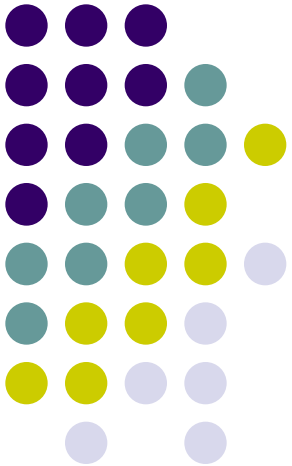
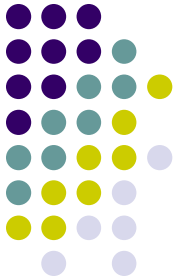
Chapter 15

UML交互图

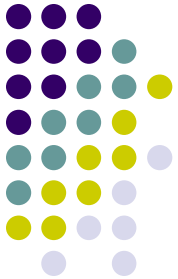


目标

- 学习UML交互图(顺序图和通信图)



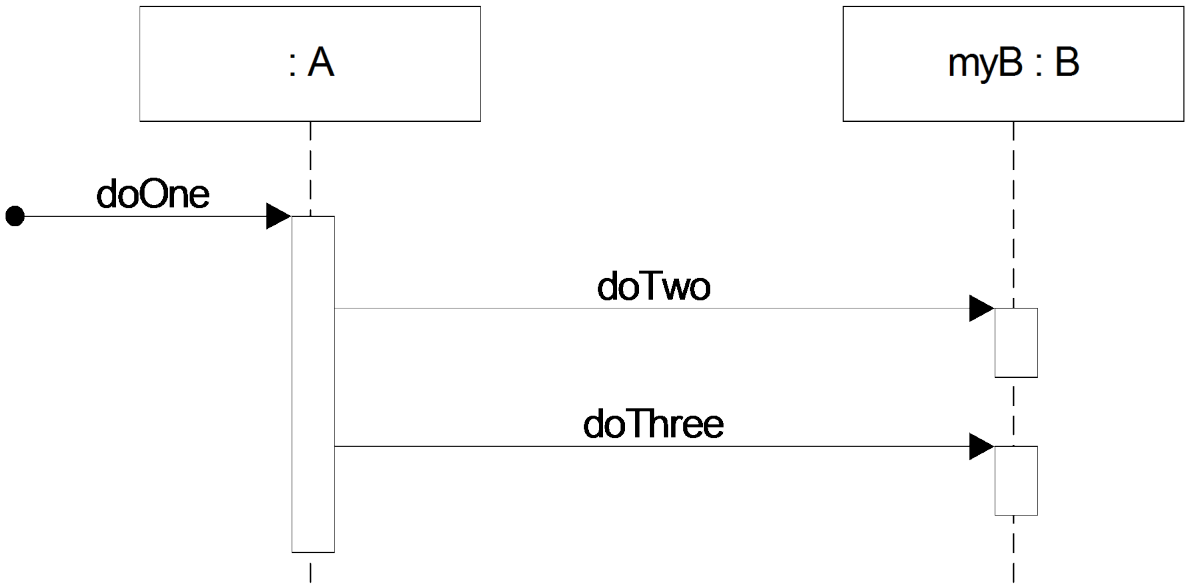
简介



- UML使用交互图(interaction diagram)来描述对象间消息的交互，用于动态对象建模。
- 交互图有两种类型：
  - 顺序图(sequence diagram)
  - 通信图(communication diagram)

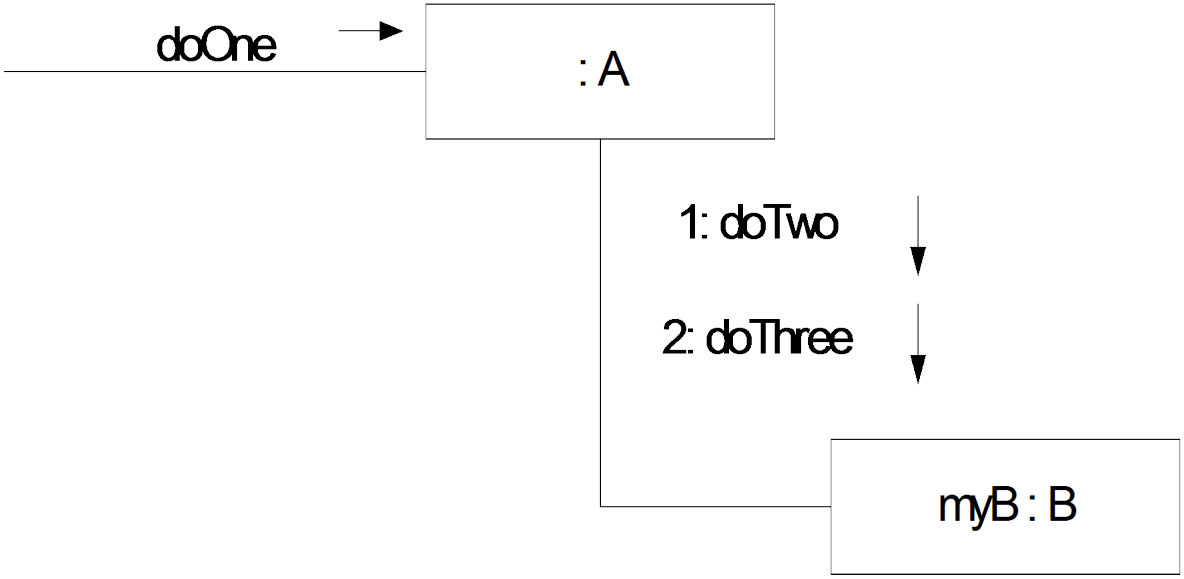
顺序图的例如

```
public class A{
    private B myB = new B();
    public void doOne(){
        myB.doTwo();
        myB.doThree();
    }
}
```

