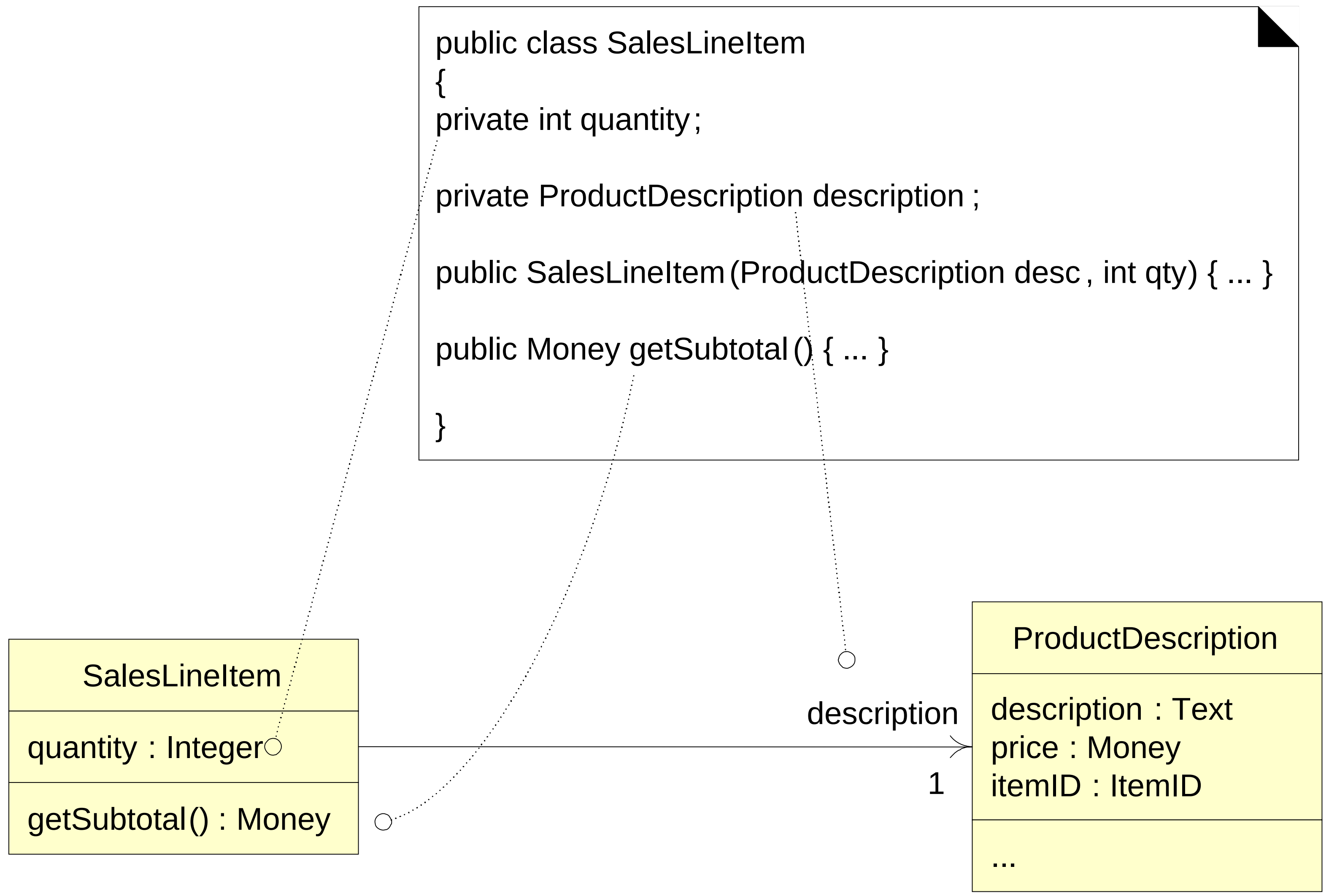
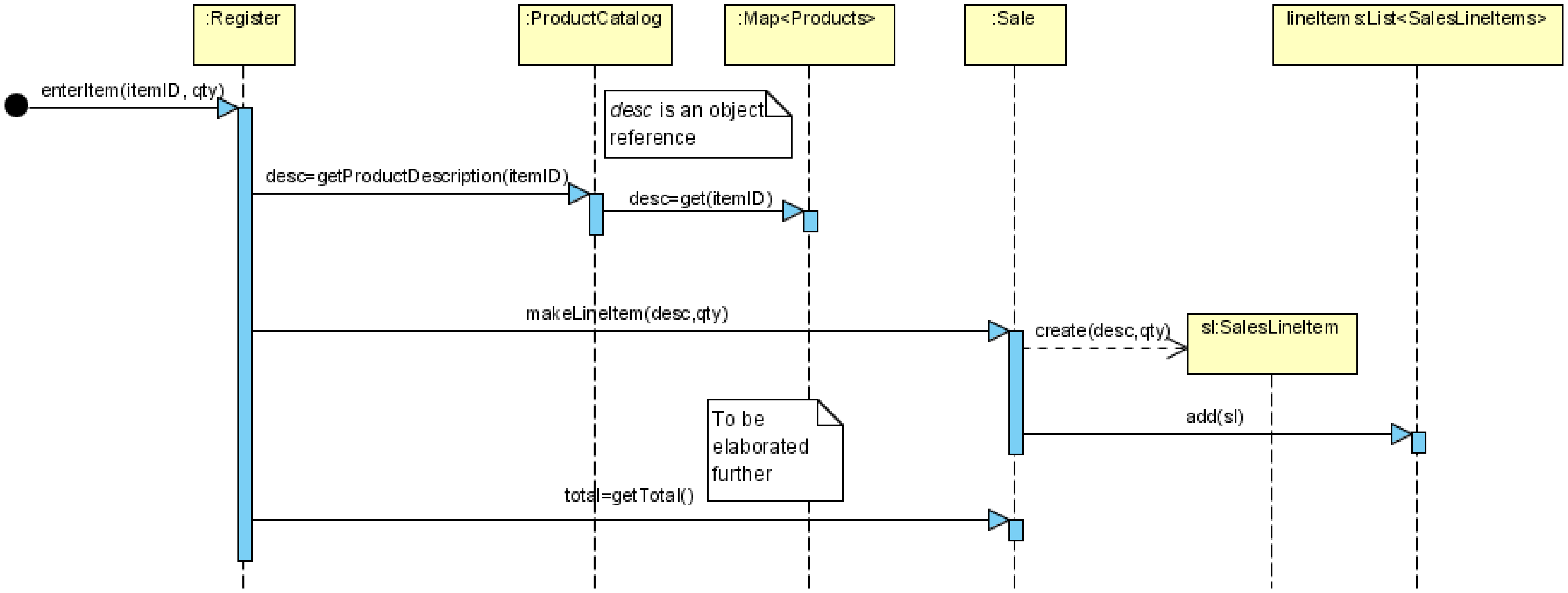
# Mapping Designs to Code

