

- An array is a structure that can store many of the same kind of data together at once.
- Arrays are important and useful programming concept because they allow a collection of related values to be stored together with a single descriptive name.

 An array has a fixed length and can contain only as many data items as its length allows.



- An array element in one of the data items in an array. Each element has an index value, with 0 being the index of the first item, 1 the index of the second item and so on.
- An array must be declared and then space allocated for the elements of the array.

<type>[] <name>;

<name> = new <type>[<num>];

 If the size of the array is known when the application is written, then the array can be created and space allocated for thr elements in one statement.

<type>[] <name> = new <type>[<num>];

 When space has been allocated for the elements of an array, the array is initialized to the default values for that element types.

 A third way to create an array is to initialize it in the declaration. Initializing an array means that a value is given for each element. In this case, the length of the array is determined by the number of elements between the curly braces.

# Using Arrays

- An array element is accessed by including its index in brackets after the array name.
- An array element id changed throught assignment.
- A runtime error is generated when an invalid index is used.

# Using Arrays

- The array structure includes the length attribute which can be used at run time to determine the length of an array.
- A for statement is often used to access the elements of an array because the loop control variable can be used as the array index.

### **Array Parameters**

 A method declaration can include array parameters. The array passed to a method can be either an entire array or an element of the array.

### **Characters and Arrays**

 Although strings are comprised of charactersm a String object cannot be manipulated as a set of characters. However, the string stored in a String object can be converted to a char array.

toCharArray()

 Additionally, an individual character of the String object can be converted to a char.

charAt( int index)

### **Characters and Arrays**

- Letters of every alphabet and symbols of every culture have been given a representation in a digital code called Unicode.
- Unicode uses a set of 16 bits to form a 16 binary code for each symbol.

## Searching an Array

 There are many ways to search an array for a specific value. The simplest searching algorithm is called linearn search and work by proceeding from one array element to the next until the specified value is found or until the entire array has been searched.

• An array with teo dimensions can be used to represent data that correspons to a grid.



 A two-dimendional array must be declared and then space allocated for the elements of the array in statements that takes the form:

<type>[][] <name>;

<name> = new <type>[<num>][<num>];

 The length property can be used to determine the number of rows and columns in a twodimensional array with two separate statements.
rows = <name>.length;

cols = <name>[<num>].length;

- An element of a two-dimensional array is accessed by including the indexes of the row and column in brackets after the array name.
- Nested for statements are often used to access the elements of a two-dimensional array.

- A collection is a group of related objects, or elements, that are stored together as a single unit.
- Java also contains a collections framework, whick provides classes for implementing collections. One such class is the ArrayList class, which includes methods for adding and deleting elements and finding an element.

 The ArrayList class implements a dynamic array. A dynamic array varies in size during runtime and is used in apllications where the size of an array may need to grow or shrink.

- add(index, element)
- add(element)
- get(index)
- indexOf(obj)
- remove(index)
- set(index, element)
- size()

 When using an ArrayList, it is important to understand that only objects, not primitive types, can be stored. Because the indexOf() method compares its object parameter to rach element of the array, it is important that the object's class has an approriately overridden equals() method.

#### Wrapper Classes

 Primitive data types cannot be directly stored in an ArrayList because the elements in an ArrayList must be objects. The Integer and Double classes, provided with Java are used to "wrap" primitive values in an object. The Integer and Double wrapper classes include methods for comparing objects and for returning, or "unwrapping", the primitive value stored by the object.