

Tutorial 3 UML2

[Experimental Objective]

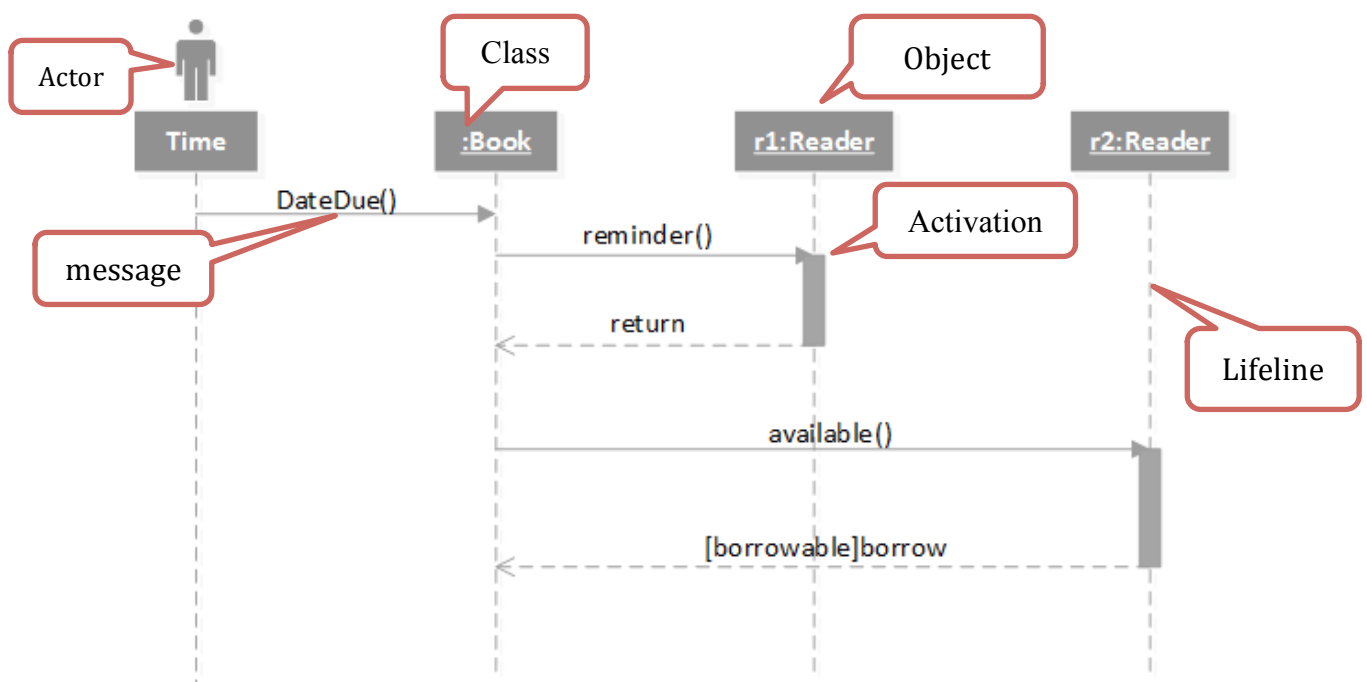
1. Learn how to design sequence diagram.
2. According to a sequence diagram, you need to understand each method should be designed in which object.

Sequence Diagram

Sequence diagrams are a kind of interaction diagram, because they describe how—and in what order—a group of objects works together. These diagrams are used by software developers and business people alike to understand requirements for a new system or to document an existing process. Sequence diagrams are sometimes known as event diagrams or event scenarios.

