

Midterm Review

October 23, 2006

*ComS 207: Programming I (in Java)
Iowa State University, FALL 2006
Instructor: Alexander Stoytchev*

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Midterm 2

- This Tuesday (Oct 24, 2006)
- Location: Hoover Hall, room 2055
- Time: 6:30pm – 7:45pm
- Try to be there at least 10 minutes early.
- If you need extra time you can have it but this is ****NOT**** a 3 hour exam!

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Midterm Format

- Covers Sections 1-5 & 7
- Also, Searching and Sorting
- Format same as Midterm 1

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Midterm Format (last semester)

- True/False (10 x 1p each = 10p)
- Short answer (5 x 2p each = 10p)
- Code Snippets (5 x 3p each = 15p)
- Other Stuff (3 x 5p each = 15p)
- Other Stuff (3 x 5p each = 15p)
- Program 1 (15p)
- Program 2 (15p)
- Program 3 (15p)
- Program 4 (20p)

- TOTAL (130p)

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Midterm Format

- You don't need to get all 130 points to get an A
- 100 is a 100

- You must get at least 65 points in order to pass this exam

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Midterm Format

- Drop Deadline is next Friday (Oct 27)

- I cannot guarantee that all exams will be graded by then.

- If you believe that you did not do well please ask me to grade your exam first at the time when you are submitting it.

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Questions

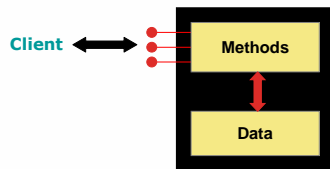
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Quick Review of the Material Since Midterm 1

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Encapsulation

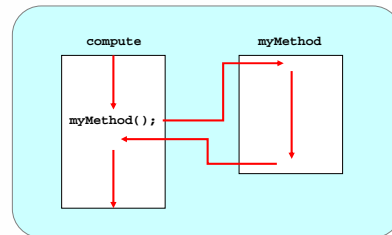
- An encapsulated object can be thought of as a *black box* -- its inner workings are hidden from the client
- The client invokes the interface methods of the object, which manages the instance data



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Method Control Flow

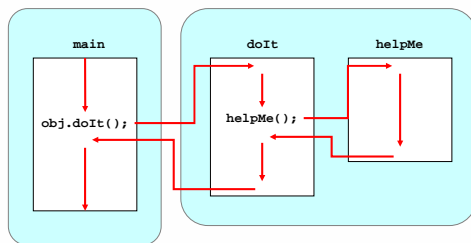
- If the called method is in the same class, only the method name is needed



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Method Control Flow

- The called method is often part of another class or object



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The if Statement

- The *if statement* has the following syntax:

`if (condition)
statement;`

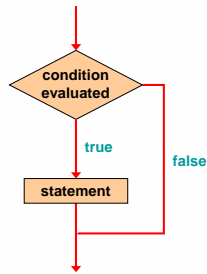
if is a Java reserved word

The *condition* must be a boolean expression. It must evaluate to either true or false.

If the *condition* is true, the *statement* is executed. If it is false, the *statement* is skipped.

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Logic of an if statement



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The if-else Statement

- An *else clause* can be added to an *if* statement to make an *if-else* statement

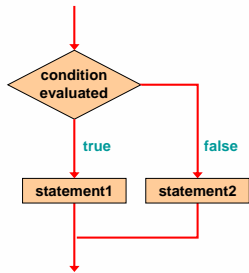
```

if ( condition )
    statement1;
else
    statement2;
  
```

- If the *condition* is true, *statement1* is executed; if the condition is false, *statement2* is executed
- One or the other will be executed, but not both

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Logic of an if-else statement



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Logical Operators

- A truth table shows all possible true-false combinations of the terms
- Since `&&` and `||` each have two operands, there are four possible combinations of conditions *a* and *b*

a	b	a && b	a b
true	true	true	true
true	false	false	true
false	true	false	true
false	false	false	false

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Boolean Expressions

- Specific expressions can be evaluated using truth tables

total < MAX	found	!found	total < MAX && !found
false	false	true	false
false	true	false	false
true	false	true	true
true	true	false	false

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The switch Statement

- The general syntax of a *switch* statement is:

```

switch ( expression )
{
    case value1 :
        statement-list1
    case value2 :
        statement-list2
    case value3 :
        statement-list3
    case ...
}
  
```

switch and case are reserved words

If expression matches value2, control jumps to here

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The switch Statement

- An example of a switch statement:

```
switch (option)
{
    case 'A':
        aCount++;
        break;
    case 'B':
        bCount++;
        break;
    case 'C':
        cCount++;
        break;
}
```

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The do Statement

- An example of a do loop:

