Computer Science 210:
Data Structures

Java review
• Base types
  • boolean, char, byte, short, int, long, float, double

• Class
  • a type; a cookie cutter; blueprint from which individual objects are created
  • A class does not actually exist; it is just a “pattern”
  • A class contains data and methods

• Object
  • an instance of a class; the actual cookie
  • instance variables
  • creating an object

• Methods
  • Declaring methods; parameters, return types
  • Constructor methods; main method

• Expressions
  • operators, the dot operator, casting

• Statements:
  • if, switch, loops, return, break, continue

• Arrays
• boolean
  • true or false
• char
  • 16 bit character
• byte
  • 8-bit signed integer
• short
  • 16-bit signed integer
• int
  • 32-bit signed integer
• long
  • 64-bit signed integer
• float
  • 32-bit floating point number
• double
  • 64-bit floating point number
Declaring

• variables
  
  \texttt{<type> <variable-name>;}

• constants

  \texttt{static final int MONDAY = 0;}

• classes

  \texttt{[abstract | public | final] \ class <class-name> extends <super-classname> \ implements \ <interface_1> <interface_2>.... \ { \}

  \ //instance variables

  \ //methods

  \}

• abstract class: class has only abstract methods (later)

• final class: can have no subclasses (later)

• public class: class can be instantiated and extended by anything in the same package or by anything that imports the class
Declaring objects

//class definition
class Gnome { ...};

//declares an object g of type Gnome
Gnome g;

//object g does not yet exist; to create an object call new
g = new Gnome(...);

• Constructor:
  • a special method that is used to create objects
  • the constructor allocates memory to hold the object and returns a reference to this memory; this address is then stored in the object variable (g)
Number objects

- we sometimes want to store integers as objects

  x = new Integer(10);

  //an object that represents integer 10
Instance variables

• represent the data associated with the object

• scope
  • public:
    • anyone can access public instance variables
  • private:
    • only methods of the same class (not subclass) can access private vars
  • protected
    • only methods of the same package and subclasses can access protected vars

• static
  • a static variable is associated with the class
  • used to store global information about the class

• final
  • a constant
  • must have an initial value, which cannot be changed
Methods

- method = code that can be called on a particular object
- declaring methods
  - parameters
  - method modifiers:
    - public, protected, private, abstract, final, static
  - return values and types
- constructor methods
  - a special kind of method that is used to initialize newly created objects
- main method
  - needed in classes that are meant to define stand-alone programs
- java Gnome
  - Java-system invokes the main method in class Gnome
  - main must be public and static
Operators

- **assignment**
  - `a = b;`

- **dot**
  - `obj.methodname(...)`

- **arithmetic**
  - `+, -, *, /, %`
  - `++, --`

- **logical operators**
  - `<, <=, >, >= , ==, !=`

- **operators on booleans**
  - `! , &&, ||`

- **bitwise operators**
  - `>>, <<, &, |`
Summary

- casting
- if
- break
- continue
- switch
- for loops
  - for ( initialization; condition; increment )
    - body
- while loops
- output
  - class System.out
  - System.out.print
- input
  - class System.in and Scanner
• Reading:
  • Java cheat-sheet http://www.cs.princeton.edu/introcs/11cheatsheet/
  • (find link on class website)

• Bring any questions to class next time