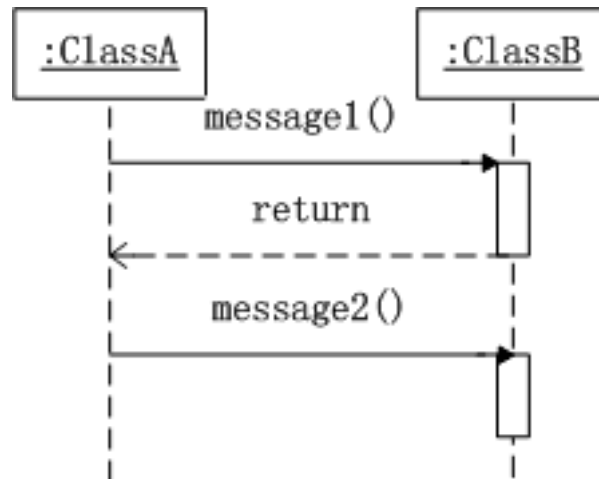
Sequence Diagram Components

1. Actor(角色): Represented by a stick figure, actors are entities that are both interactive with and external to the system.
2. Object(对象): This box shape represents a class, or object, in UML. They demonstrate how an object will behave in the context of the system. Class attributes should not be listed in this shape.
3. Lifeline(生命线): A dashed vertical line that represents the passage of time as it extends downward. Along with time, they represent the sequential events that occur to an object during the charted process. Lifelines may begin with a labeled rectangle shape or an actor symbol.
4. Activation(激活期): Symbolized by a rectangle shape, an activation box represents the time needed for an object to complete a task. The longer the task will take, the longer the activation box.

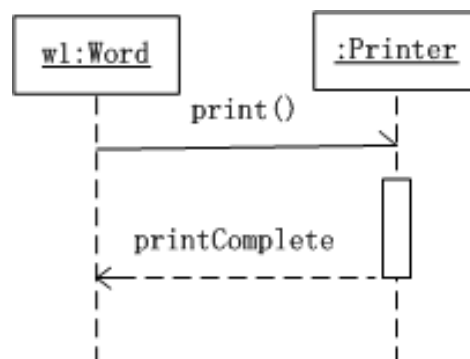


Sequence Message

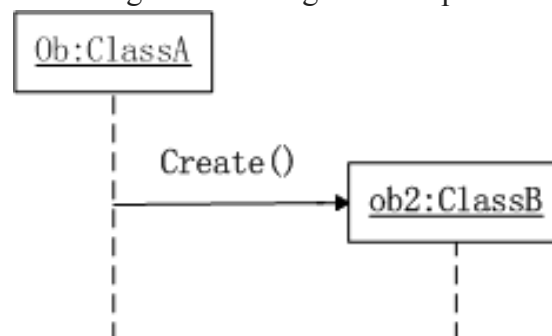
1. Synchronous Message(同步消息): Represented by a solid line with a solid arrowhead. This symbol is used when a sender must wait for a response to a message before it continues. The diagram should show both the call and the reply.



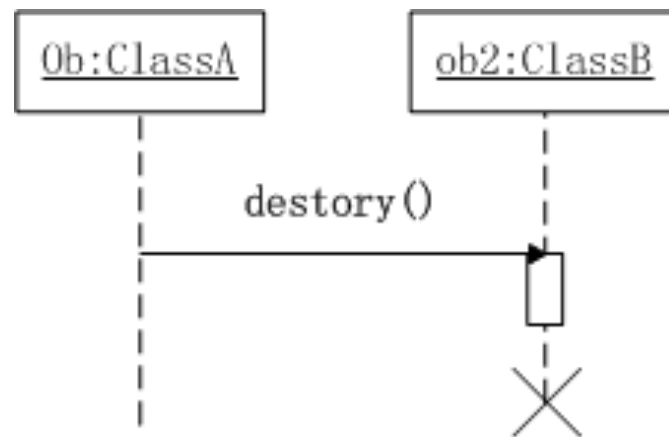
2. Reply Message(返回消息): Represented by a dashed line with a lined arrowhead, these messages are replies to calls.
3. Asynchronous Message(异步消息): Represented by a solid line with a lined arrowhead. Asynchronous messages are those that don't require a response before the sender continues. Only the call should be included in the diagram.