# Creating Class Definitions from DCDs



```
public class SalesLineItem
{
private int quantity;

private ProductDescription description;

public SalesLineItem(ProductDescription desc, int qty) { ... }

public Money getSubtotal() { ... }

}
```

# Creating Methods from Interaction Diagrams (Register.enterItem)



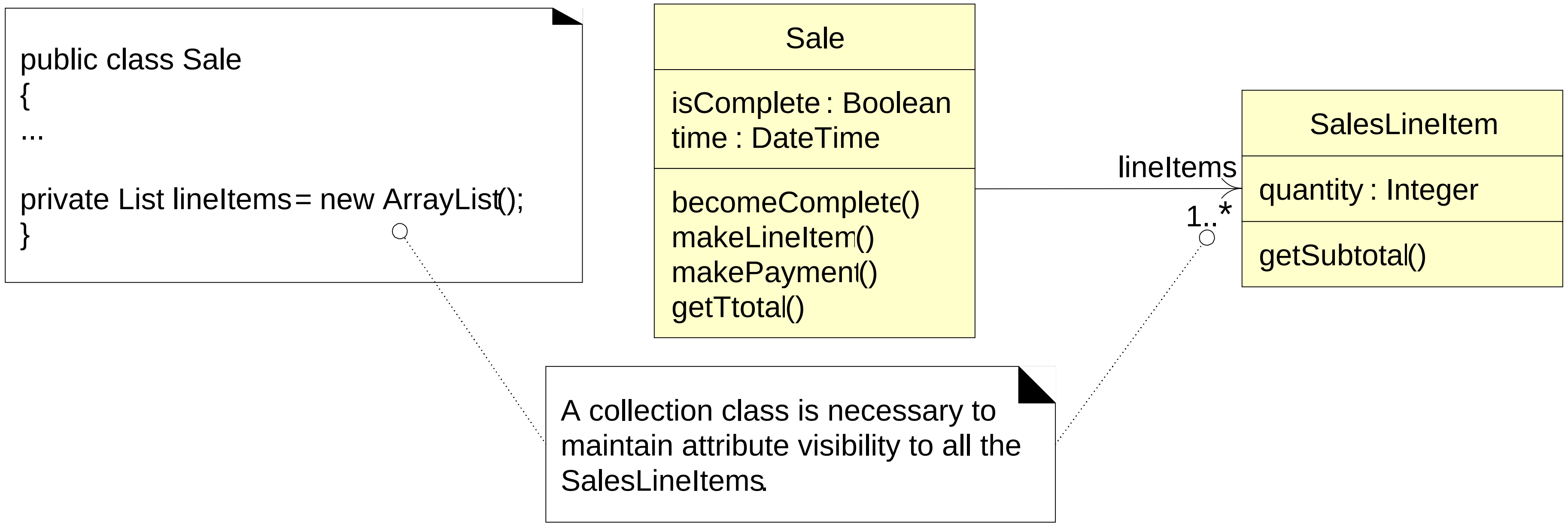
```
{
   ProductDescription desc= catalog.ProductDescription(id);
   currentSale.makeLineItem(desc, qty);
}
```

