money, you should provide identification information to the account manager server. If the identification information is incorrect, WeChat will display an error message. Otherwise, the transferring notification will be send to the receiver, and he/she can confirm this transaction to receive the money. However, if the money is not received within 24 hours, the transaction will be expired and money will be returned back to the payer. The payer will be notified in both cases.

Question 3: Draw a sequence diagram representing the process of transferring money to your contacts. Notice that the wallet managing server won't allow you to spend more money than what you have in your wallet. Can you add more details to the existing diagram to show this?

Sample Answer:



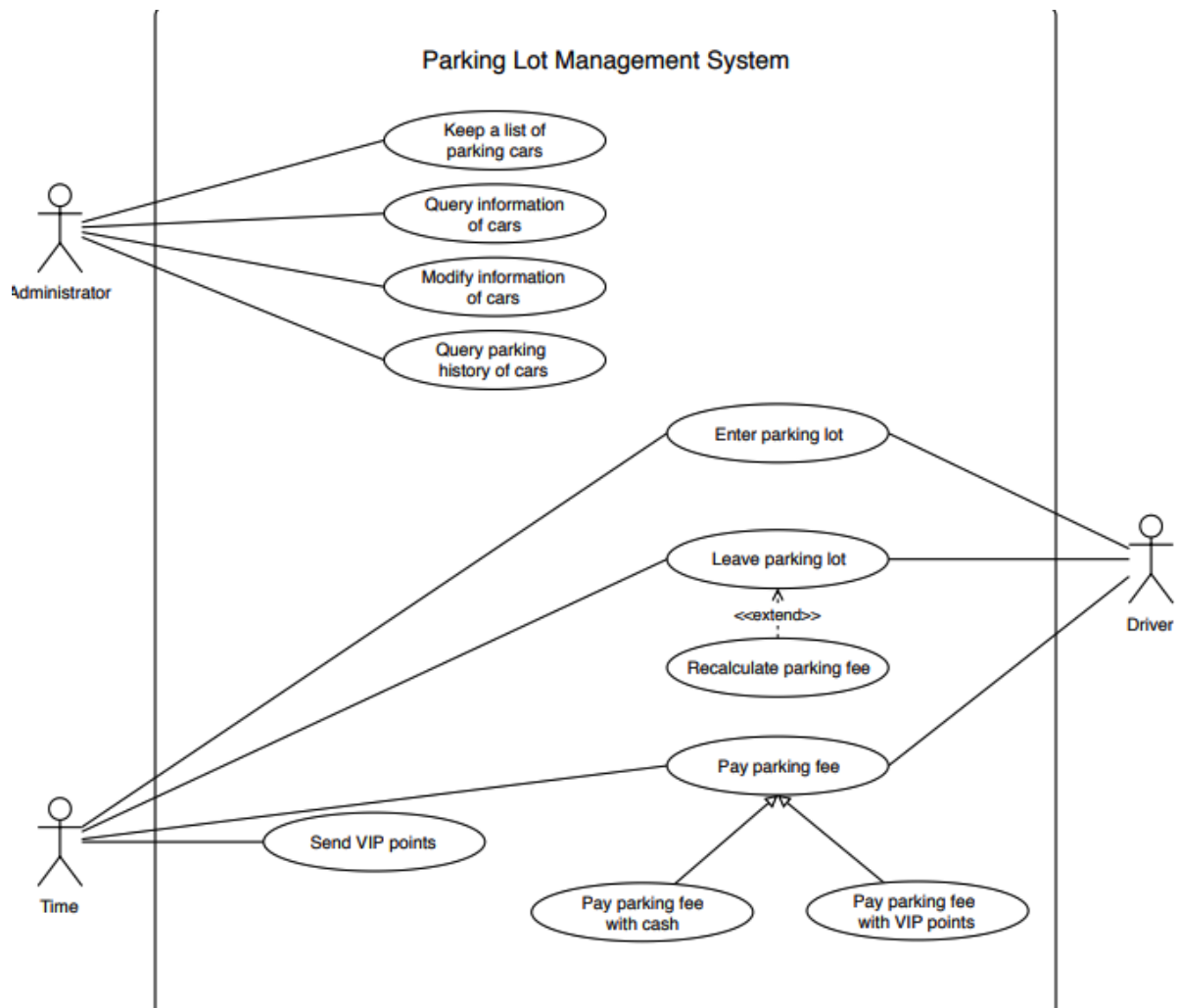
4.2 Parting

In ShenZhen city, a automatic parking payment system is widely used by almost all shopping malls. Then, it is a time for you to help a newly opened shopping mall design the system. The following description is a simple requirement of the parking management:

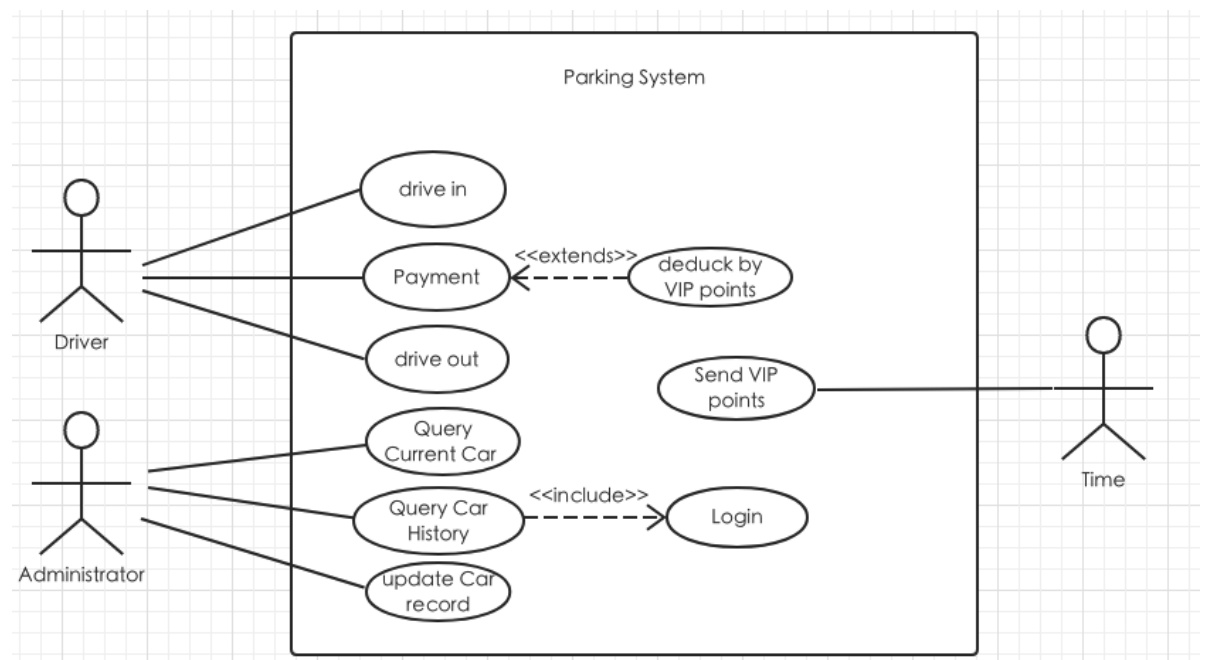
Before a car enter the parking lot, there is an automatic scanning device that can register the time and the license plate number of the car. Before leaving, the customer has to pay the parking fee, otherwise he/she cannot drive out of the parking lot. When paying, the customer can pay the parking fees directly, or he/she can choice to deduct the payment with his/her VIP points if he/she is the VIP of this shopping mall. Customers need to drive out of the parking lot within 30 minutes after the successful payment time, otherwise, the cost will be recalculated. There are several administrators who can view the parking list, and they can also query and modify the parking info of each car. On the other hand, in order to promote sales, the shopping mall set a VIP Day on the 1st day of each month. On the 12:00 am in each VIP Day, the system could send points in each VIP account automatically.

Question 1: Draw an use case diagram according to the above scenario

Sample Answer 1:

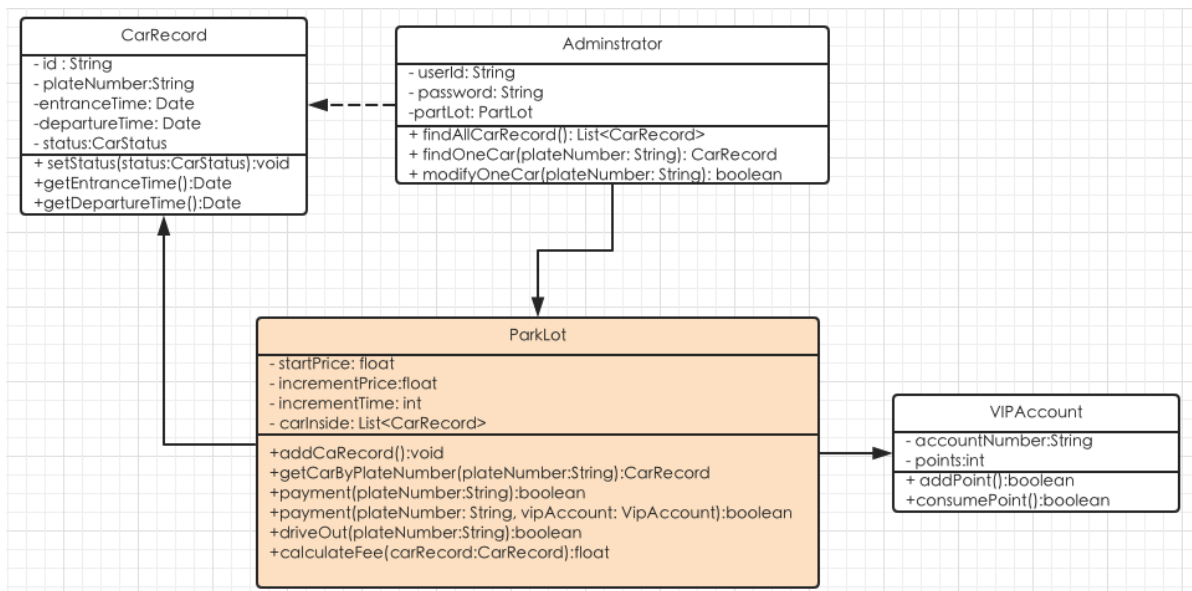


Sample Answer 2:



Question 2: Class diagram: Finding out entity class according to your design, and given the class diagram. In this section, you can only provide the class name, necessary attributes, and the indicate the relationship between those classes.

Sample Answer:



Scenario of Payment

Before the payment, customer needs to open the app by scanning a QR code first, and then input the license plate number. If the number is valid, the app can return the parking information about the parking time and how much it will cost otherwise return a error prompt message. If the costumer need to pay the parking fees, he/she can click the payment button to accomplish the payment process. In the process, if the costumer has a VIP account of the shopping mall, he/she can use the VIP points to deduct all or some of the parking fee. After successful payment, an successful message needs to be displayed in the screen and prompt costumer to leave in 30 minutes.

Question 3: Draw a sequence diagram representing the process of payment.

Answer:

