Extra Credit Assignment

- Posted on homework section of web site
- Due February 24
  - You must send me email by Friday, Feb 7 if you are going to work on this assignment
- Everything that you need to know should be on the web site
- Let me know if you have any questions

Javadoc

- Javadoc is a tool for generating web page documentation of Java programs
- Javadoc looks for special comments and tags to produce the documentation
- Special comment /* ... */

Javadoc

- Recommended practice
  - Put Javadoc comment at beginning of class
  - Put javadoc comment at beginning of every method
- Useful tags for methods
  - @param describes a method parameter
  - @return describes the method return value

Javadoc Example

From Interest.java:

```java
/**
 * Determine the number of years it takes to reach the target amount and print out intermediate results.
 *
 * @param start  the number of dollars that you start with
 * @param target the number of dollars that you would like to have
 * @param rate   the annual interest rate, as a decimal value. For example, pass 0.015 for 1.5%.
 * @return the number of years it takes to reach the target amount at the given interest rate
 */
static int numYearsToTarget(int start,
                        int target,
                        double rate) {
```

Javadoc Example

Running Javadoc

- Javadoc Interest.java
  - Produces web pages describing the class Interest
  - Only includes methods with the public keyword
- Javadoc -private Interest.java
  - Includes all methods
- See Interest.java and javadoc example on course web site
Quiz on Friday

• Covers chapter 4 topics, including
  – Methods
    • definition
    • invocation
  – Parameter passing
    • pass-by-value
      • using expressions and method calls as arguments
  – Return types
    • void
    • return statement
  – Variable scope

Example Questions

• Write a method isOdd that takes an integer parameter and returns true if the parameter value is odd, false if it is even.

Example Questions

• Using line numbers, what is the scope of a, i, j, m, and n in the following program?

```java
1 class Scope2 { 
2   public static void main( String[] args ) { 
3     int a = 5; 
4     int j; 
5     j = mystery(a); 
6     System.out.println("The mystery value is " + j); 
7   } 
8 
9   static int mystery( int n ) { 
10      int m = 0; 
11      for (int i = 0; i <= n; i++ ) 
12        m = m + n; 
13      return m; 
14   }
15 }
```

Example Questions

• What is printed by the following program?

```java
1 class Mystery { 
2   public static void main( String[] args ) { 
3     int m; 
4     m = mystery( 10 ); 
5     System.out.println("m = " + m); 
6   } 
7 
8   static int mystery( int x ) { 
9     if ( x <= 1 ) 
10       return 1; 
11     else { 
12       return ( x + mystery( x/2 ) ); 
13     } 
14 }
15 }
```

Example Questions

• What is printed by the following program?

```java
1 class WhoKnows { 
2   public static void main( String[] args ) { 
3     int m; 
4     m = foo( foo( 5, 4 ) ); 
5     System.out.println("m = " + m); 
6   } 
7 
8   static int foo( int x ) { 
9     return x * x; 
10   } 
11   static int foo( int x, int y ) { 
12     return x * y; 
13   }
14 }
```
Example Questions

• What is printed by the following program?

```java
class WhatIsIt {
    public static void main(String[] args) {
        int a = 3;
        double b = 2.5;
        byte d = 2;
        long e = 5L;
        System.out.println(x(a));
        System.out.println(x(b));
        System.out.println(x(a + d));
        System.out.println(x(e));
    }
    static int x(int a) {
        return a * 2;
    }
    static double x(double a) {
        return a * 3.0;
    }
}
```

Example Questions

• What is printed by the following program?

```java
class Hmmm {
    public static void main(String[] args) {
        double x = 2.0;
        double y = 1.0;
        System.out.println(doIt(y, x));
    }
    static double doIt(double x, double y) {
        return x / y;
    }
}
```

Example Questions

• Recall that Math.random() returns a double with a value ranging from 0.0 up to but not including 1.0. Complete the following fragment so that i has a value ranging from 1 to 20, such that all values of i are equally likely.

```java
double r;
int i;
r = Math.random();
i =
```

Example Questions

• What if you had a bunch of quiz scores that you wanted to store and print?

  − You could have a variable for each one
    ```java
    int quizScoreCrystal;
    int quizScoreWilliam;
    int quizScoreEric;
    int quizScoreMallory;
    ```
  − This is not very simple
    • What if you wanted to sort them?
    • What if you wanted to print them?

Any Questions

• Any more questions about chapter 4?

Chapter 5: Arrays

• What if you had a bunch of quiz scores that you wanted to store and print?

  − You could have a variable for each one
    ```java
    int quizScoreCrystal;
    int quizScoreWilliam;
    int quizScoreEric;
    int quizScoreMallory;
    ```
  − This is not very simple
    • What if you wanted to sort them?
    • What if you wanted to print them?

Array

• An array allows you to store many values using a single identifier
  ```java
  int[] quizScore;
  ```
  • Each element of the array can be accessed individually using its index or subscript.
    ```java
    quizScore[0] - the first element
    quizScore[1] - the second element
    quizScore[i] - the i+1st element
    ```
Arrays in memory

Array Declaration

- Use [] to declare array variables
  - int[] quizScore; - declares an array of ints
  - double[] temperature; - declares an array of doubles
  - String[] lastName; - declares an array of Strings
- The declaration does not create or initialize the array.
  - quizScore[0] - the first element
  - quizScore[1] - the second element
  - quizScore[i] - the i+1th element

Create the array

- After you have declared an array variable, you need to create the array
  arrayvariable = new type [ length ];
- This creates an array of the given type with length elements.
- arrayvariable is assigned to reference the newly created array.

Examples

- Create an array reference and an array of 65 ints.
  int[] quizScore;
  quizScore = new int[ 65 ];
  - This elements of this array will be indexed from 0 to 64.
  - The elements will be initialized with the value 0.
- Create an array reference and an array of count doubles
  double[] temperature;
  temperature = new double[ count ];

Examples

- You can create the array reference and the array in one statement:
  int[] quizScore = new int[ 65 ];
  double[] temperature = new double[ count ];
  boolean[] isFemale = new boolean[ 100 ];