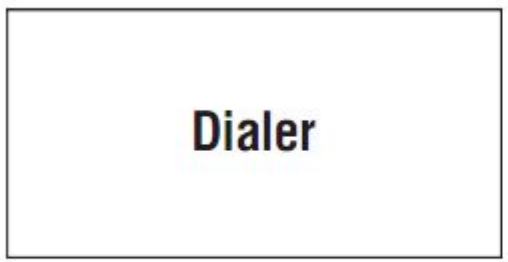
# Диаграммы классов

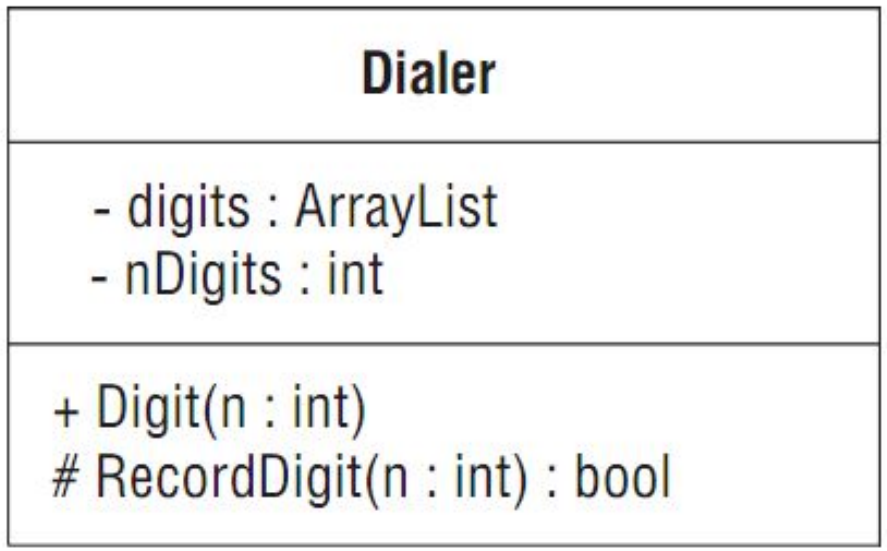
# Основные понятия

- Классы




*Значок класса*

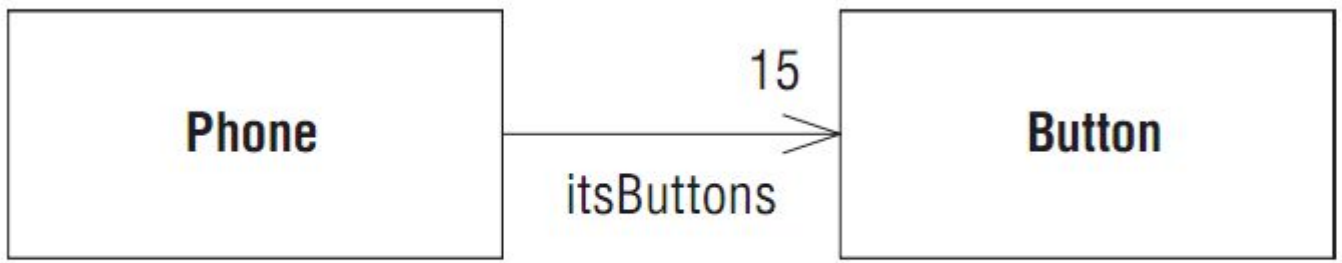
```
public class Dialer
{
}
```




```
public class Dialer
{
  private ArrayList digits;
  private int nDigits;
  public void Digit(int n);
  protected bool RecordDigit(int n);
}
```

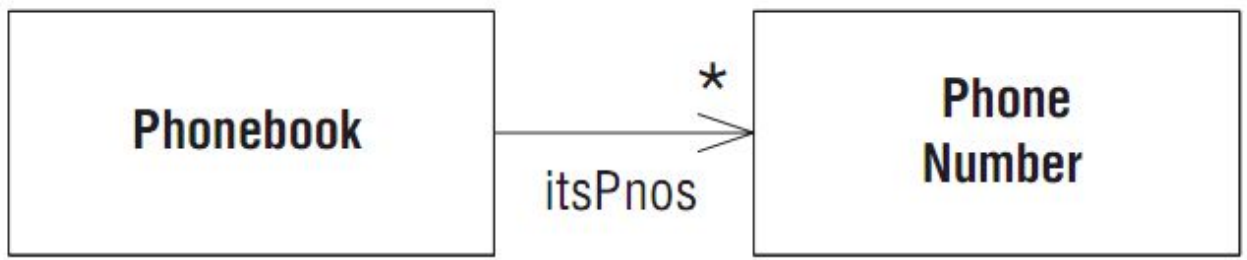
*Значок класса с отделениями и соответствующий код*