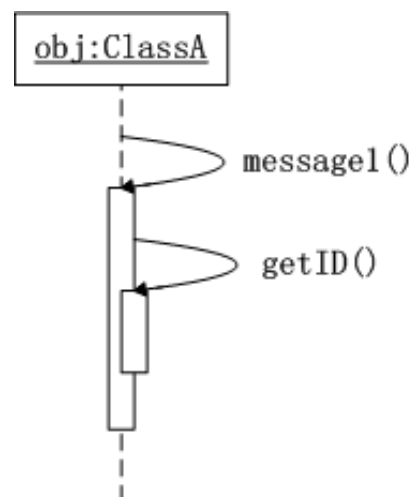
4. Create Message (通过消息创建对象): A create message represents the creation of an instance in an interaction. The create message is represented by the keyword "create". The target lifeline begins at the point of the create message.

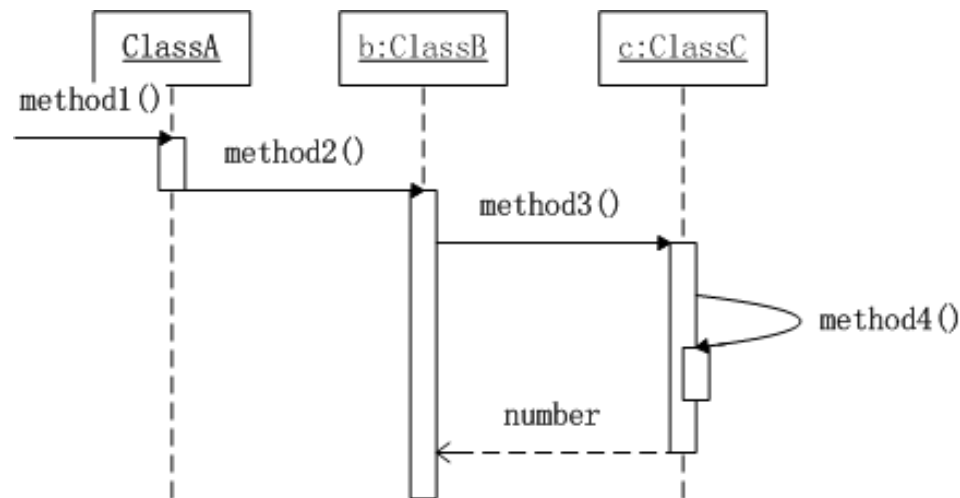


5. Destroy Message (通过消息销毁对象): Represented by a solid line with a solid arrowhead, followed by an X symbol, these messages indicate the destruction of an object and are placed in its path on the lifeline.



