



**CMSC 131**

# **Object-Oriented Programming I**

## **Arrays**

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This material is based on material provided by Ben Bederson, Bonnie Dorr,  
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# Overview

## ► Arrays

# Summary of Arrays

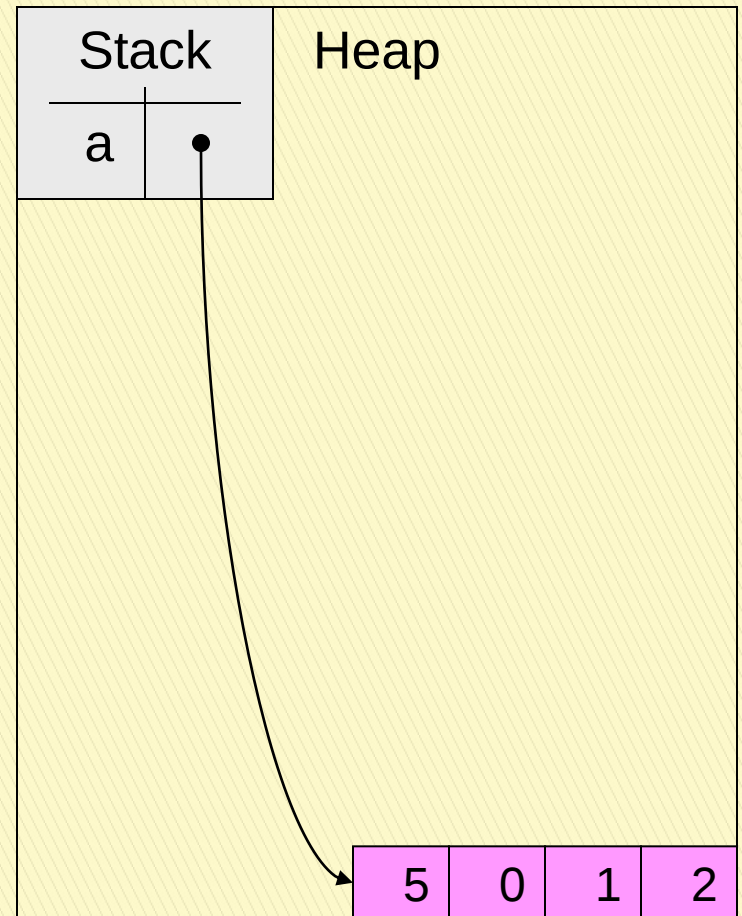
- ▶ Arrays are:
  - Sequences of cells holding values of the same type (“base type”)
  - Objects (hence created using new)
- ▶ To define an array variable:  
**int[] a;** // an array with base type int
- ▶ To create an array object:  
**a = new int[10];**
  - Creates an array of 10 cells on the heap
  - The base type is int
- ▶ To access individual array cells → use indexing
  - **a[0], a[1], ..., a[9]**
  - Cells are just like variables:
    - They may be read → **x = a[3];**
    - They may be written → **a[2] = 7;**
- ▶ Careful with index values
  - **Example:** OutOfBounds.java

# Arrays as Arguments

- ▶ Arrays = objects
- ▶ Array variables = references
- ▶ Array cells = variables of the base type (references or primitives depending on what that base type is)
- ▶ Both can be used as arguments to methods
  - Array cells → passed just like the variables of that base type
  - Array arguments → passed just like objects
    - Reference to array is passed in
    - If the method expects an array of doubles, an array of doubles **of any size** can be passed
    - **Promotion does not apply.** You cannot pass an int array when an array of doubles is expected
- ▶ **Example:** PassingValues.java
- ▶ The size of an array does not affect the amount of effort needed to pass the array