# Ассоциация




*Ассоциация*

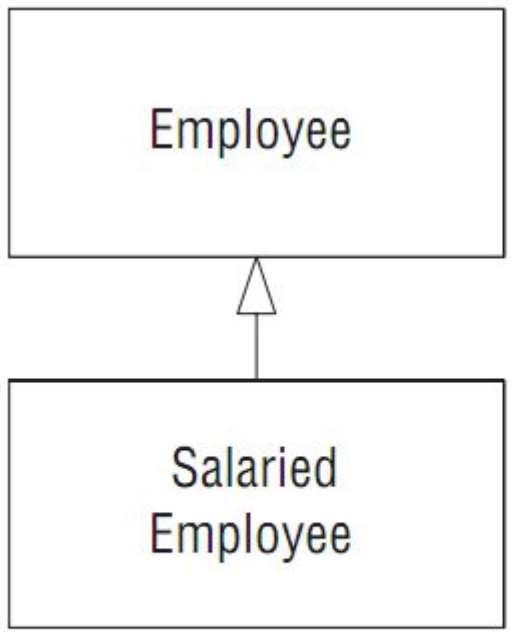
```
public class Phone
{
  private Button
itsButtons[15];
}
```




```
public class Phonebook
{
  private ArrayList itsPnos;
}
```

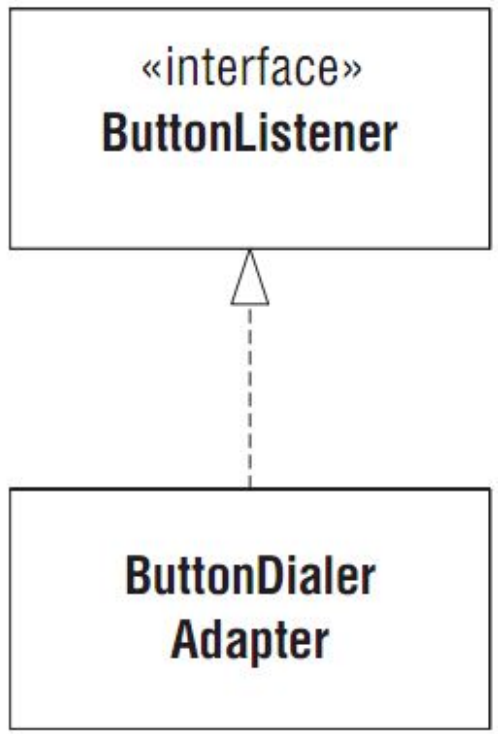
*Ассоциация один-ко-многим*

# Наследование



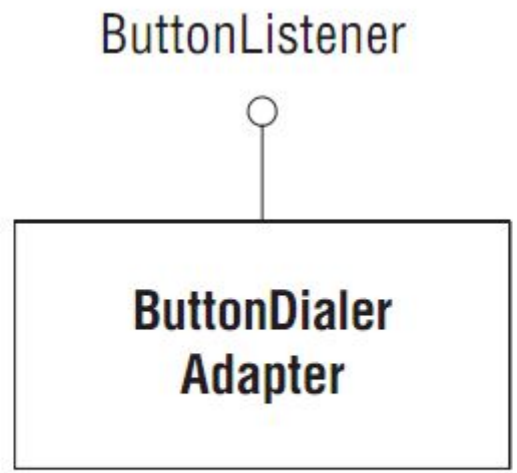

*Наследование*

```
public class Employee
{
   ...
}

public class SalariedEmployee : Employee
{
   ...
}
```




```
interface ButtonListener
{
   ...
}

public class ButtonDialerAdapter
   : ButtonListener
{
   ...
}
```