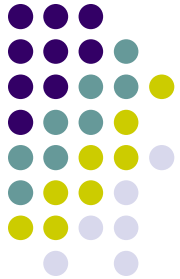


通信图的例如

```
public class A{
    private B myB = new B();
    public void doOne(){
        myB.doTwo();
        myB.doThree();
    }
}
```



顺序图和通讯图的优点和缺点



- 顺序图
  - 优点：能够清楚地表示详细的顺序和时间排序，有丰富的表示法
  - 缺点：强制在右侧增加对象，消耗水平空间
- 通信图
  - 优点：有效利用空间
  - 缺点：不易查阅消息的顺序，表示法不够丰富

交互图表示法的公共元素

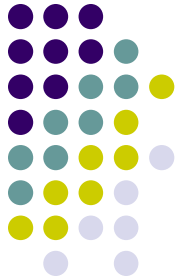
- 对象及单实例对象
- 消息

使用生命线框图表示参与者

单实例类对象


: Register
: Store
1
doX
doA
the ‘1’ implies this is a Singleton, and accessed via the Singleton pattern

消息表达式



- 交互图展示了对象之间的消息；UML对于这些消息表达式具有标准语法：

  return = message(parameter : parameterType,….):returnType

- 例

  initialize(code)

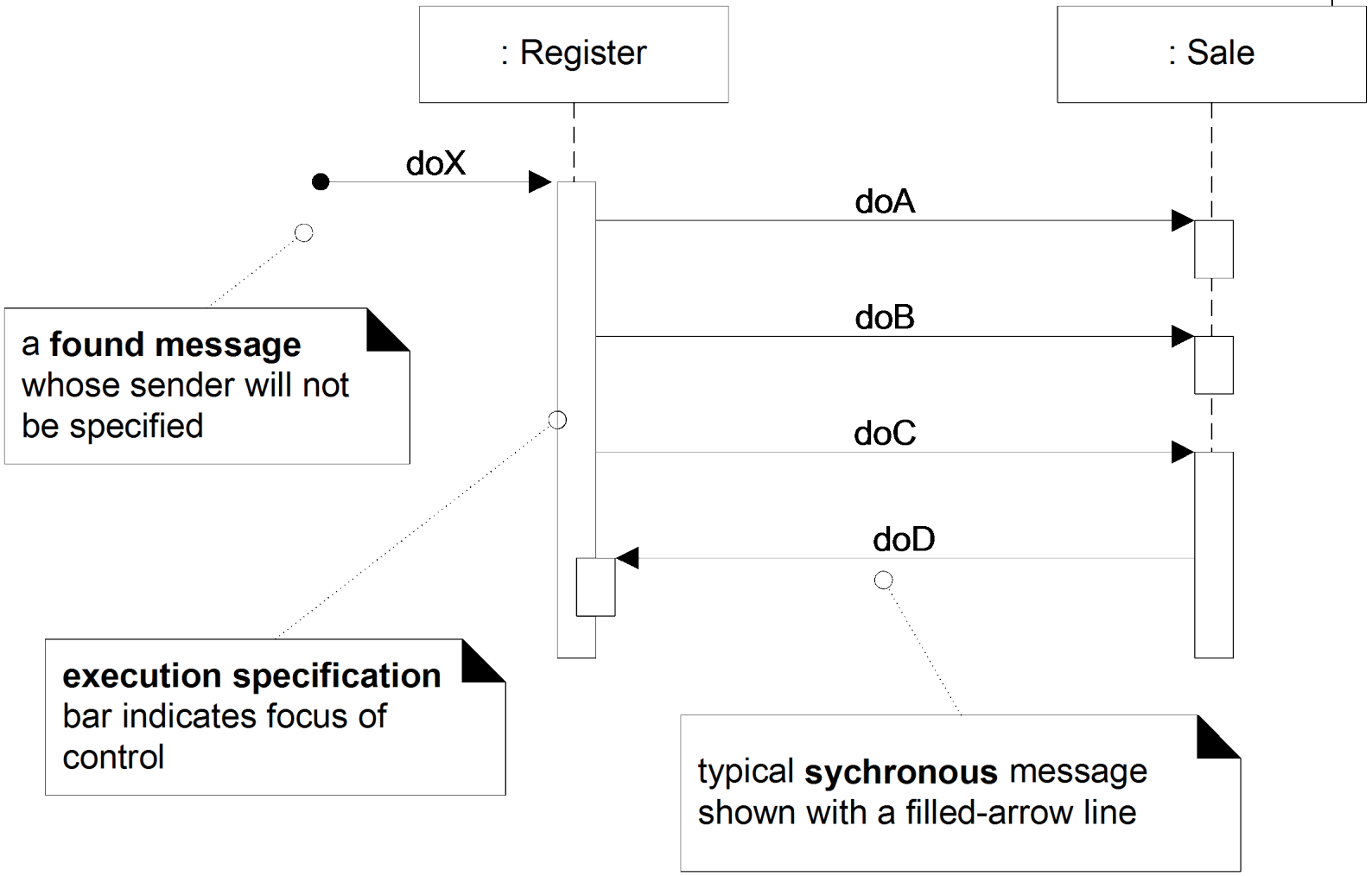
  initialize

  d = getProductDesc(id)

