CS1007: Object Oriented Design and Programming in Java

Lecture #1

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Welcome

- Today:
  - Basic overview of the course and objectives
- Goal:
  - Thing are much easier if everyone knows why they are here, and what we are trying to accomplish.
  - I will not stand here an lecture (although there will be some of that). This is going to be a very interactive course.
  - We will learn about programming ideas while trying to have fun.
  - I hope to impart an impression of why I choose to study CS and some of the options available to you.

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What?

- CS1007: Second course for CS majors.
- Prerequisites:
  - Basic knowledge in Java Programming
- NOTE: JAVA is only a tool!!
- Object Oriented Programming:
  - What, why, how, and when.
- Program Designs.
  - Not enough to know how to write the program, need to know how to do it correctly.

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Example:

- Task:
  - Create a program to run a chess game set.
  - Any Ideas on how to design the programming backend?
  - Ideas on how to measure requirements.
  - What is missing?

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CS1004 vs CS1007

- CS1004 is an Introduction for those with no formal CS/Java training
  - Assumes only basic computer skills (email, web, mouse, brain)
  - Focuses on basic theoretical knowledge as well as basic Java fluency
- CS1007 assumes basic Java knowledge
  - If you don't know Java and/or didn't take the AP CS exam, you're in the wrong room.
  - Emphasis on more advanced Java and algorithmic skills.
- If you have questions, ask me after class

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Basics

- Instructor: Professor Shlomo Hershkop
  - (shlomo@cs.columbia.edu)
  - 646 775 6041
  - 460 CSB
- Class website:
  - cs.columbia.edu/~sh553/teaching/1007f05/
  - Check it regularly (at least twice a week).
    - See announcement sections for update info.
- Two lectures a week.
- See website for office hours

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Resources

- TA's:
  - Edward Ishak
  - Amrita Rajagopal
- Class Webboard:
  - Excellent place to post GENERAL questions, and solutions.
    - Good: How do I check what version of java is running?
    - Bad: What is wrong with my code:
      public class foo()

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Requirements

- Interest to learn about OOP
- Textbook:
  - Cay S. Horstmann
    OO Design & Patterns, 2nd ed.
    ISBN 0-471-74487-5
  - Textbook can be acquired online or at the Columbia Bookstore.

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Why this textbook

- Light
- Well written
- Covers the subject well
  - Good mix of theory and practice
- Interesting Examples

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Course Structure

- 6 Homeworks – 150 points (50% of grade)
  - Will have about 2 weeks per homework
- Midterm (50 points), Final (100 points)
  - open book
- Homework is very important:
  - Firm believer in hands on learning
  - Start early
  - Come to office hours, and ask questions
    - We are here for YOU!

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Homework Assignments

- Written Sections:
  - Will be collected at first class after HW deadline.
- Programming:
  - Online submission
  - Must be able to run on cunix system (this is important).
- Late policy:
  - You have 3 late days that can be used during the semester.
  - Late day is exactly 24 hours.
  - After your late day deadline passes, the homework will not be accepted.
- Extra Credit:
  - To allow for some maneuvering room, there will be extra credit assignments during the semester.

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Class participation and Attendance

- Attendance and participation is expected
  - Very interactive lectures
  - I hope to learn everyone's name by midterm
  - Useful for your grade
  - Anonymous feedback system
- If you have to miss class, I expect you to catch up.
  - There will be some type of class notes posted to the website
  - Plan on lab components
  - There will be many examples in class on the board, so make sure to get someone's notes.

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Cheating Policy

- Don’t

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Cheating Policy

- Plagiarism and cheating:
  - I’m all against it. It is unacceptable.
- You’re expected to do homeworks by yourself
  - This is a learning experience.
  - You will only cheat yourself.
  - My job is to help you learn, not catch you cheating, but….
- Automated tools to catch plagiarizers
  - http://www.cs.berkeley.edu/~aiken/moss.html
  - Moving stuff around, renaming, etc. doesn’t help
- Results: instant zero on assignment, referral to academic committee
  - Columbia takes dishonesty very seriously
  - I’d much rather you come to me or the TAs for help

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Feedback System

- Last minute of class will be set aside for feedback:
  - Please bring some sort of scrap paper to class to provide feedback.
  - Feel free to leave it anonymous.
  - Content: Questions, comments, ideas, random thoughts.
- I will address any relevant comments at the beginning of each class.

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Shopping List

- Make sure you have an extended CUNIX account.
  - Try to log into the account
- Check out the class page
- Obtain a textbook
- See Homework 0 on class page
  - General overview of cunix system and how to use it.

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Java Language

- A *programming language* specifies the words and symbols that we can use to write a program
- A programming language employs a set of rules that dictate how the words and symbols can be put together to form valid *program statements*
- The Java programming language was created by Sun Microsystems, Inc. and introduced in 1995.

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Language Levels

- There are four programming language levels:
  - machine language
  - assembly language
  - high-level language
  - fourth-generation language
- Each type of CPU has its own specific *machine language*
- The other levels were created to make it easier for a human being to read and write programs

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Programming Languages

- Each type of CPU executes only a particular *machine language*
- A program must be translated into machine language before it can be executed
- A *compiler* is a software tool which translates *source code* into a specific target language
- Often, that target language is the machine language for a particular CPU type
- The Java approach is somewhat different

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Java Translation

- The Java compiler translates Java source code into a special representation called *bytecode*
- Java bytecode is not the machine language for any traditional CPU
- Another software tool, called an *interpreter*, translates bytecode into machine language and executes it
- Therefore the Java compiler is not tied to any particular machine
- Java is considered to be *architecture-neutral*

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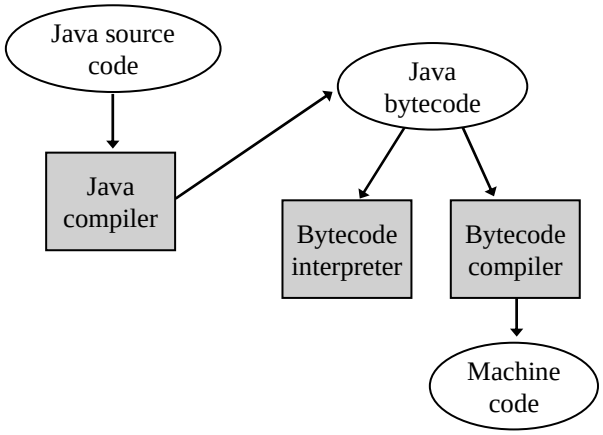
Java Translation



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Topics to be covered

- Review of Java basics, Introduction to object oriented programming, Writing classes in Java.
- Extended Java coverage: Exception handing. Event Handling. Applets. GUIs. Java I/O
- Object Oriented concepts: Abstraction, Polymorphism, Inheritance
- Problem solving, program design, and common Design Patterns
- Algorithms and Algorithm Analysis: Searching and Sorting
- Introduction to data structures: Queues, Binary trees, etc.
- Problem solving with Recursion
- Advanced topics: multi-threading, concurrency, network programming.

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Something to think about:

- How do you swap two integers without using any extra memory?

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Next class:

- Cunix overview
- Review of Java basics.
- Simple Exception handling.
- Writing classes in Java.
- Object Oriented Design Process (intro).

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Poll

- To better tailor the class content:

1. Class: CC, GEAS…
2. Year:
3. Computer background
4. Familiar with unix/linux/windows command prompt?
5. Why are you taking this course, and what are you planning on doing long term.
6. Will you be mostly using your own computer or lab?

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