*Отношение «реализует»*




*Обозначение интерфейса «леденцом на палочке»*

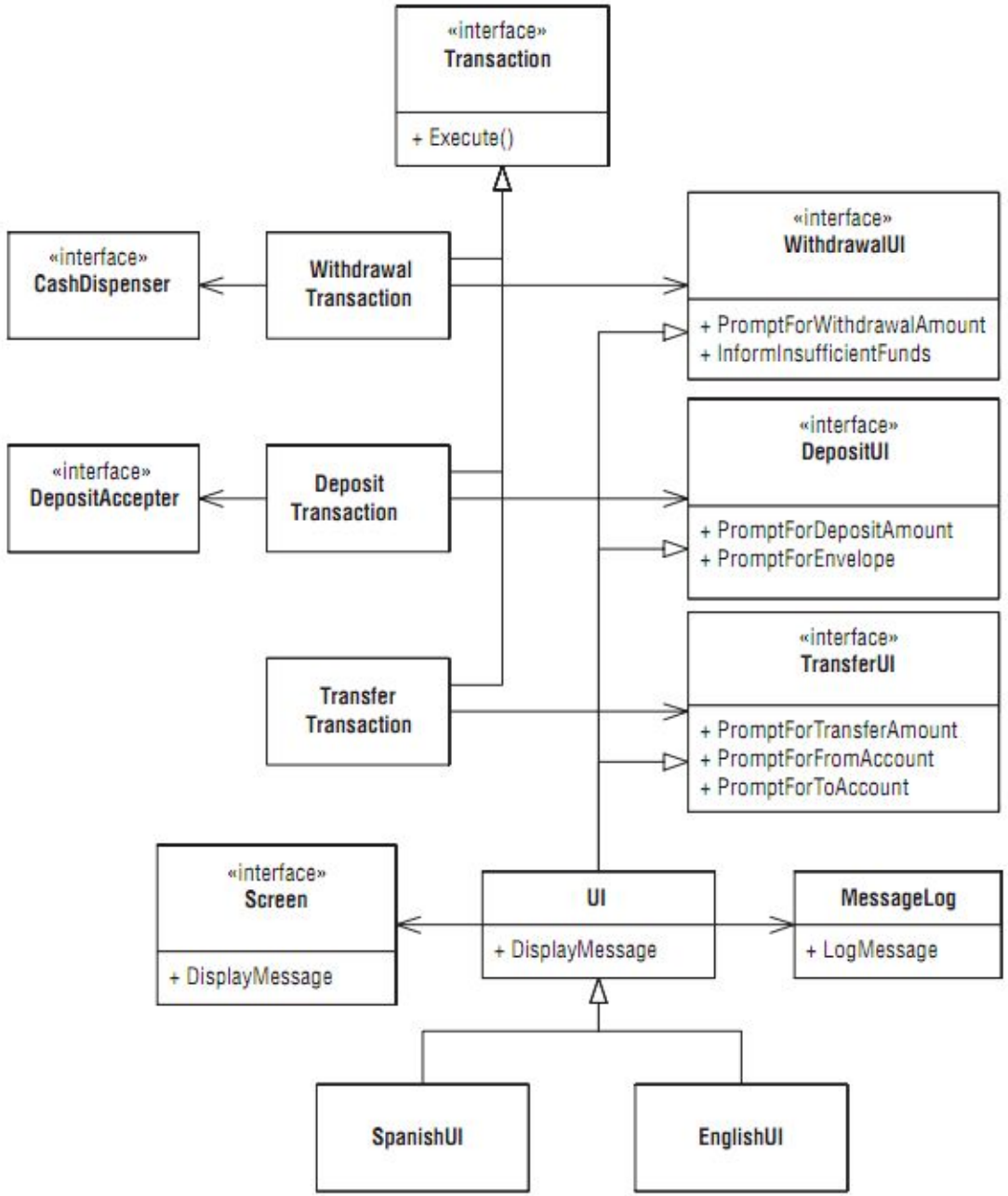
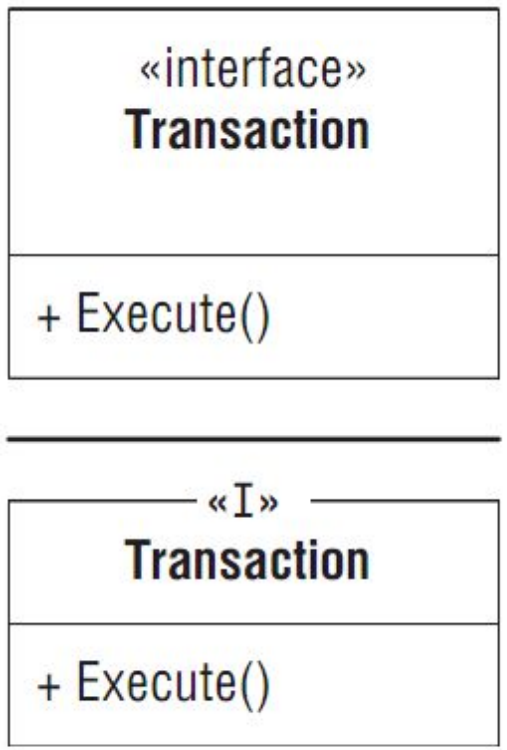



*Диаграмма классов банкомата*

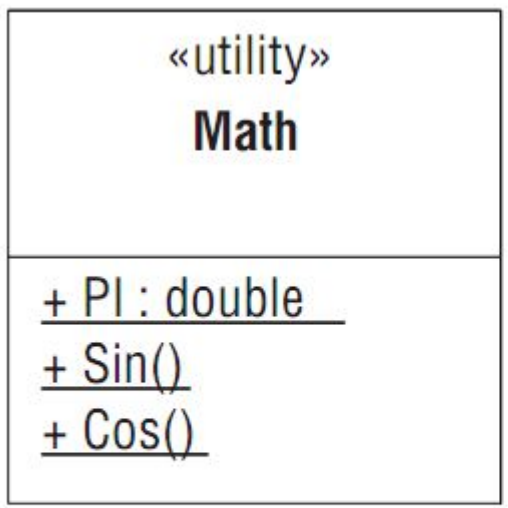
```
public abstract class UI : WithdrawalUI, DepositUI, TransferUI
{
    private Screen itsScreen;
    private MessageLog itsMessageLog;
    public abstract void PromptForDepositAmount();
    public abstract void PromptForWithdrawalAmount();
    public abstract void InformInsufficientFunds();
    public abstract void PromptForEnvelope();
    public abstract void PromptForTransferAmount();
    public abstract void PromptForFromAccount();
    public abstract void PromptForToAccount();
    public void DisplayMessage(string message)
    {
        itsMessageLog.LogMessage(message);
        itsScreen.DisplayMessage(message);
    }
}
```

# Детали: Стереотипы классов




```
interface Transaction
{
  public void Execute();
}
```

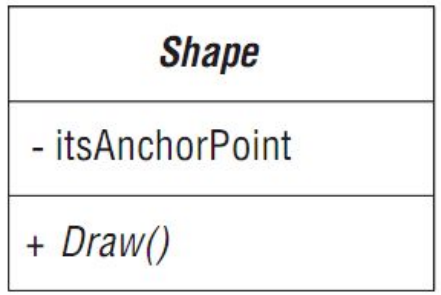
*Стереотип класса «interface»*

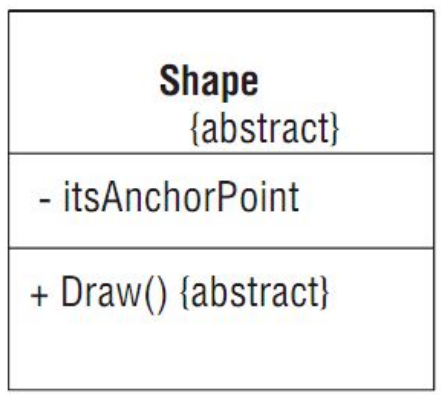



```
public class Math
{
  public static readonly double PI =
    3.14159265358979323;
  public static double Sin(double theta){...}
  public static double Cos(double theta){...}
}
```