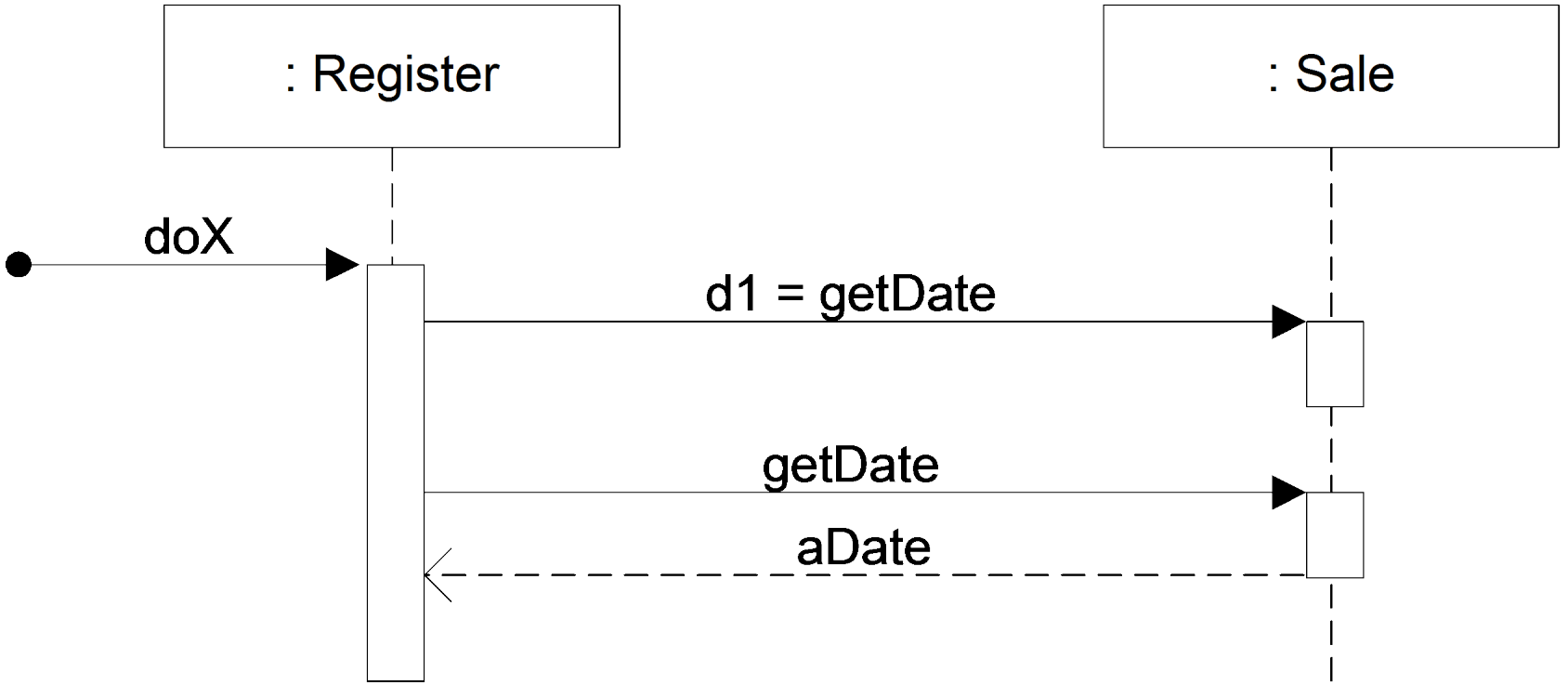
  d = getProductDesc(id : ItemID)

  d = getProductDesc(id : ItemID) : ProductDescription

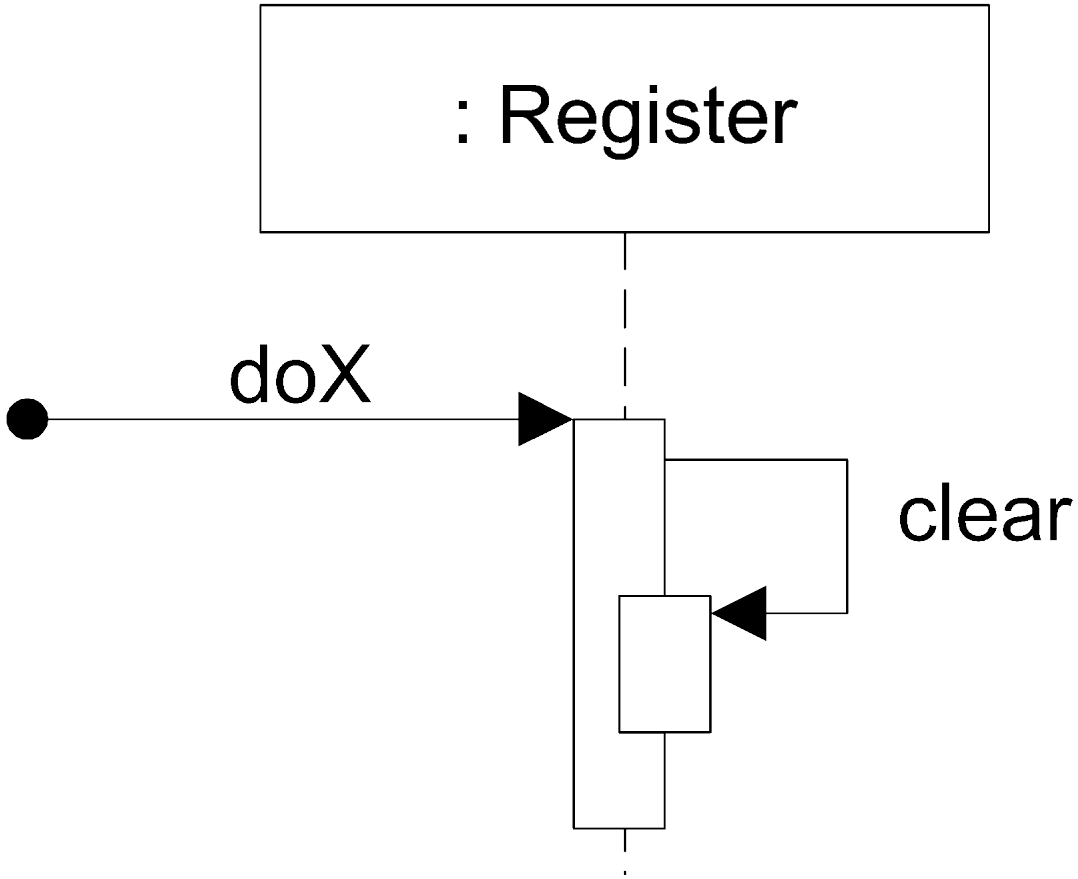
顺序图的根本表示法


: Register
: Sale
doX
doA
doB
doC
doD
a **found message** whose sender will not be specified
execution specification bar indicates focus of control
typical **sychronous** message shown with a filled-arrow line