6. Self-associative message (自关联消息): The message represents a message will invoke another message in the same object.



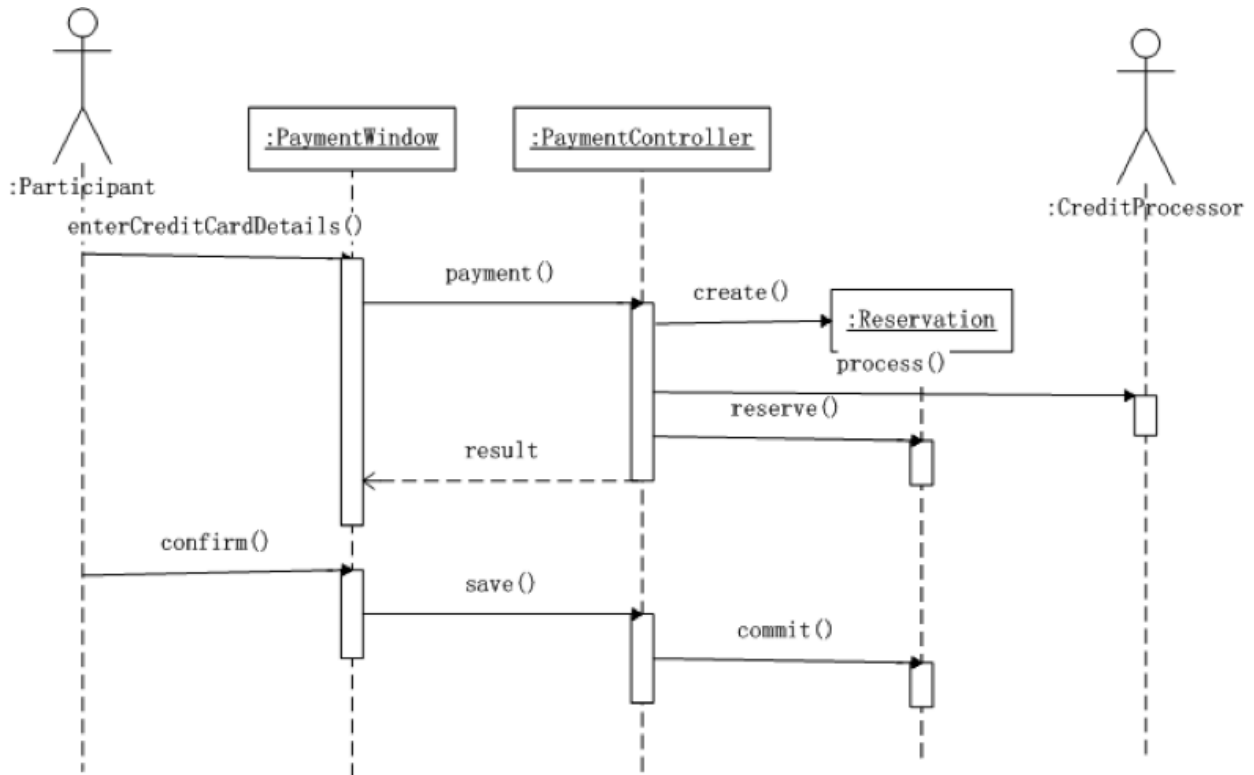
The code framework of sequence diagram

```
public class classA {
    classB b;
    public void method1(){
        b.method2();
    }
}
public class classB {
    classC c;
    public void method2(){
        c.method3();
    }
}
public class classC {
    int number;
    public int method3(){
        method4();
        return number;
    }
    void method4(){}
}
```

Exercise1

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

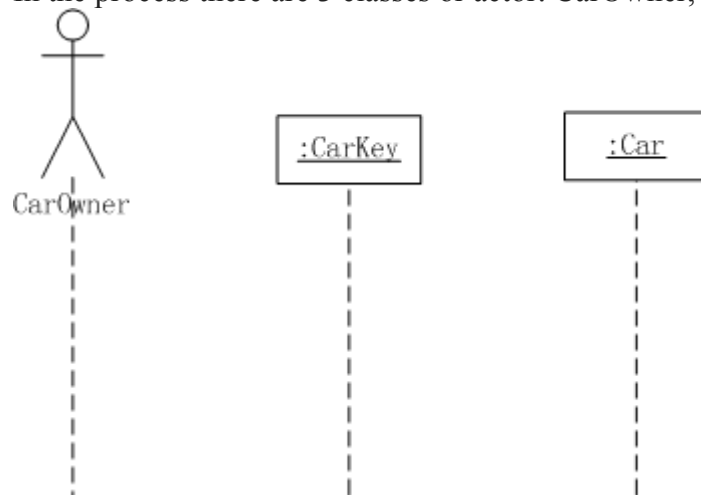
1. Listing all the method should be defined in "PaymentController" class.
2. Listing all the method can be invoked by "PaymentController" class.



Exercise2

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



Exercise3

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 users in user list, the system needs to determine whether we filled is to meet the writing requirements, and the user can be created after satisfying this condition. After finishing all the operation, the user list 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, UserList

Comprehensive Exercise: WeChat Payment

There can be 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.

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?