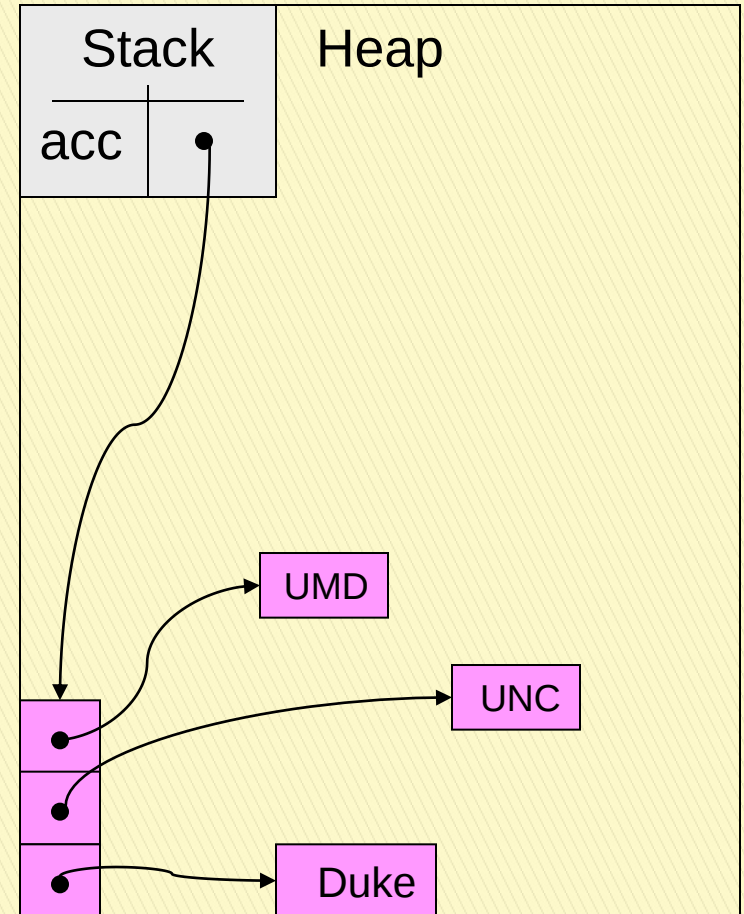
# Array Initializers

- ▶ Arrays may be initialized at declaration time!  
`int[] a = {5,0,1,2};`
- ▶ Java:
  - Counts elements (here, 4);
  - Creates correct size of array
  - Copies elements into array
  - Returns reference to array
- ▶ Here is another initialization
  - `process(new int[]{10, 20, 30});`
  - process expects an integer array
- ▶ **Example:** GradeComputation.java



# Arrays of Objects

- ▶ **Class types** can also be base types of arrays
  - e.g.  
`String[] acc = new String[3];`
  - Array cells store references to objects
  - **Notice that they are initialized to null!**
- ▶ Array initializers can also be used  
`String[] acc = {"UMD", "UNC", "Duke"};`



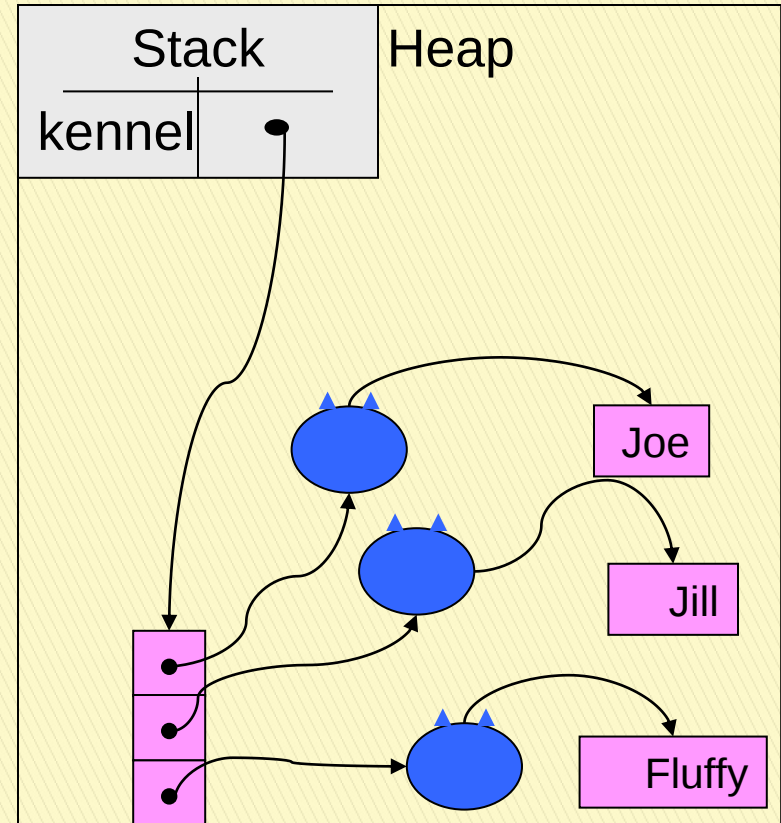
# Arrays of Objects (Continued)

- ▶ More complicated example than strings:

Cat objects

- ▶ Expressions can also appear in initializers

```
Cat[] kennel = {  
    new Cat("Joe"),  
    new Cat("Jill"),  
    new Cat("Fluffy")  
};
```



# Text Generation

- ▶ **Example:** words package example
- ▶ In the words example, the text is random, However we can create text that is statistically similar to other documents using Markov Text Generators (actually a project in cmsc132 ☺)
- ▶ Some text generators
  - <http://www.doctornerve.org/nerve/pages/interact/mrkvform.shtml>