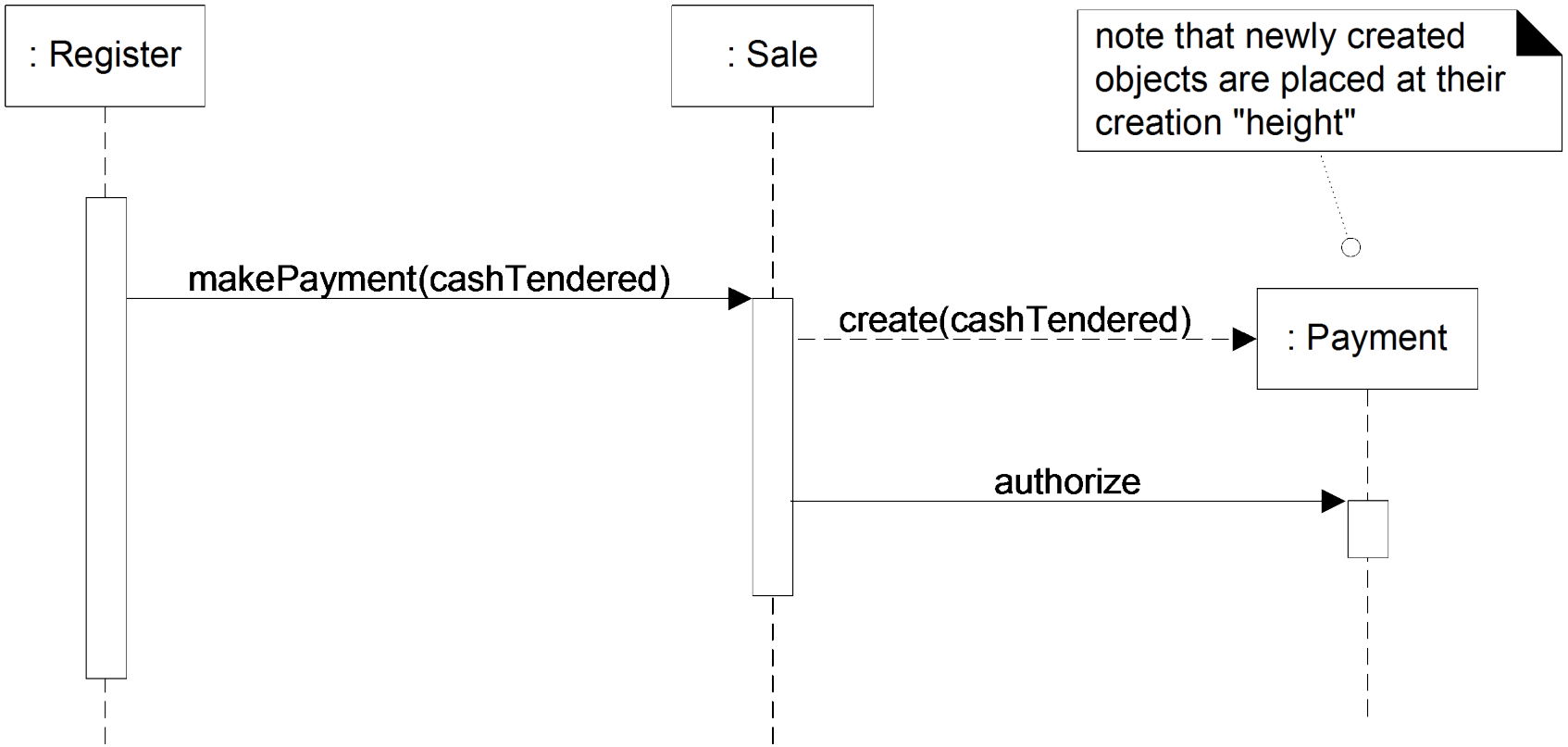
表示应答或返回



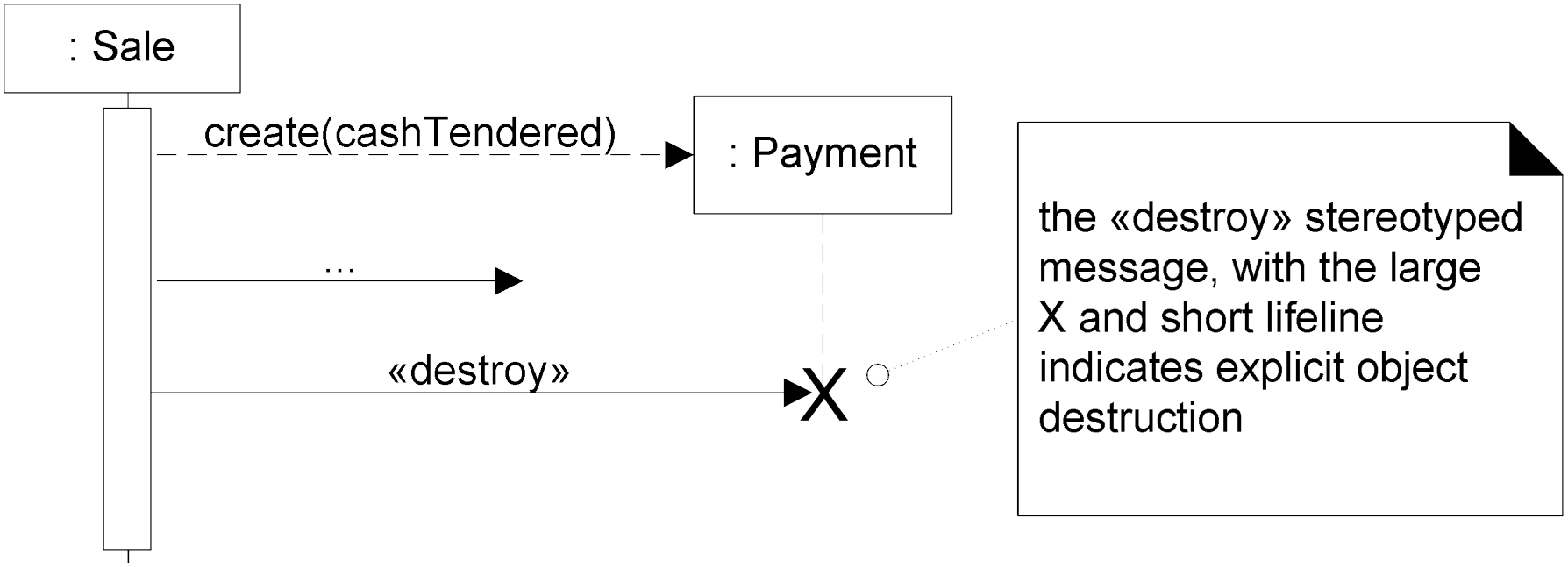
发送给自身的消息



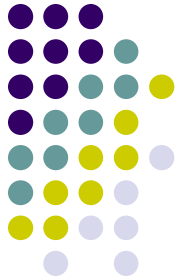
创立实例


: Register
: Sale
note that newly created objects are placed at their creation "height"
makePayment(cashTendered)
create(cashTendered)
: Payment
authorize

销毁实例

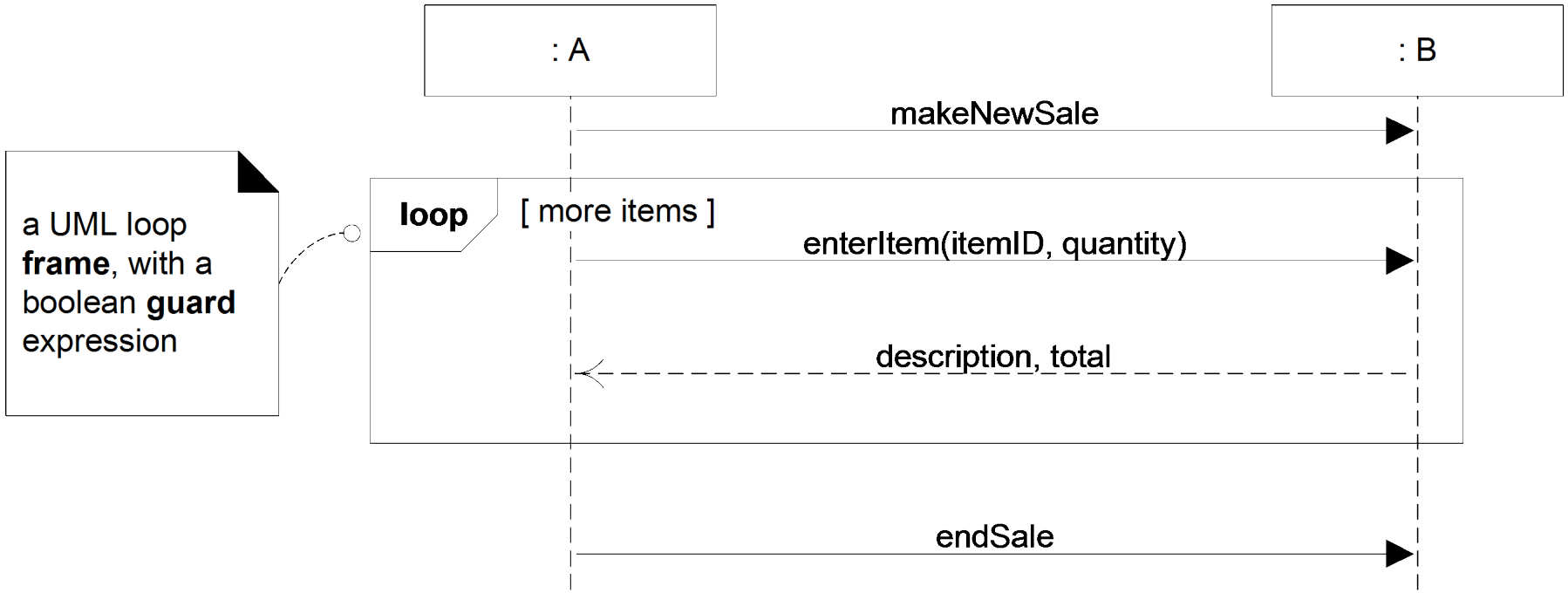

: Sale
create(cashTendered)
: Payment
...
«destroy»
the «destroy» stereotyped message, with the large X and short lifeline indicates explicit object destruction