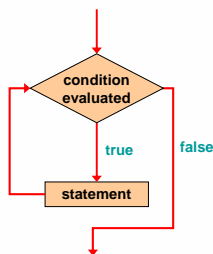
```
int count = 0;
do
{
    count++;
    System.out.println (count);
} while (count < 5);
```

- The body of a do loop executes at least once
- See [ReverseNumber.java](#) (page 244)

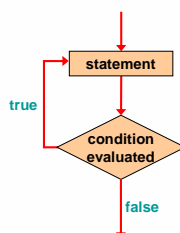
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Comparing while and do

The while Loop



The do Loop



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The for Statement

- A for statement has the following syntax:

The *initialization* is executed once before the loop begins

The *statement* is executed until the *condition* becomes false

```
for ( initialization ; condition ; increment )
    statement;
```

The *increment* portion is executed at the end of each iteration

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The for Statement

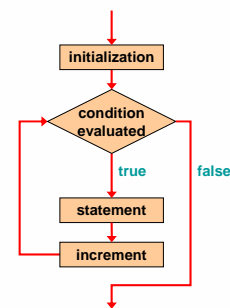
- An example of a for loop:

```
for (int count=1; count <= 5; count++)
    System.out.println (count);
```

- The initialization section can be used to declare a variable
- Like a while loop, the condition of a for loop is tested prior to executing the loop body
- Therefore, the body of a for loop will execute zero or more times

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Logic of a for loop



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The for Statement

- A `for` loop is functionally equivalent to the following `while` loop structure:

```
initialization;
while ( condition )
{
    statement;
    increment;
}
```

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Nested Loops

- How many times will the string "Here" be printed?

```
count1 = 1;
while (count1 <= 10)
{
    count2 = 1;
    while (count2 <= 20)
    {
        System.out.println ("Here");
        count2++;
    }
    count1++;
}
```

10 * 20 = 200

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Arrays

- An *array* is an ordered list of values

The entire array has a single name

Each value has a numeric *index*

	0	1	2	3	4	5	6	7	8	9
scores	79	87	94	82	67	98	87	81	74	91

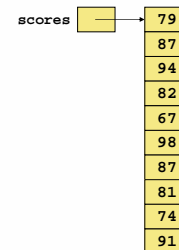
An array of size *N* is indexed from zero to *N*-1

This array holds 10 values that are indexed from 0 to 9

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Arrays

- Another way to depict the `scores` array:



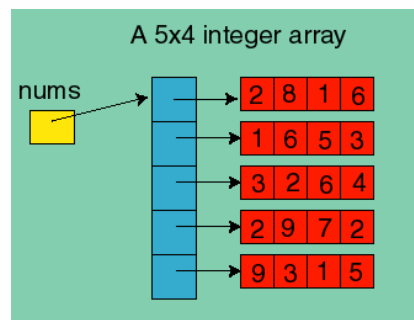
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Arrays in Java

- Java represents 2D arrays as an array of arrays!
- In other words, a 2D integer array is really a 1D array of references to 1D integer arrays.
- The concept generalizes to *N*-dimensions

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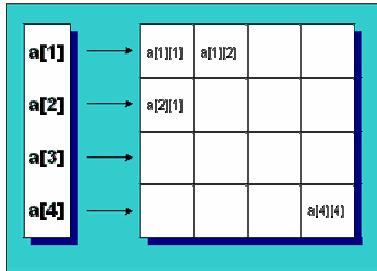
Anatomy of a 2D Array



[<http://www.willamette.edu/~gorr/classes/cs231/lectures/chapter9/arrays2d.htm>]

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Example of a regular 2D array

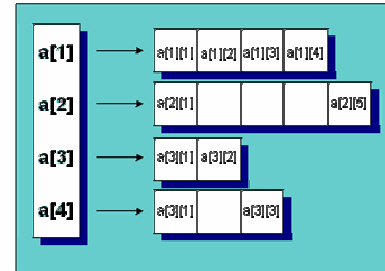


Note: In Java the first index should be 0 not 1!

[http://livedocs.macromedia.com/coldfusion/5.0/Developing_ColdFusion_Applications/arrayStruct2.htm]

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Example of a Ragged Array



Note: In Java the first index should be 0 not 1!

[http://livedocs.macromedia.com/coldfusion/5.0/Developing_ColdFusion_Applications/arrayStruct2.htm]

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Searching and Sorting

- Too much stuff to cover again
- Check the slides and programs on the web page

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Animations of Sorting Algorithms

- <http://maven.smith.edu/~thiebaut/java/sort/demo.html>
- <http://www.cs.ubc.ca/spider/harrison/Java/sorting-demo.html>

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Sample Homework Solutions

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THE END

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