CMSC 131

Object-Oriented Programming I

For Statement, Nested Loops

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This material is based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Jan Plane

Overview

- For loops
- Nested Loops
- Expressions side effects
- Assignment operators

Types of loops

- Indefinite iteration
  - Usually tests something that is coming from outside the loop structure (e.g. input)
  - Needs to eventually change from **true** to **false**
- Counted iteration
  - Something that is controlled inside the loop
  - To start at some value and count up or down until some set ending point

for loop

- **for-loop** → The counter is set, the condition is tested before each body execution, the update is performed at the end of each iteration

```
for (initialization; condition; update) {
    ⟨body⟩
}
```

- Usually used for counted loops, but any of the parts can be left empty
- **Example:** ForExample.java

Nested Loops

- while, do-while are statement constructors (like if and if-else: they use blocks)
- Loops can thus be used inside other loops!
- **Example:** NestedWhile.java, NestedFor.java
- Let's build a trace table for NestedWhile.java

About Local Variables

- When you declare local variables they are only accessible (in scope) within the block they are declared in
- **Example:** ScopeError.java

Expressions

- Java “expressions” that yield values

```
x
x + 1 - y
x == y && z == 0
foo.equals(“cat”)
```

- Expressions have values of a specific type (int, boolean, etc.)
- Expressions can be assigned to variables, appear inside other expressions, etc.

Expressions and Side Effects

- Some expressions can also alter the values of variables
  - e.g. x = 1
- x = 1 is an expression?
  - Yes!
  - Value is result of evaluation right-hand side of =
  - It also alters the value of x
- Such alterations are called side effects

Are the Following Legal?

- int x, y;
  x = y = 1;
  Yes. Result assigns 1 to x and to y

- int x = 0, y = 1;
  boolean b = false;
  if (b = (x <= y)){
  x = y;
  }
  Yes. Result assigns true to b and 1 to x

Other Assignment Operators

- Example: decrement operations (Basically equivalent to x = x – 1)

  --x "Pre-decrement"
  Decrements x, returns the new value of x

  x-- "Post-decrement"
  De*crements x, returns the old value of* x
  "return x, then decrement it"

- General modification by constant
  - General form: <var> <op with=> <constant>
  - Examples

x += 2	equivalent to	x = x + 2
x -= 2	equivalent to	x = x - 2
x *= 2	equivalent to	x = x * 2
x /= 2	equivalent to	x = x / 2

Examples

- Let's try to draw shapes with asterisks
  - Horizontal line
  - Vertical line
  - Square
  - Triangle of asterisks