UML中的图框

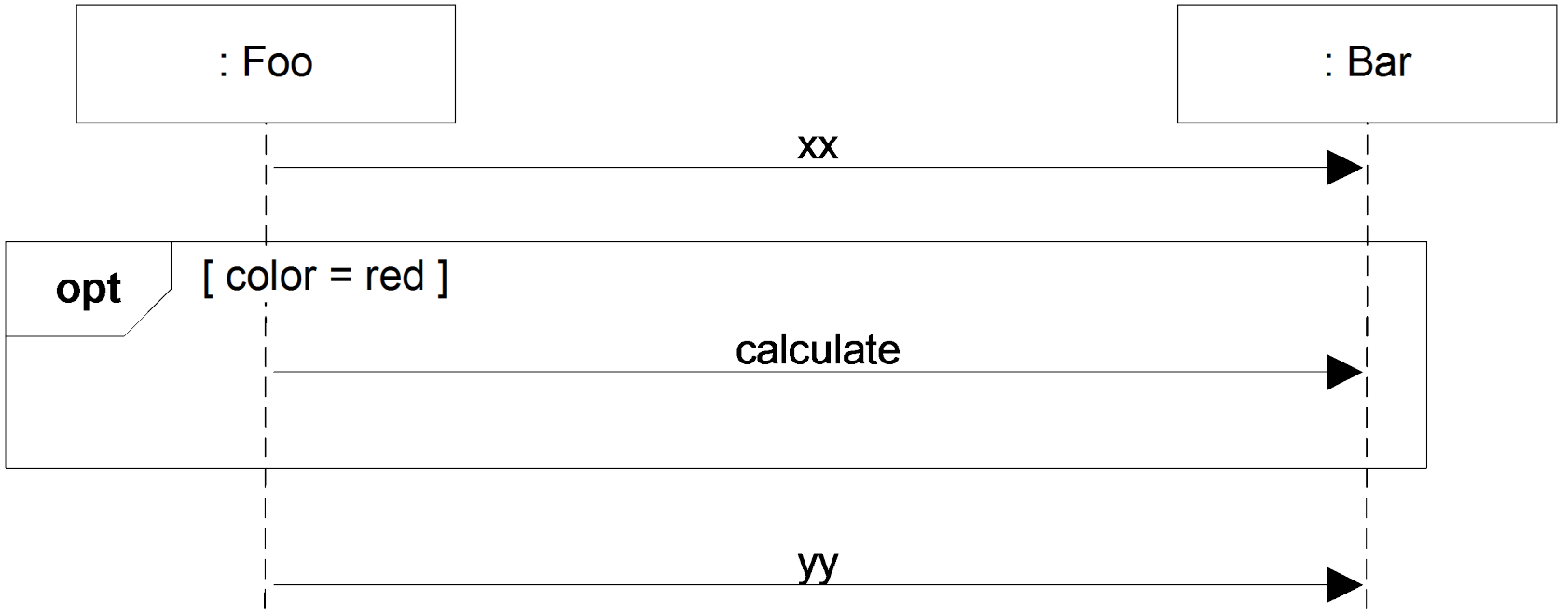


- 为了在顺序图中表示更为复杂的控制流程，UML2.0中引入了图框的概念
- 图框可用来表示分支和循环等复杂的程序结构

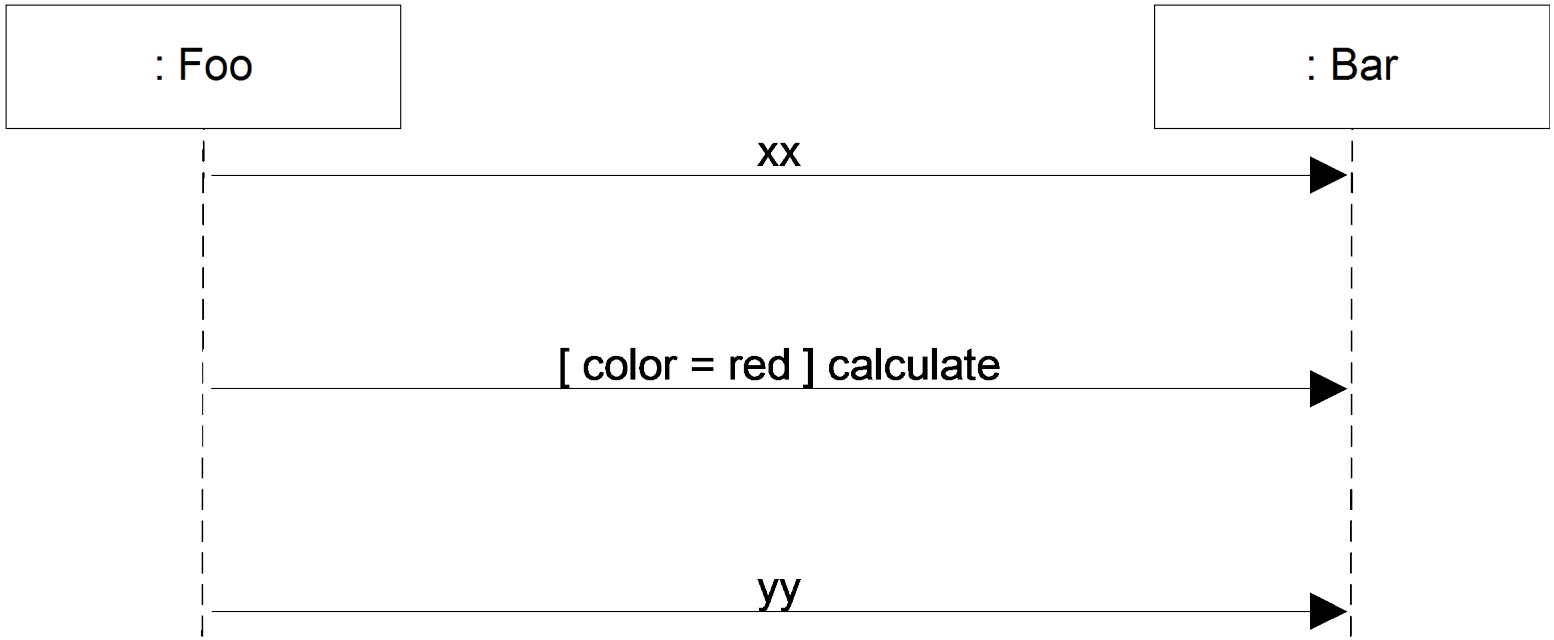
一个图框的例如〔循环〕


: A
: B
makeNewSale
loop
[more items]
enterItem(itemID, quantity)
description, total
endSale
a UML loop **frame**, with a boolean **guard** expression