*Стереотип класса «utility»*

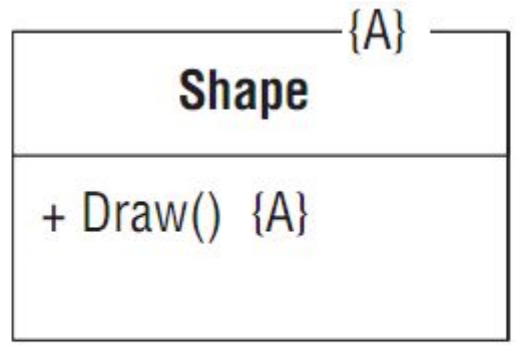
# Абстрактные классы




```
public abstract class Shape
{
  private Point itsAnchorPoint;
  public abstract void Draw();
}
```

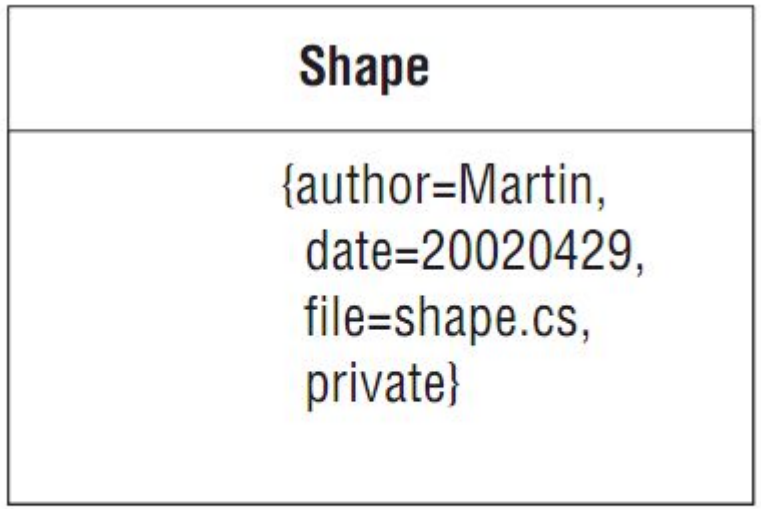
*Абстрактные классы*




*Неофициальное обозначение абстрактных классов*

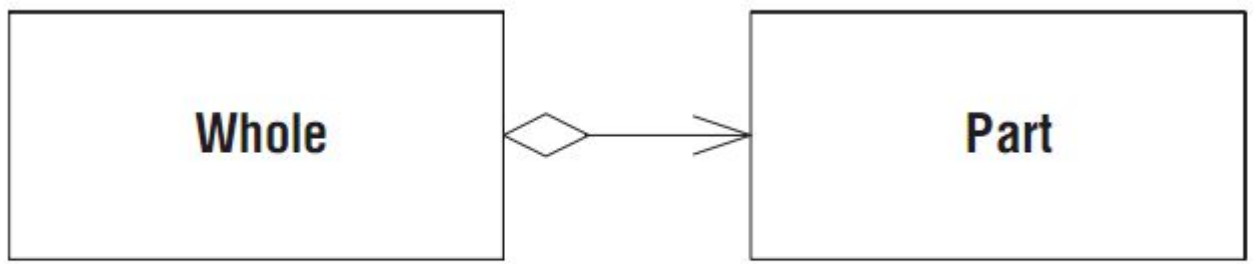
# Свойства

- {author=Martin, date=20020429, file=shape.cs, private}