enterItem method of Register

# Collections

- One-to-many relationships are common.
  - For example, a **Sale** must maintain visibility to a group of many **SalesLineItem** instances.
  - In OO programming languages, these relationships are usually implemented with the introduction of a **collection** object, such as a **List** or **Map**, or even a **simple array**.
- Java libraries contain collection classes such as **ArrayList** and **HashMap**, which implement the List and Map interfaces, respectively.
- The choice of collection class is influenced by the requirements;
  - key-based lookup requires the use of a **Map**,
  - a growing ordered list requires a **List**, and so on.

# Collections



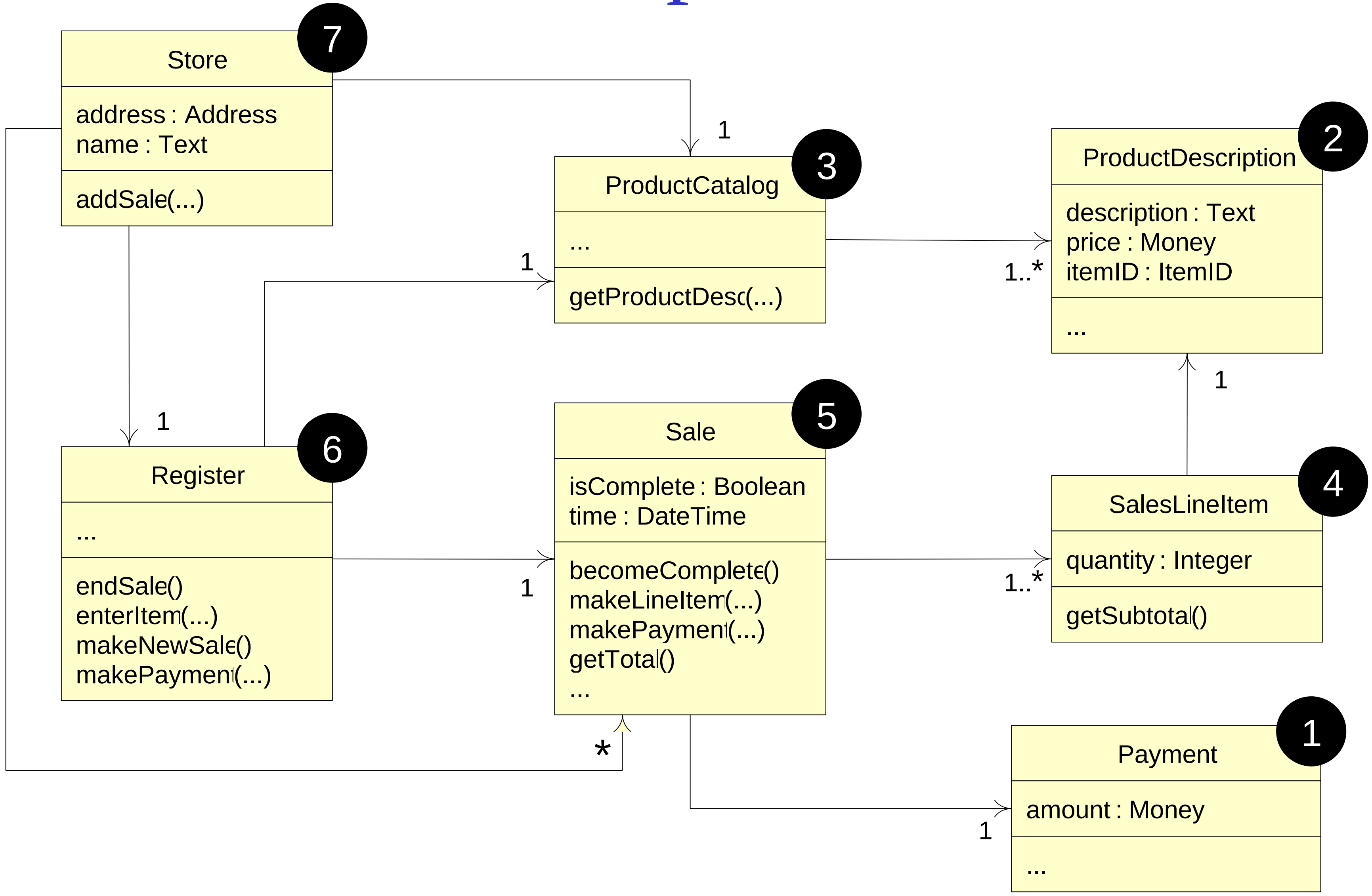
```
public class Sale
{
...

private List lineItems = new ArrayList();
}
```

