CMSC 131

Object-Oriented Programming I

Arrays

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This material is based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Jan Plane
Overview

- Arrays
Arrays are:
- Sequences of cells holding values of the same type ("base type")
- Objects (hence created using new)

To define an array variable:
```java
int[] a; // an array with base type int
```

To create an array object:
```java
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!
  ```java
  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
  ```java
  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