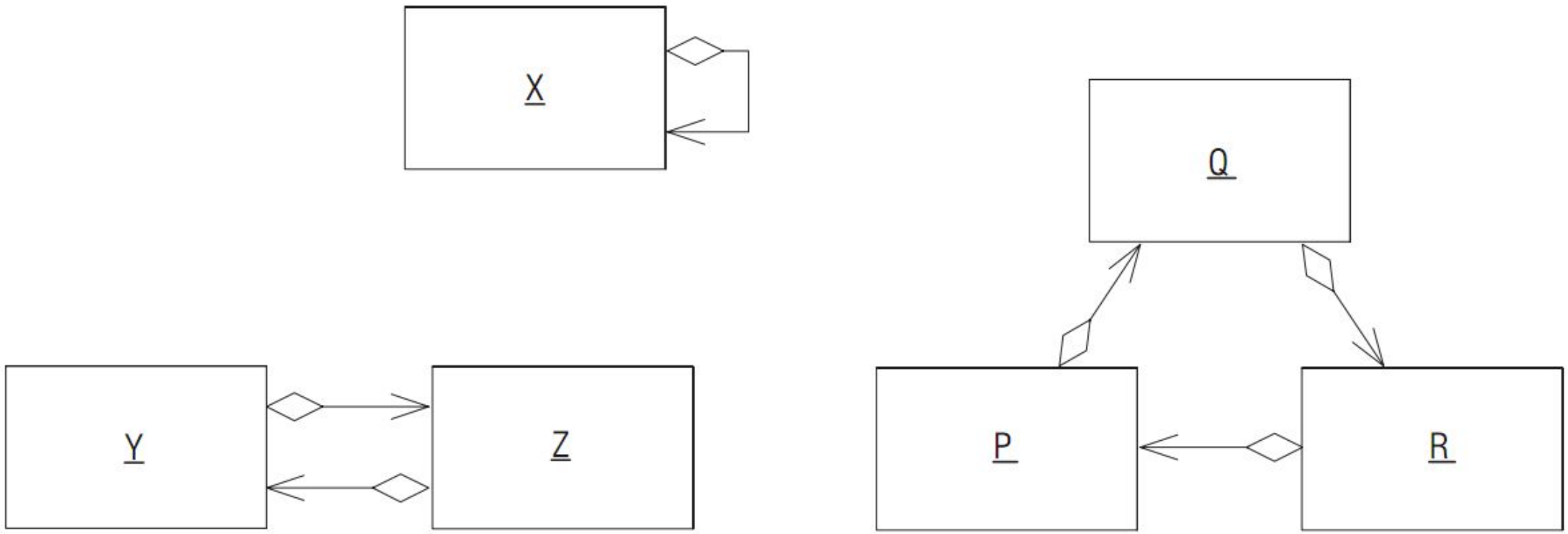

*Свойства*

# Агрегирование



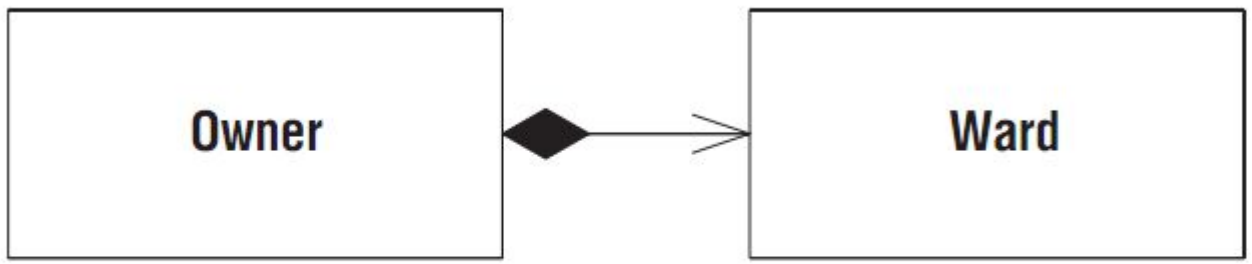

*Агрегирование*

```
public class Whole
{
  private Part itsPart;
}
```



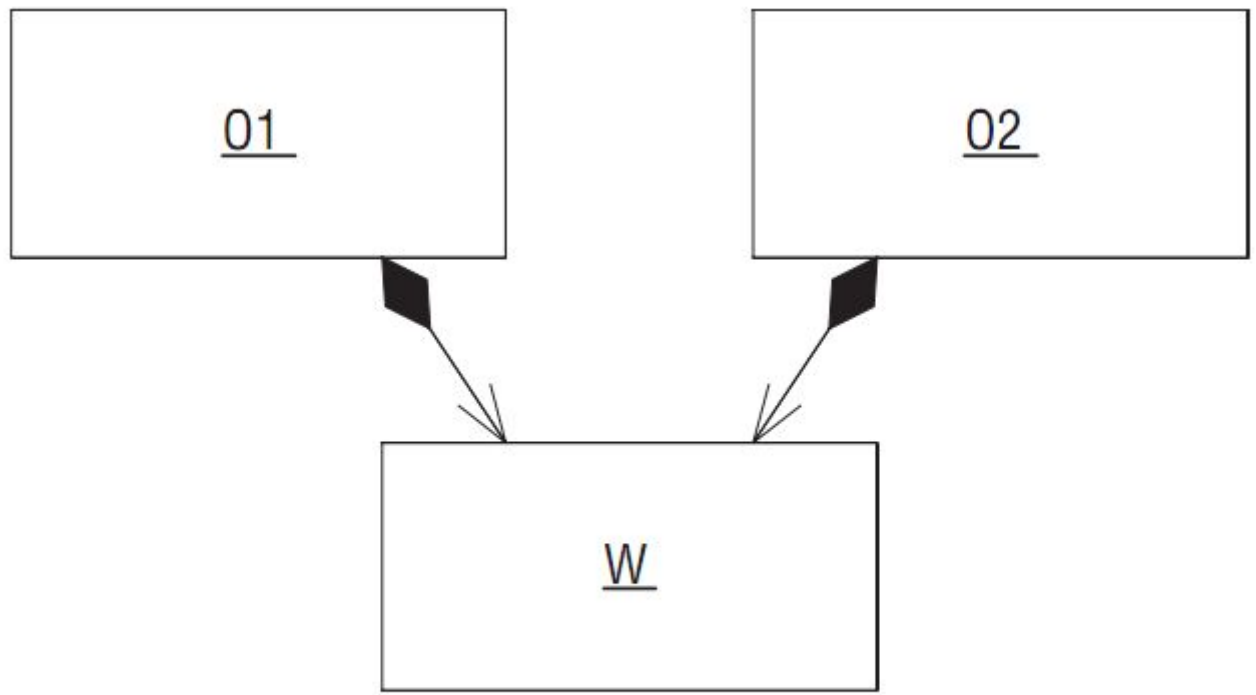

*Недопустимые циклы агрегирований экземпляров*

# Композиция

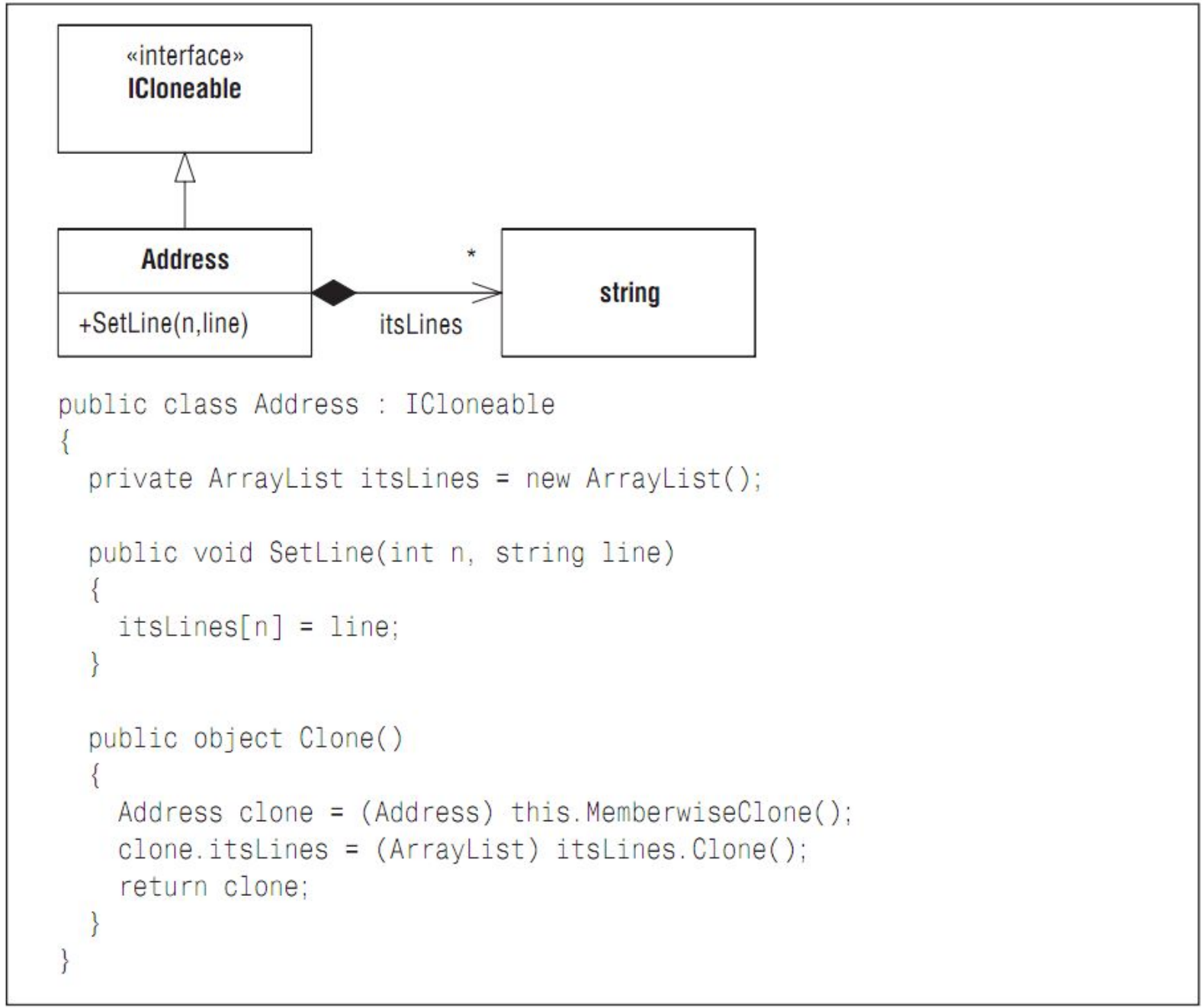



*Композиция*

```
public class Owner
{
  private Ward itsWard;