A collection class is necessary to maintain attribute visibility to all the SalesLineItems.

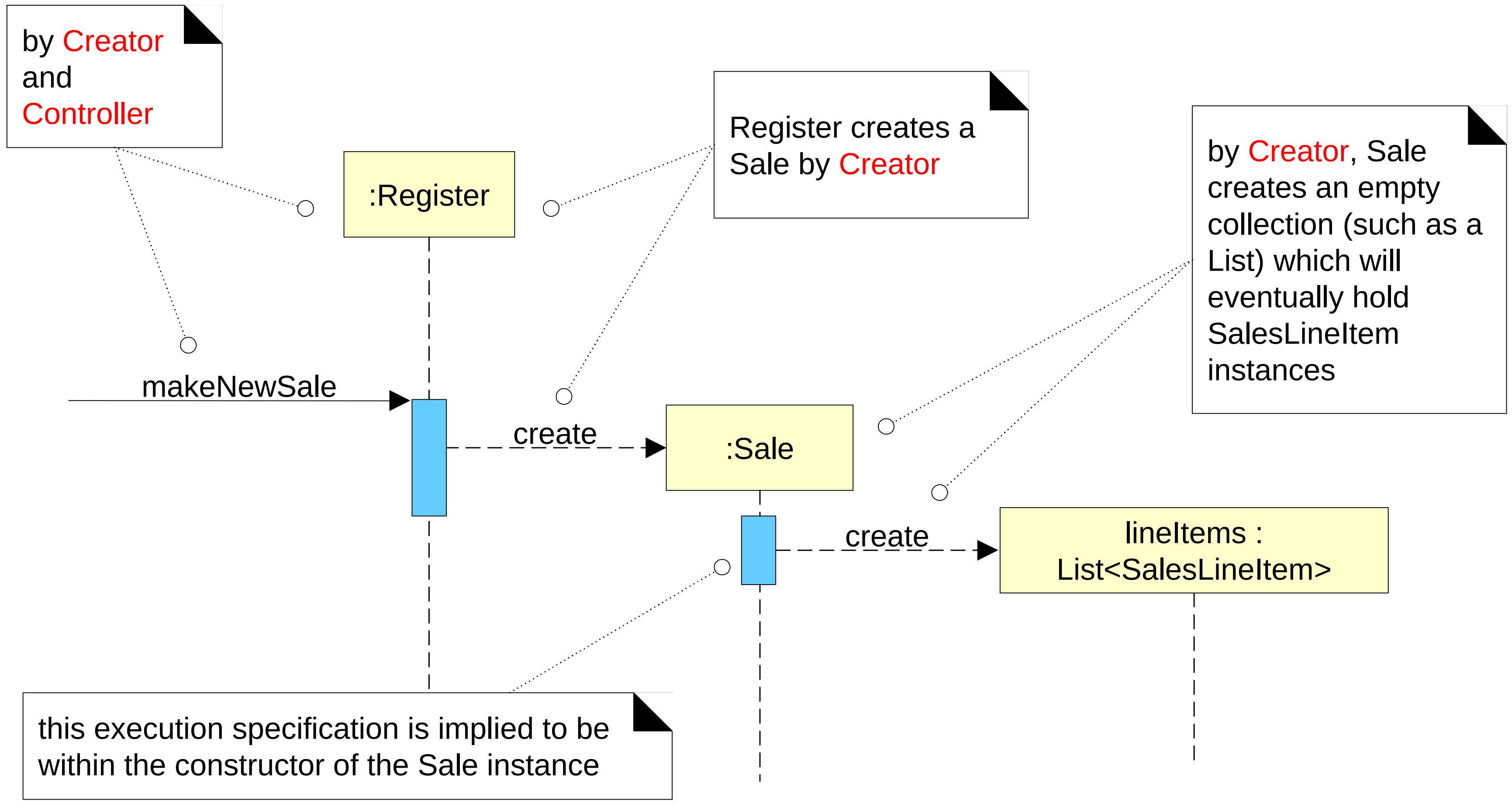
# Order of Implementation

- Classes need to be implemented from least-coupled to most-coupled.
- E.g.,
  - possible first classes to implement are either Payment or ProductDescription;
  - next are classes only dependent on the prior implementations—ProductCatalog or SalesLineItem.

