5 ARRAYS

Objectives

- ▶Declare and create arrays of primitive, class, or array types
- ▶Explain why elements of an array are initialized
- ▶Given an array definition, initialize the elements of an array
- ▶Determine the number of elements in an array
- ▶Create a multidimensional array
- ▶Write code to copy array values from one array type to another

Declaring Arrays

- Group data objects of the same type
- Declare arrays of primitive or class types

```
char s[];
Point p[];
char [] s;
Point [] p;
```

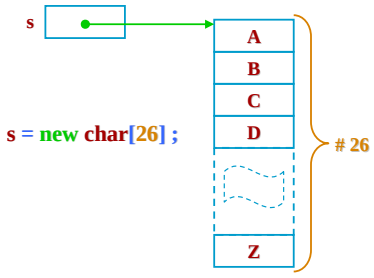
- Create space for a reference
- An array is an object; it is created with **new**.

Creating Arrays ❶

Use the **new** keyword to create an array object.

For example, a primitive (`char`) array:

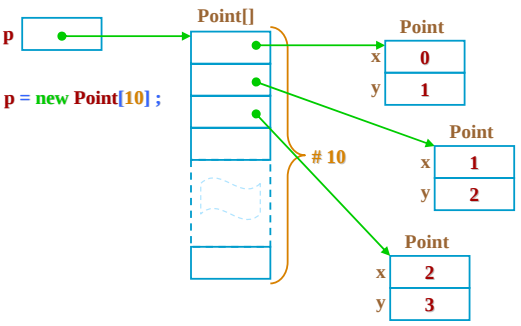
```
public char[] createArray() {
      char[] s;
      s = new char[26] ;
      for (int i=0; i<26; i++){
          s[i] = (char) ('A'+i) ;
      }
}
```

Creating Arrays ❷

Another example, an object array:

```
public Point[] createArray() {
      Point[] s;
      p = new Point[10] ;
      for (int i=0; i<10; i++){
          p[i] = new Point(i,i+1) ;
      }
}
```



Initializing Arrays

- Initialize an array element
- Create an array with initial values :

```
String names[] ;
names = new String[3] ;
names[0]="Georgianna";
names[1]="Jen";
names[2]="Simon";
```

❶

```
String names[] = {
"Georgianna",
"Jen",
"Simon"
};
```

❷


```
MyDate dates[] ;
dates = new MyDate[3] ;
dates[0]= new MyDate(22,7,1964);
dates[1]= new MyDate(1,1,2000);
dates[2]= new MyDate(22,12,1964);
```

❶

```
MyDate dates[]= {
      new MyDate(22,7,1964),
      new MyDate(22,1,1964),
      new MyDate(1,7,2000)
};
```

❷

Multidimensional Arrays

- Arrays of arrays

```
int twoDim [][] = new int [4][];
twoDim[0] = new int[5];
twoDim[1] = new int[5];
```

rectangular array

```
int twoDim [][] = new int [][4];
```

illegal

Multidimensional Arrays

- Non-rectangular arrays of arrays

```
twoDim[0] = new int[2];
twoDim[1] = new int[4];
twoDim[2] = new int[6];
twoDim[3] = new int[8];
```

- Array of four arrays of five integers each

```
int twoDim[][] = new int[4][5];
```


Array Bounds

All array subscripts begin at 0 :

```
int list[] = new int [10];
for (int i = 0; i < list.length; i++){
  System.out.println(list[i]);
}
```

Array Resizing

- Cannot resize an array
- Can use the same reference variable to refer to an entirely new array

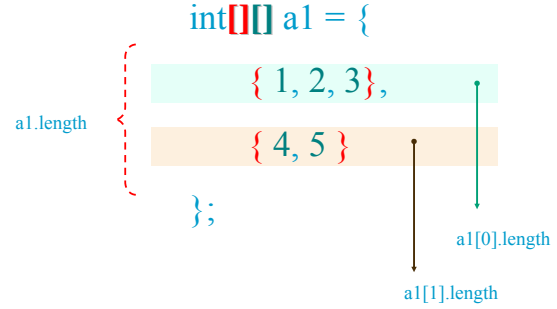
```
int elements[] = new int[6];
elements = new int[10];
```


Copying Arrays


```
The System.arraycopy() method
//original array
int elements[] = { 1, 2, 3, 4, 5, 6 };
:
// new larger array
int hold[] = { 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 };
// copy all of the elements array to the hold
// array, starting with the 0th index
System.arraycopy(elements, 0, hold, 0,elements.length);
```



```
public class Arrays {
  public static void main(String[] args) {
        int[] a1 = { 1, 2, 3, 4, 5 };
        int[] a2;
        a2 = a1;
        for(int i = 0; i < a2.length; i++)
          a2[i]++;
        for(int i = 0; i < a1.length; i++)
          prt("a1[" + i + "] = " + a1[i]);
  }
}
```

5# Arrays

- Exercise-1: “Manipulating Arrays”
- Exercise-2: “Using Arrays to Represent Multiplicity”

Practice Session

write a method

```
public static int[] ins(int[] a,int x)
```

which takes a sorted integer array, **a**, and an integer value **x**, and then returns another sorted array, which includes elements of **a** and **x**.

```
import java.io.* ;

public class Insert {
    public static int [] ins(int[] a,int x){
        int  r[],i,p;
        r = new int[a.length+1] ;
        for(i=0;i<a.length;i++){
          if(a[i]>x)
            break;
          r[i] = a[i] ;
        }
        r[i] = x ;
        i++;
        for(;i<=a.length;i++)
          r[i] = a[i-1] ;
        return r ;
    }
```



```
    public static void print(int a[]){
        System.out.print("\n"+a[0]);
        for(int i=1;i<a.length;i++)
            System.out.print(","+a[i]);
    }
    public static void main(String[] args) throws IOException {
        int c[]={1,2,3,4,6,7,8,9};
        int[] d ;
        int e = 5 ;
        d = ins(c,e) ;
        print(c);
        print(d);
    }
}
```