}
```



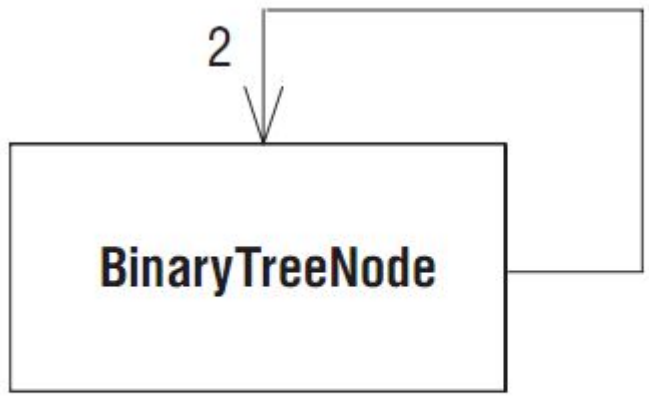

*Недопустимая композиция*




```
public class Address : ICloneable
{
  private ArrayList itsLines = new ArrayList();

  public void SetLine(int n, string line)
  {
    itsLines[n] = line;
  }

  public object Clone()
  {
    Address clone = (Address) this.MemberwiseClone();
    clone.itsLines = (ArrayList) itsLines.Clone();
    return clone;
  }
}
```

