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
  – creating and handling exceptions

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

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

**while Loop**

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

**do Loop**

```
int count = 0;
doo
{
    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;
  ```

- **Instantiation:**
  - 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`

The entire array has a single name: `scores`
We wrote classes that work together

```java
public class Transactions {
    //-----------------------------------------------------------------
    //  Creates some bank accounts and requests various services.
    //-----------------------------------------------------------------
    public static void main (String[] args) {
        Account acct1 = new Account ("Ted Murphy", 72354, 102.56);
        Account acct2 = new Account ("Jane Smith", 69713, 40.00);
        Account acct3 = new Account ("Edward Demsey", 93757, 759.32);
        System.out.println(acct1);
        System.out.println(acct2);
        System.out.println(acct3);
        acct1.deposit (25.85);
        acct1.withdraw (60, 2.50);
        System.out.println();
        System.out.println(acct1);
        System.out.println(acct2);
        System.out.println(acct3);
    }
}
```

```java
import java.text.NumberFormat;

public class Account {
    int acctNumber;
    double balance;
    String name;

    //-----------------------------------------------------------------
    //  Sets up the account by defining its owner's name, account
    //   number, and initial balance.
    //-----------------------------------------------------------------
    public Account (String x, int y, double z) {
        name = x;
        acctNumber = y;
        balance = z;
    }

    //-----------------------------------------------------------------
    //  Deposits the specified amount x into the account.
    //-----------------------------------------------------------------
    public void deposit (double x) {
        balance = balance + x;
    }

    //-----------------------------------------------------------------
    //  Withdraws the specified amount x from the account.
    //-----------------------------------------------------------------
    public void withdraw (double x) {
        balance = balance - x;
    }
}
```
We learned about graphics and JavaFX

Color (red=116, green=86, blue=142)

x = 11
y = 8
We made SNOW DAYS!
public class TwoDArray {
    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();
        }
    }
}
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
- JavaFX
- file input/output
- arrays
- arrays of objects
- 2D arrays
- from the Library
  - Strings
  - Scanner
  - Random
  - Math
  - GUI classes
- etc etc etc
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