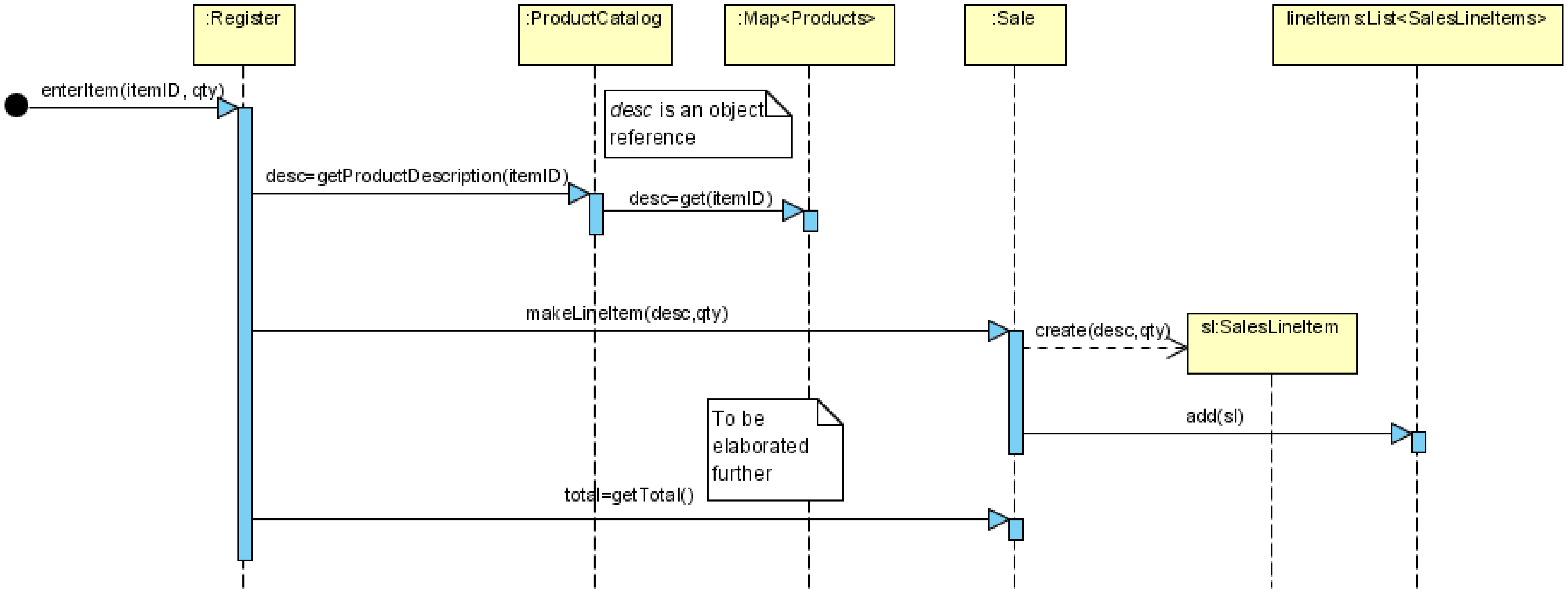
# Order of Implementation



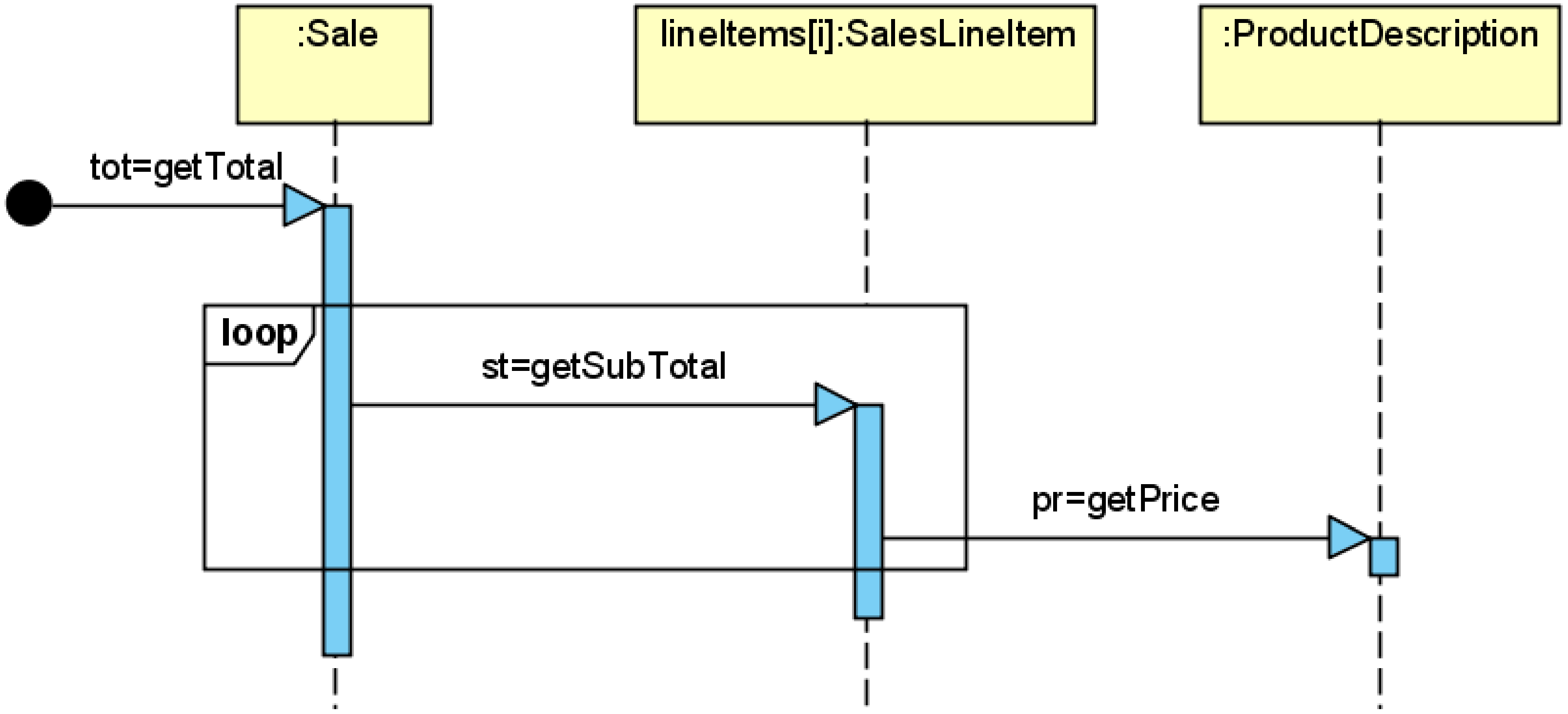
# How to design makeNewSale ?


by Creator and Controller
Register creates a Sale by Creator
by Creator, Sale creates an empty collection (such as a List) which will eventually hold SalesLineItem instances
:Register
makeNewSale
create
:Sale
create
lineItems : List<SalesLineItem>
this execution specification is implied to be within the constructor of the Sale instance

