University of British Columbia
CPSC 111, Intro to Computation
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More Class Design

Lecture 13, Wed Feb 3 2010

borrowing from slides by Paul Carter and Steve Wolfman

http://www.cs.ubc.ca/~tmm/courses/111-10

Reminder: Lab Schedule Change

- no labs next week Feb 8-12
- TAs will hold office hours in labs during Monday lab times to answer pre-midterm questions
  - Mon Feb 8 11am - 3pm ICICS 008
- labs resume after break
  - staggered to ensure that even Monday morning labs have seen material in previous week's lecture

Recap: Refined UML Design for `Point`

- refined design for 2D point class

Point

`- x: double`
`- y: double`

`+ Classname(inX: double, inY: double)`
`+ distanceBetween(Point otherPoint): double`
`+ getX(): double`
`+ getY(): double`
`+ distanceToOrigin(): double`

Recap: Point Class Ideas

- continued testing after first victory
  - negative vs positive values
  - double vs integer values
  - check distance between same point is zero
- avoided duplication of code
  - for distanceToOrigin we created new Point representing origin, and used distanceBetween
  - versus cut/paste + tweaking
- cannot initialize fields by having parameter names in constructor match field names

Formal vs. Actual Parameters

- formal parameter: in declaration of class
- actual parameter: passed in when method is called
  - variable names may or may not match
- if parameter is primitive type
  - call by value: value of actual parameter copied into formal parameter when method is called
  - changes made to formal parameter inside method body will not be reflected in actual parameter value outside of method
- if parameter is object: covered later

Scope

- Fields of class are have class scope: accessible to any class member
  - in `Die` and `Point` class implementation, fields accessed by all class methods
- Parameters of method and any variables declared within body of method have local scope: accessible only to that method
  - not to any other part of your code
- In general, scope of a variable is block of code within which it is declared
  - block of code is defined by braces { }

Point Final Testing/Refinement

- check questions we noted in comments along the way
- clean up and comment

Commenting Code

- Conventions
  - explain what classes and methods do
  - plus anywhere that you've done something nonobvious
    - often better to say why than what
      - not useful

```
int wishes = 3; // set wishes to 3
```

      - useful

```
int wishes = 3; // follow fairy tale convention
```

`javadoc` Comments

- Specific format for method and class header comments
  - running javadoc program will automatically generate HTML documentation
- Rules
  - **`/**`** to start, first sentence used for method summary
  - **`@param`** tag for parameter name and explanation
  - **`@return`** tag for return value explanation
  - other tags: **`@author`**, **`@version`**
  - **`*/`** to end
- Running

```
% javadoc Die.java
% javadoc *.java
```

`javadoc` Method Comment Example

```
/**
 Sets the die shape, thus the range of values it can roll.
 @param numSides the number of sides of the die
*/
public void setSides(int numSides) {
  sides = numSides;
}

/**
 Gets the number of sides of the die.
 @return the number of sides of the die
*/
public int getSides() {
  return sides;
}
```

javadoc Class Comment Example

```
/** Die: simulate rolling a die
 * @author: CPSC 111, Section 206, Spring 05-06
 * @version: Jan 31, 2006
 *
 * This is the final Die code. We started on Jan 24,
 * tested and improved in on Jan 26, and did a final
 * cleanup pass on Jan 31.
 */
```

Cleanup Pass

- Would we hand in our code as it stands?
  - good use of whitespace?
  - well commented?
    - every class, method, parameter, return value
  - clear, descriptive variable naming conventions?
  - constants vs. variables or magic numbers?
  - fields initialized?
  - good structure?
  - follows specification?
- ideal: do as you go
  - commenting first is a great idea!
- acceptable: clean up before declaring victory

Key Topic Summary

- Generalizing from something concrete
  - fancy name: abstraction
- Hiding the ugly guts from the outside
  - fancy name: encapsulation
- Not letting one part ruin the other part
  - fancy name: modularity
- Breaking down a problem
  - fancy name: functional decomposition