*Глубокое копирование, подразумеваемое композицией*

# Кратность

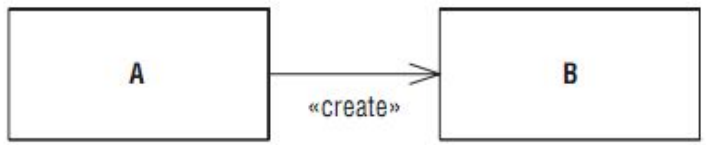



```
public class BinaryTreeNode
{
  private BinaryTreeNode leftNode;
  private BinaryTreeNode rightNode;
}
```

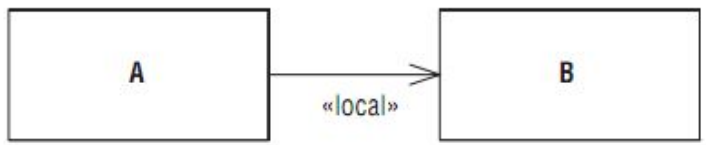
*Простой пример кратности*

- Цифра точное число элементов
- или 0..*  0 или более
- 0..1 0 или 1; в Java часто реализуется ссылкой, которая может быть равна null
- 1..*  1 или более
- 3..5  от трех до пяти
- 0,2..5,9..*  странно, но допустимо

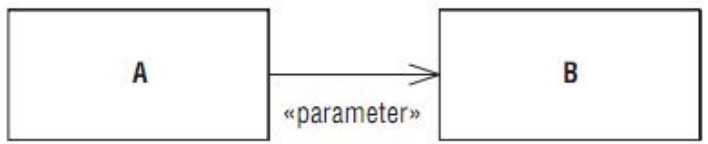
# Стереотипы ассоциаций

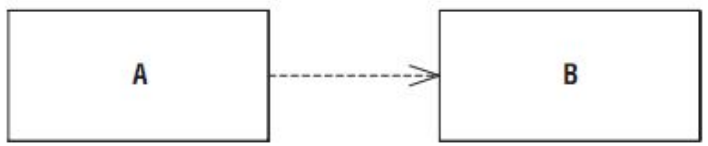



```
public class A {
  public B MakeB() {
    return new B();
  }
}
```

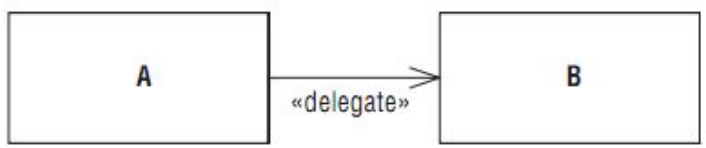



```
public class A {
  public void F() {
    B b = new B();
    // use b
  }
}
```



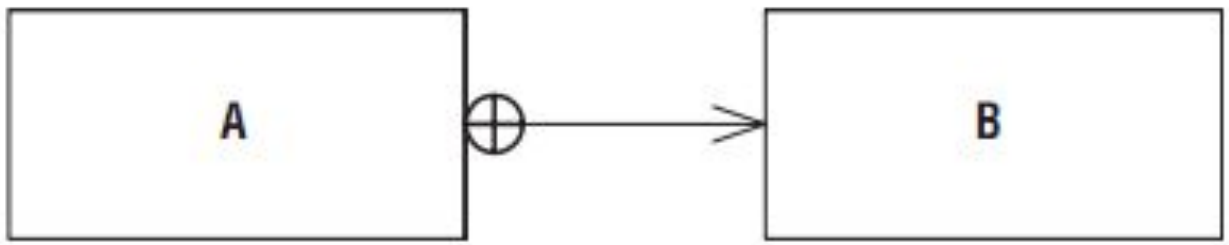

```
public class A {
  public void F(B b) {
    // use b;
  }
}
```




```
public class A {
  private B itsB;
  public void F() {
  itsB.F();
  }
}
```

