University of British Columbia
CPSC 111, Intro to Computation
2009W2: Jan-Apr 2010

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More Class Design

Lecture 12, Mon Feb 1 2010

borrowing from slides by Paul Carter and Steve Wolfman

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

Department of Computer Science
Undergraduate Events

Events this week

Resume Editing Drop-In Session
Date: Mon., Feb 1
Time: 11 am – 2 pm
Location: Rm 255, ICICS/CS

EADS Info Session
Date: Mon., Feb 1
Time: 3:30 – 5:30 pm
Location: CEME 1202

Job Interview Practice Session (for non-coop students)
Date: Tues., Feb 2
Time: 11 am – 1 pm
Location: Rm 206, ICICS/CS

RIM Info Session
Date: Thurs., Feb 4
Time: 5:30 – 7 pm
Location: DMP 110

Events next week

Finding a Summer Job or Internship Info Session
Date: Wed., Feb 10
Time: 12 pm
Location: X836

Masters of Digital Media Program Info Session
Date: Thurs., Feb 11
Time: 12:30 – 1:30 pm
Location: DMP 201

Reminders

- Assignment 1 due Wed 5pm
- TA office hours in DLC
  - http://www.cs.ubc.ca/ugrad/current/resources/cslearning.shtml
- my office hours 4-5pm today in X661

News: 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

Midterm Coverage

- reading: chapters 1-4
- lectures: weeks 0-4
  - through this Friday 2/5
- topics:
  - intro, hardware background, programming languages, comments, identifiers, whitespace, errors, variables, primitive data types, assignment, casting, constants, objects, classes, strings, input, class design
- assignments:
  - assignment 1

Midterm Format

- closed book, no notes, no calculators
- must bring ID, put in front of you face up so we can see picture and name
- 6:30 Monday 2/8, FSC 1005
  - exam *starts* at 6:30, please arrive before that
  - you will have 60 minutes to do the exam
  - do not turn over or open exam until we say to begin

Midterm Advice

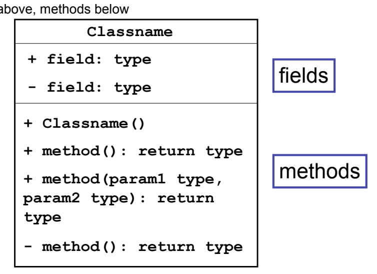
- good to read book, but definitely don't stop there!
- best thing to do: practice programming
  - try exercises in Big Java
    - solutions for some practice problems now posted in new Handy Links folder on WebCT Vista
  - and/or invent your own problems!
  - do a mix of programming on the computer, and on paper
    - you will only have paper for the exam

Reading Assignment This Week

- Chap 4.3-4.5 re-read

Recap: UML Visual Syntax

- + for public, - for private
- fields above, methods below



Recap: Control Flow Between Modules

- Two weeks ago it was easy to understand control flow: order in which statements are executed
  - march down line by line through file
- Now consider control flow between modules

Client code

```
int rollResult;

myDie.setSides();

rollResult = myDie.roll();
```

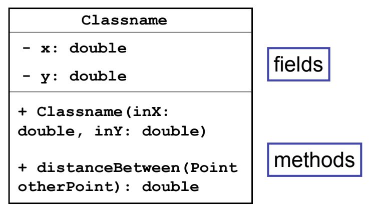
Die class methods

```
public int roll()
{
    …
}

public void setSides()
{
    …
}
```

Recap: UML Design for `Point`

- preliminary design for 2D point class


Classname
- x: double
- y: double
+ Classname(inX: double, inY: double)
+ distanceBetween(Point otherPoint): double
fields
methods

Continuing: Implementing `Point`

```
public class Point {





}
```

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 { }

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