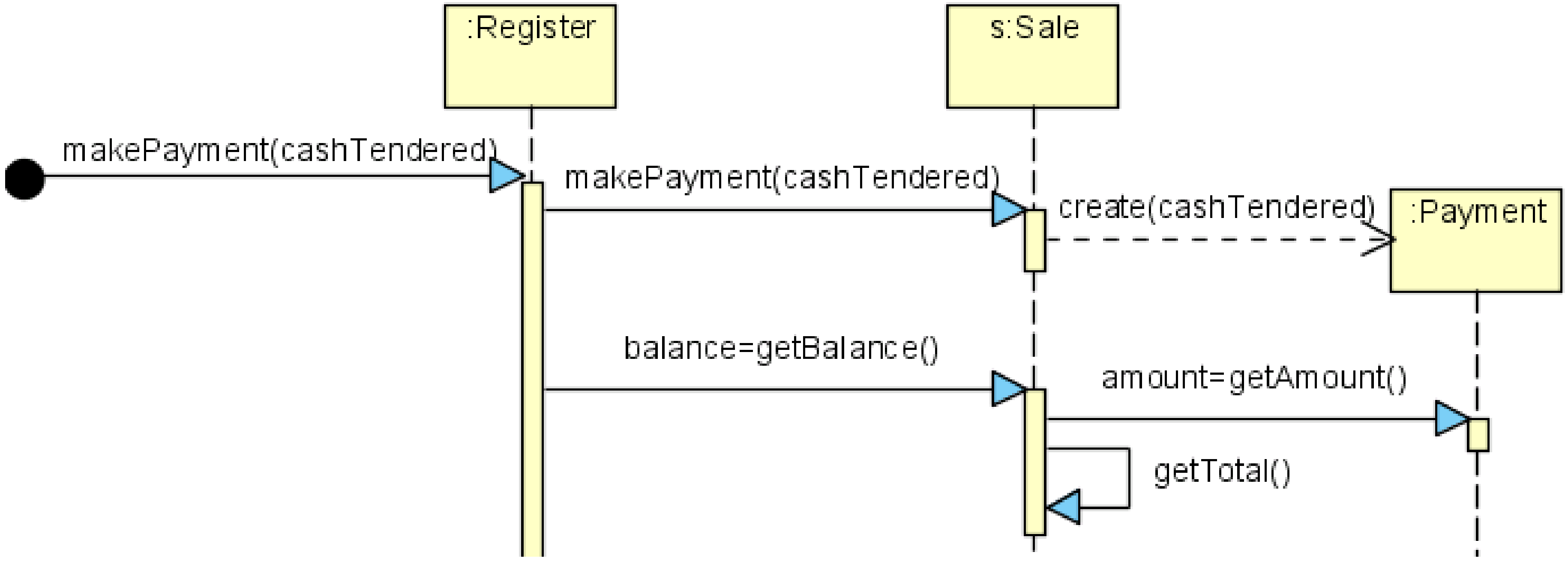
# enterItem


:Register
:ProductCatalog
:Map<Products>
:Sale
lineItems:List<SalesLineItems>
enterItem(itemID, qty)
desc is an object reference
desc=getProductDescription(itemID)
desc=get(itemID)
makeLineItem(desc,qty)
create(desc,qty)
sl:SalesLineItem
add(sl)
To be elaborated further
total=getTotal()