*Стереотипы ассоциаций*

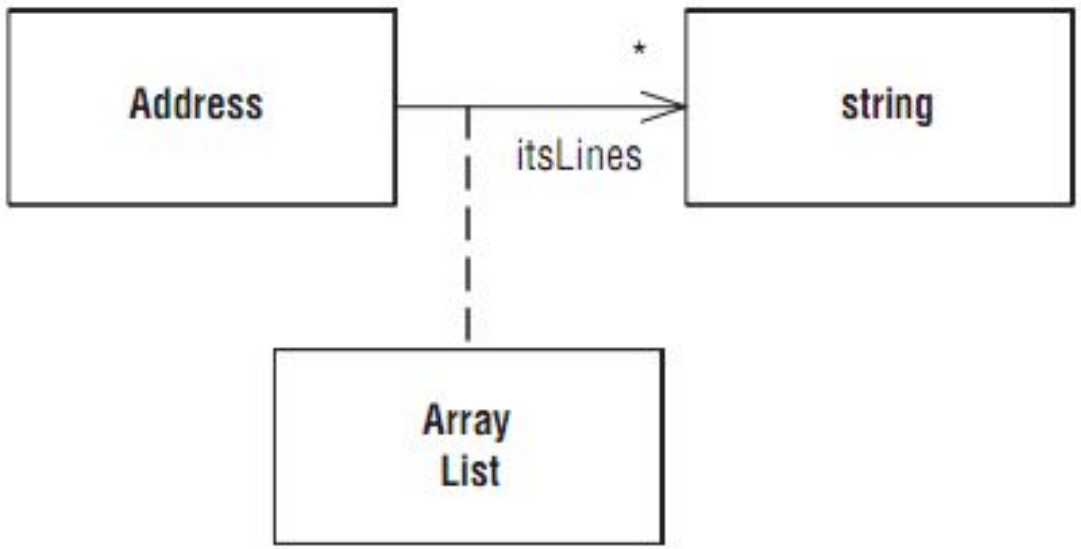
# Вложенные классы




*Вложенный класс*

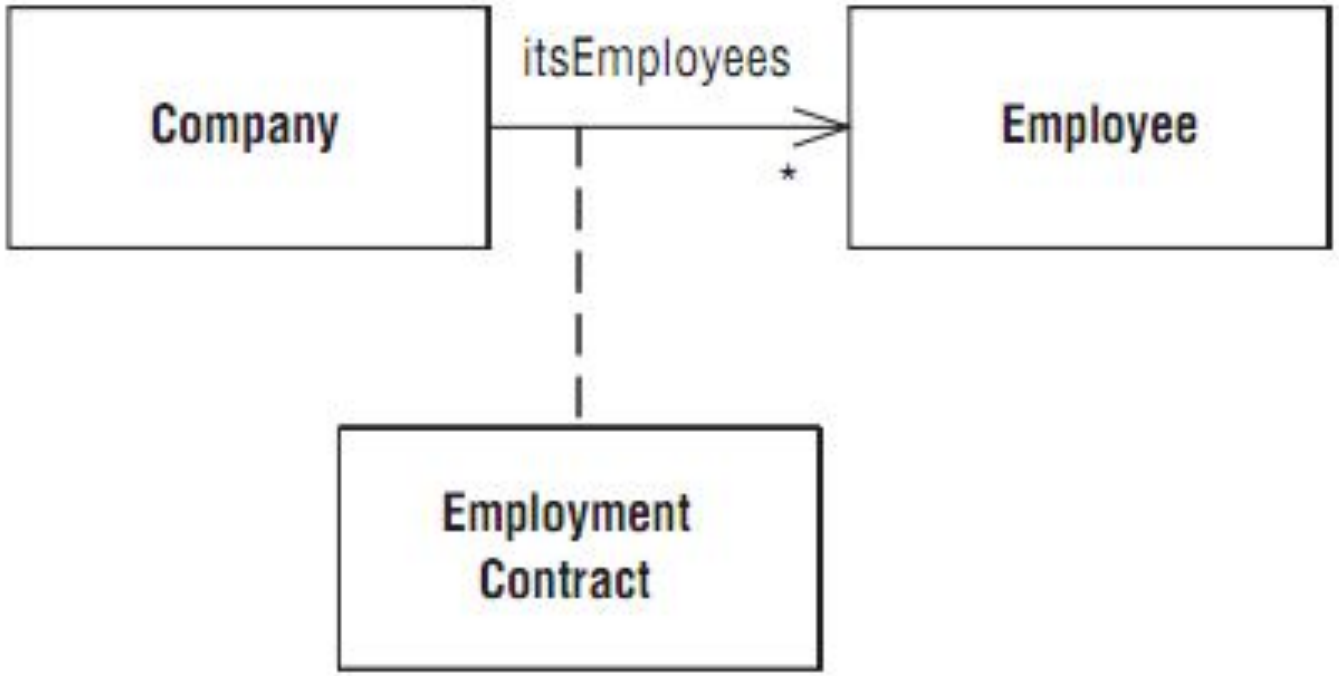
```
public class A {
  private class B {
    ...
  }
}
```

# Классы ассоциаций




*Класс ассоциации*

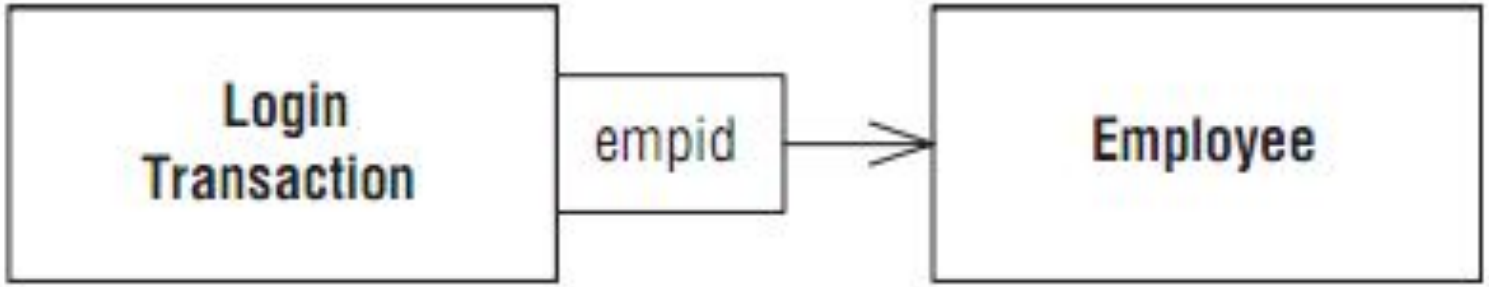
```
public class Address {
  private ArrayList itsLines;
};
```




*Контракт с работником*

```
public class Company
{
    private EmploymentContract[] itsEmployees;
};
```

# Квалификаторы ассоциаций




*Квалификатор ассоциации*

```
public class LoginTransaction
{
    private string empid;
    public string Name()
    {
        Employee e=DB.GetEmp(empid);
        return e.GetName();
    }
}
```