Short vs. Long

“I have made this longer than usual because I have not had time to make it shorter.”  - Blaise Pascal

“I have already made this paper too long, for which I must crave pardon, not having now time to make it shorter.”  - Benjamin Franklin

“Not that the story need be long, but it will take a long while to make it short.”  - Henry David Thoreau

“That depends on the length of the speech,” answered the President. “If it is a ten-minute speech it takes me all of two weeks to prepare it; if it is a half-hour speech it takes me a week; if I can talk as long as I want to it requires no preparation at all. I am ready now.”  - Woodrow Wilson
Types of Errors

What are different kinds of errors?
When do they occur?
What do these evaluate to?

Assume:
   int m, k;
   System.out.println( expr);

new Random()
m = 5
k = m + 4
"hello"
"hello" + " today"
"hello".length()
"int".toUpperCase()
"".isEmpty()
Declaring/Defining vs. Calling

static void happy(boolean whether) {
    System.out.println("Happy=" + whether);
}

...somewhere else...

happy( true);
What is print out?

```java
static void myPrint( int out) {
    System.out.println( "i: " + out);
}
static void myPrint( String s) {
    System.out.println( "s: " + s);
}

.... in main....
int i = 5;
myPrint( i + "3" + (3 + 4 * 6) + 4);
```
Announcements

P4 now Due Monday, December 14th, 8am.
● No consulting hours after noon on Friday.
Office Hours:
● Wednesday (today): 2:30pm - 3:30pm?
● Thursday: 9:00am to 10:45am

What will print out and why?

```java
int k = 'A';
System.out.println(k);
```
Heap vs. Stack

Heap
- at runtime, JVM allocates memory for objects and classes
- Garbage collector runs periodically
- Global access, need a reference though

Stack
- method specific values that are short-lived
- always referenced, last-in first-out (LIFO)
- when method invoked (called) new block is created on stack to hold primitive values and references to other objects
- as soon as method ends, block becomes unused and available for other methods
Wrapper Classes

```java
int k;
Integer m;
```

// if local variables, what memory, when and where for k & m?
// if class variables, what memory, when and where for k & m?
// if instance variables, what memory, when and where for k & m?
Draw a picture of memory and describe each.

```java
public static void main( String []args ) {
    int k;
    Integer m;
    k = 2;       //example of ?
    m = 3;     //example of ?
    k = m;     //example of ?
}
```
Strings and memory

class S {
    public static void main(String[] args) {
        String name;  //Where and what is the value?

        new String("sad");  //What and where is the value?

        name = new String("happy");  //What and where is the value?
    }
}

Discuss the **differences**.

```java
class C {
    static int k;
    int m;
    static void printK() {
        System.out.println( k);
        System.out.println( m); //? A
    }
    void printM() {
        System.out.println( this.m);
        System.out.println( k); //? B
    }
}

...main() {
    C.printK();
    C varC = new C();
    varC.printM();
}
```

```java
class C {
    static int k;
    int m;
    static void printK() {
        System.out.println( k);
        System.out.println( m); //? C
    }
    static void printM(C this) {
        System.out.println( this.m);
        System.out.println( k); //? D
    }
}

... main() {
    C.printK();
    C varC = new C();
    C.printM( varC);
}
```
What is print out?

File f = new File( "myfile.txt");
Scanner scnr = new Scanner( f);
scnr.nextLine();
int count = 4;
if ( scnr.hasNextInt())
    count = scnr.nextInt();
else {
    scnr.nextLine();
    count = scnr.nextInt();
}
for ( int i = 0; i < count; i++)
    scnr.nextLine();
System.out.println( scnr.nextLine());
Online Course Evaluation - [http://aefis.wisc.edu](http://aefis.wisc.edu)

Thoughts on?
- In-class problems
- Polling the class
- Java Visualizer demos
- Eclipse demos
- Worked Problems:
  - 3D Tic-Tac-Toe (P2)
  - Bouncing Balls (P3)
  - Uline Boxes (P4)
- Class & Sequence diagrams (P3)
- Recorded lectures
- Exam wrappers

- Hand drawn diagrams
  - UML, Memory
- About learning
- Misconceptions
- Muddiest Point
- Personal Stories
- Navigating This Social System
- Research Ideas
  - how do people learn programming?
  - build a graphical, professional programming language

*What would make lecture better for you?*
String filename = "aFile.txt";
try {
    PrintWriter output = new PrintWriter(filename);
} {
    output.println( "hello");
    output.println( " world");
} catch (FileNotFoundException e) {
    e.printStackTrace();
    //OR
    System.out.println( "File + " + filename + " not found. ");
}
//is the PrintWriter closed?

// Output: What is the difference?

// Output:
// hello
// world

// Output:
// File + aFile.txt not found.
class Dag {
    static int smop;
    Hup h;
    Dag( int smop, Hup h) {
        Dag.smop = smop;
        this.h = h;  //4
    }
}

class Hup {
    double gep;
    Hup( double g) {
        gep = g;  //2
    }
}

class TestDag {
    Dag methodB( Hup p) {
        Dag t;  //3
        t = new Dag( 2, p);
        t = new Dag( 3, p);
        return t;  //5
    }
    main() {
        Dag y;  //1
        y = methodB( new Hup( 13));  //6
    }
}
What is print out?

File f = new File( "myfile.txt");
Scanner scnr = new Scanner( f);
int count= -1;
count = scnr.nextInt();
for ( int i = 0; i < count; i++)
    scnr.nextLine();
if ( scnr.hasNextInt()) {
    count = scnr.nextInt();
    scnr.nextLine();
} else {
    scnr.nextLine();
    count = scnr.nextInt();
}
System.out.println( "count: " + count + " nl:" + scnr.nextLine());
What is print out?

String str = ""Falling Off a Cliff' by Eileen Dover";
System.out.println( str.substring(4,8));

String str2 = ""The Future of Robotics' by Cy Borg and Anne Droid";
System.out.println( str2.substring( str2.indexOf('o'),
    str2.lastIndexOf('B')));

String str3 = ""Technology in the 21st Century' by Rob Ott";
System.out.println( str3.substring( str3.indexOf('R') ).concat( ".") );

Strings courtesy of Boy Scouts