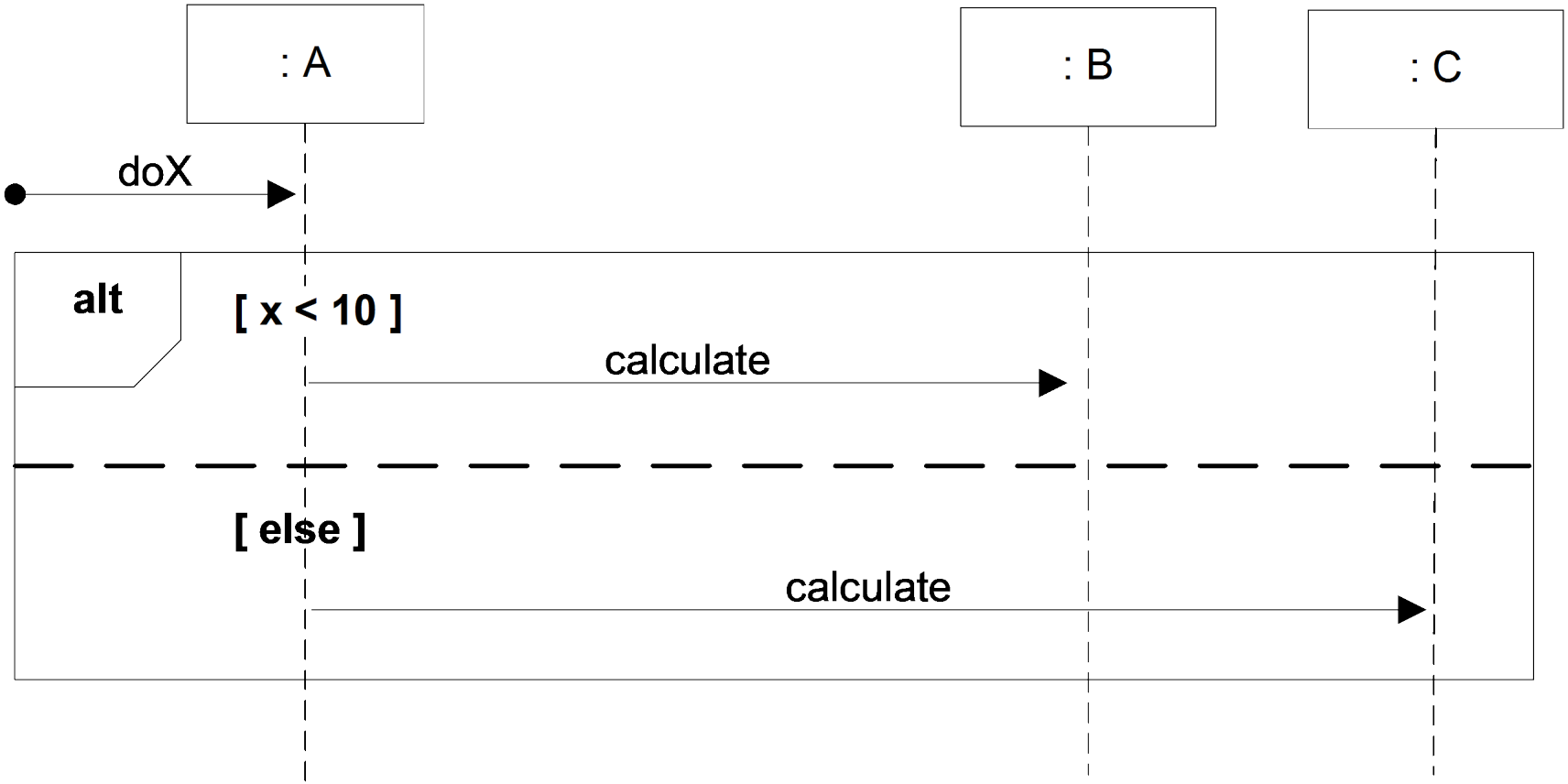
有条件消息



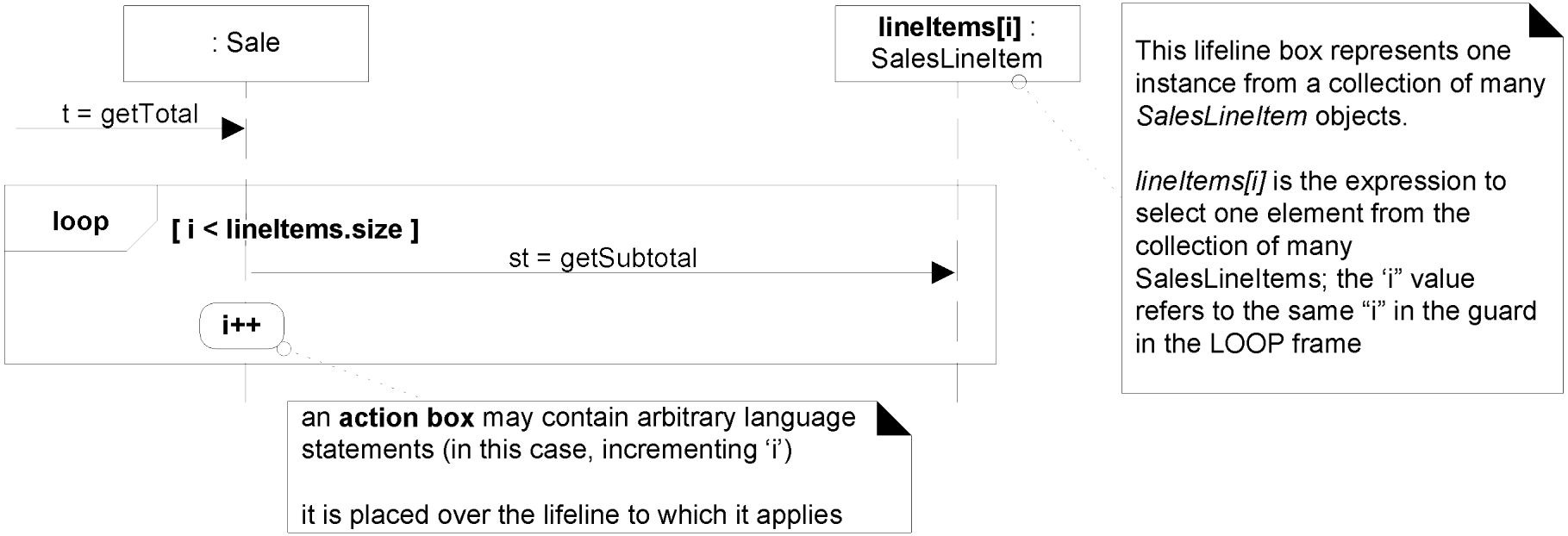
有条件消息(UML1.X)



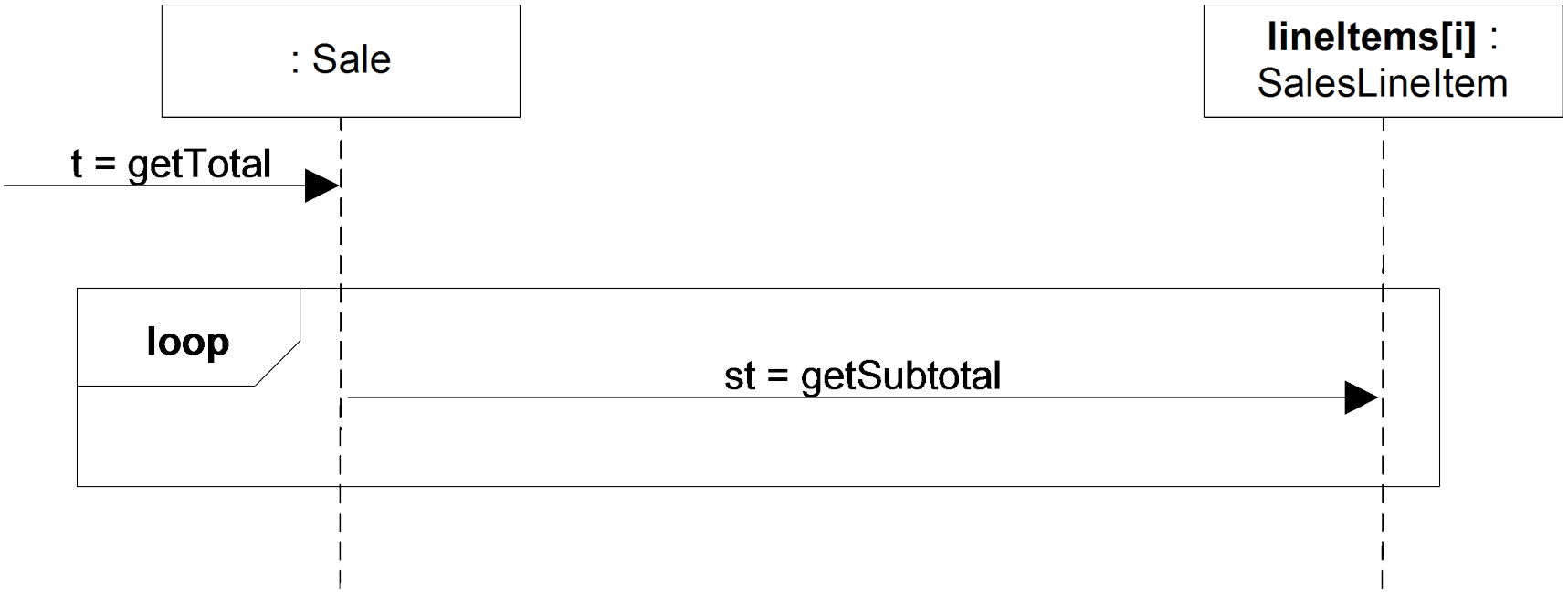
互斥的有条件消息



对集合的迭代


: Sale
lineItems[i] : SalesLineItem
t = getTotal
loop
[i < lineItems.size]
st = getSubtotal
i++
an action box may contain arbitrary language statements (in this case, incrementing 'i')
it is placed over the lifeline to which it applies
This lifeline box represents one instance from a collection of many SalesLineItem objects.
lineItems[i] is the expression to select one element from the collection of many SalesLineItems; the 'i' value refers to the same "i" in the guard in the LOOP frame

对集合的迭代(简化版)


: Sale
lineItems[i] : SalesLineItem
t = getTotal
loop
st = getSubtotal