

## 3. 列表

(x2) Java序列

邓俊辉

[deng@tsinghua.edu.cn](mailto:deng@tsinghua.edu.cn)

## Interface : 定义

❖ Java支持ADT的一种机制

在同一接口规范下，允许不同的实现

❖ 实例

```
interface Geometry { //几何物体  
    final double PI = 3.1415926; //常量定义，类定义可直接使用  
    double area(); //无参数的接口方法  
    boolean inside(Point p); //带参数的接口方法  
}
```

❖ interface不能直接实例化为对象

符合interface定义的任何类，都需要具体地实现其中的接口方法

## Interface : 实现

```
class Disk implements Geometry { //符合Geometry接口的Disk类
    Point c; double r;
    public Disk(Point center, double radius) //构造方法
    {c = center; r = radius;}
    public double perimeter() { return 2 * PI * r; } //类方法
    public double area() { return PI * r * r; } //接口方法的实现
    public boolean inside(Point p) { //接口方法的实现
        double dx = p.x - c.x, dy = p.y - c.y;
        return dx*dx + dy*dy < r*r;
    }
}
```

## 向量接口 : Vector.java

```
public interface Vector {  
    public int getSize();  
    public boolean isEmpty();  
    public Object getAtRank(int r)  
        throws ExceptionBoundaryViolation;  
    public Object replaceAtRank(int r, Object obj)  
        throws ExceptionBoundaryViolation;  
    public Object insertAtRank(int r, Object obj)  
        throws ExceptionBoundaryViolation;  
    public Object removeAtRank(int r)  
        throws ExceptionBoundaryViolation;  
}
```

## 向量实现1 : Vector\_Array.java

```
public class Vector_Array implements Vector {  
    private final int N = 1024; //数组容量固定  
    private Object[] A;  private int n = 0;  
    public Vector_Array() { A = new Object[N]; n = 0; }  
    public int getSize() { return n; }  
    public boolean isEmpty() { return 0 == n; }  
    public Object insertAtRank(int r, Object obj) throws ExceptionBoundaryViolation {  
        if (0 > r || r > n) throw new ExceptionBoundaryViolation("out of range");  
        if (n >= N) throw new ExceptionBoundaryViolation("overflow");  
        for (int i = n; i > r; i--) A[i] = A[i - 1];  
        A[r] = obj; n++; return obj;  
    }  
    /* ..... */  
}
```

## 向量实现2 : Vector\_ExtArray.java

```
public class Vector_ExtArray implements Vector {  
    private int N = 8; //数组的初始容量, 可不断增加  
    /* ..... */  
    public Object insertAtRank(int r, Object obj) throws ExceptionBoundaryViolation {  
        if (0 > r || r > n) throw new ExceptionBoundaryViolation("out of range");  
        if (N <= n) { //空间溢出的处理  
            N *= 2; Object B[] = new Object[N]; //容量加倍  
            for (int i = 0; i < n; i++) B[i] = A[i]; A = B; //用B[]替换A[]  
        }  
        for (int i = n; i > r; i--) A[i] = A[i - 1]; //后续元素顺次后移  
        A[r] = obj; n++; return obj;  
    }  
    /* ..... */  
}
```

## 序列接口及其实现

❖ //列表, List.java

```
interface List  
{ /* ... */ }
```

//List\_DLNode.java

```
class List_DLNode  
implements List  
{ /* ... */ }
```

❖ //序列, Sequence.java

```
interface Sequence  
extends Vector, List  
{ /* ... */ }
```

//Sequence\_DLNode.java

```
class Sequence_DLNode  
extends List_DLNode  
implements Sequence  
{ /* ... */ }
```

