Last Class

CSC 1051 – Data Structures and Algorithms I
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Course website:
www.csc.villanova.edu/~map/1051/

Some slides in this presentation are adapted from the slides accompanying Java Software Solutions by Lewis & Loftus
We learned

• Fundamental algorithms
  – finding max/min, average
  – repeated interactive input
  – processing lists
  – processing 2D tables of data
  – file management

• Fundamental data structures
  – Classes that aggregate information (eg: Account, Shoe, Person, PassengerCollection)
  – Strings
  – Arrays

• The basics of Java
We studied many ways of controlling flow through a program...

```java
int count = 0;
while (count < 5) {
    System.out.println (count);
    count++;
}
```

```java
int count = 0;
do {
    System.out.println (count);
    count++;
} while (count < 5);
```
We studied ways to structure data

• **Declaration:**
  ```java
  double[] scores = new double[10];
  ```

• **Initialization:**
  ```java
  scores[0] = 7.9;
  scores[1] = 8.7;
  scores[2] = 9.4;
  scores[3] = 8.2;
  scores[4] = 6.7;
  scores[5] = 9.8;
  scores[6] = 8.7;
  scores[7] = 8.1;
  scores[8] = 7.4;
  scores[9] = 9.1;
  ```

The entire array has a single name

This array holds 10 values of type `double` that are indexed from 0 to 9

The size of the array is given by:

`scores.length = 10`
We wrote classes that work together

- Example: managing a collection of DVD objects

```
Movies.java
+ main (args : String[]) : void

DVDCollection.java
+ collection : DVD[]
+ count : int
+ totalCost : double
+ addDVD(title : String, director : String, year : int, cost : double, blueray : boolean) : void
+ toString() : String
+ increaseSize() : void

DVD.java
+ title : String
+ director : String
+ year : int
+ cost : double
+ blueray : boolean
+ toString() : String
```
We played around with GUIs and Applets

Link to Project 5 applets: http://www.csc.villanova.edu/~map/1051/f13/proj5/index.html
We ran a lot of programs!

```
public class TwoDArray {
  //-----------------------------------------------------------------
  // Creates a 2D array of integers, fills it with increasing integer values, then prints them out.
  //-----------------------------------------------------------------
  public static void main (String[] args) {
    int[][] table = new int[5][10];

    // Load the table with values
    for (int row=0; row < table.length; row++)
      for (int col=0; col < table[row].length; col++)
        table[row][col] = row * 10 + col;

    // Print the table
    for (int row=0; row < table.length; row++)
    {
      for (int col=0; col < table[row].length; col++)
        System.out.print (table[row][col] + "\t");
      System.out.println();
    }
  }
```

<table>
<thead>
<tr>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  1  2  3  4  5  6  7  8  9</td>
</tr>
<tr>
<td>10 11 12 13 14 15 16 17 18 19</td>
</tr>
<tr>
<td>20 21 22 23 24 25 26 27 28 29</td>
</tr>
<tr>
<td>30 31 32 33 34 35 36 37 38 39</td>
</tr>
<tr>
<td>40 41 42 43 44 45 46 47 48 49</td>
</tr>
</tbody>
</table>
We wrote a lot of programs!

- Project 1: Welcome to Poetry 101
- Project 2: Cash Register
- Project 3: Check in, check out
- Project 4: Investment calculator
- Project 5: Art!
- Project 6: You’ve got Shoes!
- Project 7: Response Times Experiment
- Project 8: Hot Hands
- Project 9: Particle simulation
The basics of Java

- style
- comments
- identifiers
- variables
- constants
- assignment statement
- primitive types
- objects
- classes
- packages
- methods
- assignment
- arithmetic ops
- boolean ops
- casting

- algorithms
- comparison
- aliases
- formatting output
- instance variables
- visibility
- scope
- static
- return statement
- if-else
- while
- for
- do/while

- GUI classes
- Graphics
- Applets
- file input
- arrays
- arrays of objects
- 2D arrays
- from the Library
  - Strings
  - Scanner
  - Random
  - Math
  - GUI classes
- etc etc etc

7-9
So now we understand…

• What an algorithm is…
• How data can be represented and used…
• The basics of Java…
• What programming is …
• What object-orientation is …
• A little about computer architecture
• A way of thinking
• If we like computer science
  … or not
Final Exam

- Similar to quizzes and midterm .. but longer
- Same material:
  - algorithms
  - writing and using classes
  - tracing code
  - coding: proper naming, indentation but commenting not needed
    - statements
    - code fragments
    - methods
    - classes
- Partial credit available
  - Be legible
  - Check your work (eg, double check that you have the right type)
- Don’t get stuck
  - Don’t write more than you are asked to write