CSE 2221 Software 1: Software Components and CSE 2231 Software 2: Software Development and Design

Learning Outcomes (1)

- Theme 1: ***software engineering concepts***
  - Be familiar with sound software engineering principles for component-based object-oriented software design

Software Engineering Concepts

- Component-based software engineering
  - System thinking
    - Mathematical modeling
    - Design-by-contract
    - Client vs. implementer view
  - Object-oriented software building blocks
    - Components and their relationships
  - Discipline
    - Single-point control over change
    - Adherence to conventions

Learning Outcomes (2)

- Theme 2: ***Java programming language***
  - Be competent with Java programming

Java Programming Language

- Core syntax and features
  - Variables, types, values, operators, expressions, control flow (selection, iteration)
  - Reference vs. value types
  - Interfaces, classes, methods, objects
  - Inheritance, polymorphism
  - Generics, exceptions
- Libraries
  - Input/output, Java's Swing for GUIs
  - Collections (e.g., List, Map, Queue, Set, …)

Learning Outcomes (3)

- Theme 3: ***industry-standard tools***
  - Be familiar with the use of industrial-strength software development tools

Industry-Standard Tools

- Eclipse
  - Industrial-strength open-source IDE
  - Many (free) plug-ins/extensions, including Checkstyle and SpotBugs
- JUnit
  - Industry-standard library for unit-testing software components
- Javadoc
  - Industry-standard documentation utility for Java programs

Learning Outcomes (4)

- Theme 4: ***professional best practices***
  - Be familiar with Java programming "**best practices**"

Professional Best Practices

- Problem
  - Complex language mechanisms make it easy to produce code that is wrong, brittle, inextensible, and hard to maintain
- Solution
  - Discipline that helps (but does not guarantee) that developers write better code
- Examples
  - Naming conventions, coding conventions
  - Design-by-contract and programming-to-the-interface

What's New in Software 2?

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- ***Implementer***: a software engineer who designs a Java ***class*** that implements an interface

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With respect to ***kernel components***, this is the focus of ***Software 1***.

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- ***Client***: a software engineer who uses a software component (in Java, a class) by programming to its ***interface***
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With respect to ***kernel components***, this is the focus of ***Software 2***.

Role ≠ Person

- It is typical for a given software engineer to play *both roles* at the same time, as he/she designs and codes a new class by programming to the interfaces of existing classes
  - As you will do throughout Software II for implementations of ***kernel*** interfaces as well as others...

Resources (1)

- Course web site
  - https://cse22x1.engineering.osu.edu/
  - All materials and links
- Class website on Carmen
  - https://carmen.osu.edu/
  - Announcements
  - Assignment submissions
  - Grades
  - Additional materials
- MS Teams CSE 2231 team for this semester
  - multiple channels for questions and discussions about course material and assignments

Resources (2)

- Online Java tutorials
  - https://docs.oracle.com/javase/tutorial/
- Online OSU CSE components API
  - https://cse22x1.engineering.osu.edu/common/doc/
- Online Java libraries API
  - https://docs.oracle.com/en/java/javase/21/docs/api/java.base/module-summary.html
- Many other Java resources available on the web!

Resources (3)

- Many Java books available for free to OSU students via O'Reilly Online Learning

  https://learning.oreilly.com/home/

- Recommended books
  - C.S. Horstmann, *Java for Everyone*, John Wiley and Sons, 2013 https://library.ohio-state.edu/record=b8347056~S7
  - J. Bloch, *Effective Java*, 3nd ed., Prentice Hall, 2018 https://library.ohio-state.edu/record=b9496067~S7