Principles of Software Construction: Objects, Design, and Concurrency

Course Organization

Christian Kästner **Charlie Garrod**

School of Computer Science
institute for SOFTWARE RESEARCH

Course preconditions

- 15-122 or equivalent
  - 2 semesters of programming, knowledge of C-like languages
- Specifically:
  - Basic programming skills
  - Basic (formal) reasoning about programs with pre/post conditions, invariants, verification of correctness
  - Basic algorithms and data structures (lists, graphs, sorting, binary search, …)

Course learning goals

1. Basic fluency in Java
2. Use modern development tools, including VCS, IDEs, debuggers, build and test automation, static analysis, …
3. Understanding the basic concepts of Object-Oriented Programming (polymorphism, encapsulation, object identity and equality, inheritance and delegation, …)
4. Reasoning about functional correctness of a program, selecting a suitable quality assurance strategy (testing, verification, static analysis)
5. Designing object-oriented software at medium scale, fluency in using design pattern
6. Understanding common design paradigms, including event-based GUI programming
7. Understanding the fundamentals of concurrency and distributed systems

Important features of this course

- The team
  - Instructors
    - Christian Kästner kaestner@cs.cmu.edu
    - Charlie Garrod charlie@cs.cmu.edu
  - TAs
    - Shannon Lee [Section A]
    - Andrew Zeng [Section B and C]
    - Aniruddh Chaturvedi [Section D]
    - Harry Zeng [Section E]
    - Zada Zhai [Section F]
    - Yanna Wu
- The schedule
  - Lectures
    - Tues, Thurs 3:00 – 4:20pm DH 2315
  - Recitations
    - A: Weds 9:30-10:20am WEH 5310
    - B: Weds 10:30-11:20am WEH 5310
    - C: Weds 11:30-12:20pm WEH 5310
    - D: Weds 12:30-1:20pm WEH 5310
    - E: Weds 1:30-2:20pm WEH 5310
    - F: Weds 1:30-2:20pm BH 235B
  - Office hours and emails
    - *see course web page*

Recitations are required

Important features of this course

- Course website
  - Schedule, assignments, lecture slides, policy documents
    http://www.cs.cmu.edu/~charlie/courses/15-214
- Tools
  - Git
    - Assignment distribution, handin, and grades
  - Piazza
    - Discussion site – link from course page
  - Eclipse
    - Recommended for developing code
- Assignments
  - Homework 0 available tonight
    - Ensure all tools are working together
    - Git, Java, Eclipse
- First recitation is tomorrow
  - Introduction to Java and the tools in the course
  - ***Bring your laptop, if you have one!***
    - Install Git, Java, Eclipse beforehand – instructions on Piazza

Homework preview

- 0: Java Warmup
- 1: Objects and Interfaces
- 2: Inheritance (virtual worlds?)
- 3: Testing
- 4 a-c: Design and GUI (scrabble)
- 5 a-c: Frameworks (social media analysis)
- 6: Concurrent and distributed systems (map reduce?)

Course policies

- Grading (*subject to adjustment*)
  - 55% assignments
  - 10% each midterm
  - 20% final exam
  - 5% participation
- Collaboration policy is on the course website
  - We expect your work to be your own
  - Ask if you have any questions
  - If you are feeling desperate, please reach out to us
    - Always turn in any work you've completed *before* the deadline
- Texts
  - Alan Shalloway and James Trott. *Design Patterns Explained: A New Perspective on Object-Oriented Design* (2nd Ed).
  - Several free online texts (Java, etc.)

Course policies

- Late days for homework assignments
  - 5 total free late days for the semester
    - A separate budget of 2 late days for assignments done in pairs
  - Late days beyond the free budget cost 10% per day
  - May use a maximum of 2 late days per assignment
    - Work submitted more than 2 days late is not accepted, except under extreme circumstances
- Recitations
  - Practice of lecture material
  - Presentation of additional material
  - Discussion, presentations, etc.
  - Attendance is required
  - In general, bring a laptop if you can