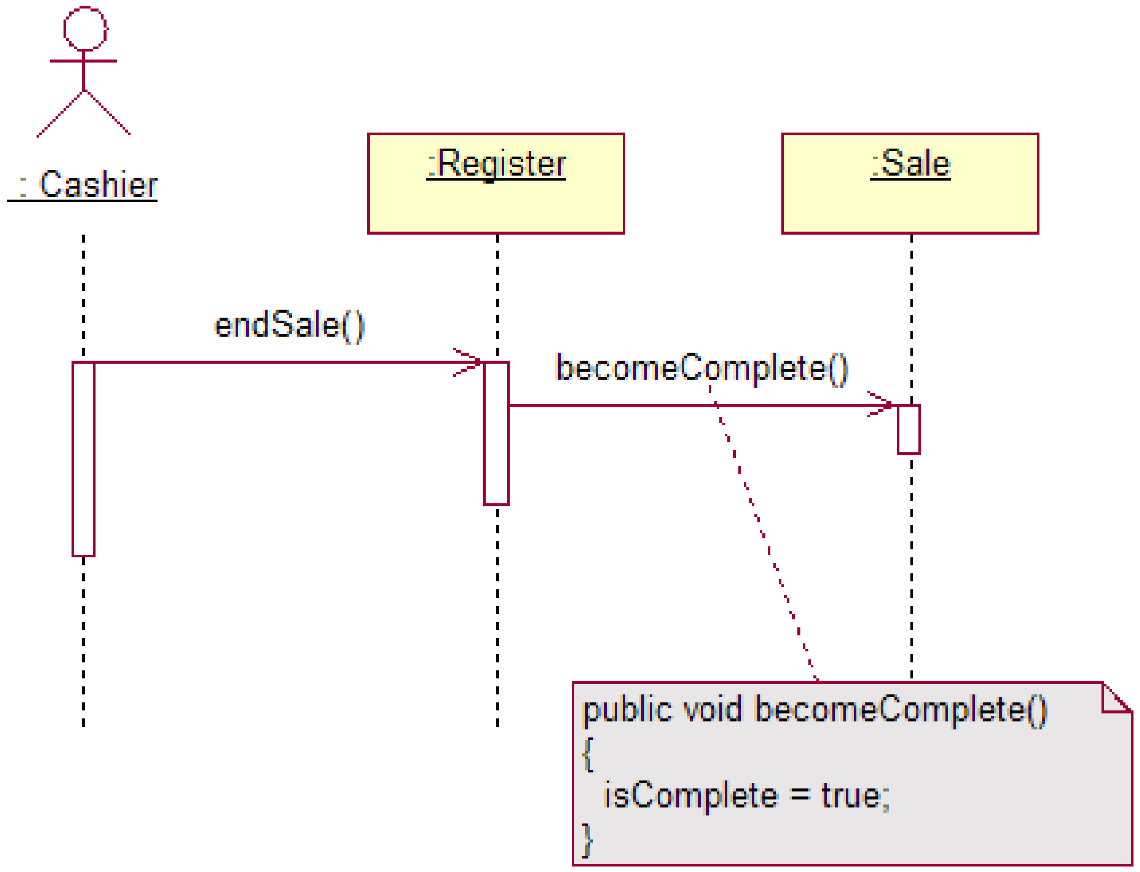
# getTotal


:Sale
lineItems[i]:SalesLineItem
:ProductDescription
tot=getTotal
loop
st=getSubTotal
pr=getPrice

# makePayment, getBalance



# endSale



```
public void becomeComplete()
{
  isComplete = true;
}
```

# Class Payment

```
// all classes are probably in a package named
// something like:
package com.foo.nextgen.domain;


public class Payment
{
   private Money amount;

   public Payment( Money cashTendered ){
       amount = cashTendered;
   }
   public Money getAmount() {
       return amount;
   }
}
```

## Class ProductDescription

```
public class ProductDescription
{
   private ItemID id;
   private Money price;
   private String description;

   public ProductDescription
      ( ItemID id, Money price, String description )
   {
      this.id = id;
      this.price = price;
      this.description = description;
   }

   public ItemID getItemID() { return id;   }
   public Money getPrice() { return price; }
   public String getDescription() { return description; }
}
```

# Class ProductCatalog

```
public class ProductCatalog
{
   private Map<ItemID, ProductDescription>
         descriptions = new HashMap()<ItemID, ProductDescription>;

   public ProductCatalog() {
      // sample data
      ItemID id1 = new ItemID( 100 );
      ItemID id2 = new ItemID( 200 );
      Money price = new Money( 3 );

      ProductDescription desc;
      desc = new ProductDescription( id1, price, "product 1" );
      descriptions.put( id1, desc );
      desc = new ProductDescription( id2, price, "product 2" );
      descriptions.put( id2, desc );
   }

   public ProductDescription getProductDescription( ItemID id ) {
      return descriptions.get( id );
   }
}
```

## Class SalesLineItem

```
public class SalesLineItem
{
   private ProductDescription description;
   private int quantity;

   public SalesLineItem (ProductDescription desc, int quantity )
   {
      this.description = desc;
      this.quantity = quantity;
   }

   public Money getSubtotal()
   {
      return description.getPrice().times( quantity );
   }
}
```

## Class Sale

```
public class Sale {
   private List<SalesLineItem> lineItems =
                              new ArrayList()<SalesLineItem>;
   private Date date = new Date();
   private boolean isComplete = false;
   private Payment payment;

   public Money getBalance()
   {
      return payment.getAmount().minus( getTotal() );
   }

   public void becomeComplete() { isComplete = true; }

   public boolean isComplete() { return isComplete; }

   public void makeLineItem
      ( ProductDescription desc, int quantity )
   {
      lineItems.add( new SalesLineItem( desc, quantity ) );
   }
```

# Class Sale

```
    public Money getTotal()
    {
       Money total = new Money();
       Money subtotal = null;

       for ( SalesLineItem lineItem : lineItems )
       {
          subtotal = lineItem.getSubtotal();
          total.add( subtotal );
       }
    return total;
    }

    public void makePayment( Money cashTendered )
    {
       payment = new Payment( cashTendered );
    }
 } //end of sale
```

# Class Register

```
public class Register {
   private ProductCatalog catalog;
   private Sale currentSale;

   public Register( ProductCatalog catalog ) {
      this.catalog = catalog;
   }

   public void makeNewSale() { currentSale = new Sale(); }

   public void enterItem( ItemID id, int quantity ) {
      ProductDescription desc = catalog.getProductDescription(id);
      currentSale.makeLineItem( desc, quantity );
   }

   public void makePayment( Money cashTendered ) {
      currentSale.makePayment( cashTendered );
   }

   public void endSale() { currentSale.becomeComplete(); }
}
```

## Class Store

```
public class Store
{
   private ProductCatalog catalog = new ProductCatalog();
   private Register register = new Register( catalog );

   public Register getRegister() { return register; }
}
```