Lecture 5: Listeners and assertions

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Alexandra Papoutsaki & William Devanny
Inner Classes

• **DrawingCanvas** extends **JPanel**
  • Associates listeners for mouse actions on the canvas
  • Responsible for repainting the screen
• **DrawingMouseListener** and **DrawingMouseMotionListener**
  • Responsible for responding to mouse actions by changing the items in the **ArrayList**.
Handling Mouse Events

• If you want program to react to mouse press, click, or release on a component
  • send `addMouseListener(mlo)` to component (usually in the constructor of the component)
  • See `PostItApplication.java` and `Demo.java`
  • For motion or drag, send `addMouseMotionListener(mlo)`

• When user presses mouse on a component
  • Computer looks for registered `MouseListener` for component or its containers.
  • If found, sends `mousePressed(evt)` to listener
• Object designated as mouse listener must
  • implement `MouseListener` (& implement `mousePressed`, `mouseReleased`, & `mouseClicked`) or
  • extend `MouseAdapter` (which has default implementations of all 3)

• Second is easier unless class already extends another.
  • *Can only extend one class in Java*

• Similarly, for mouse motion listener
  • implement `MouseMotionListener` or
  • extend `MouseMotionAdapter`
Listeners in **PostItApplication**

- Main class *(this)* is listener for button and choice. Set up when GUI items constructed.

- Special listener objects for mouse actions. Set up by **DrawingCanvas** since listening for actions on that object.
Pre and Post conditions

• Pre-condition: Specification of what must be true for method to work properly

• Post-condition: Specification of what must be true at end of method if precondition held before execution.

• See Ratio class example
Assertions in Java

• Won’t use **Assert** class from Bailey.
• Command to check assertions in standard Java
• Two forms:
  • `assert boolExp`
  • `assert boolExp: message`
• Article on when to use assert: [https://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html](https://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html)
Assertions help...

• Defensive programming
• Little cost to executing assertions … and can turn off checking
• Extremely useful in debugging in tracking down what is going wrong - can be better than inserting println’s.
• Also useful in checking cases that should not occur
  • e.g., defaults in switch, other control paths not taken.
• Do NOT use argument checking in public methods
  • Should throw an exception instead
• Do NOT use to perform action that is critical for the program
  • Instead perform the action before the assertion and then assert that the action succeeded
Turning on assert

• Turn on assertions when run program, by adding `-ea` as virtual machine argument in arguments tab in Eclipse when set up runtime configuration.

• If you leave it off, then it ignores assert statements.

• If on and the assertion is false, then it will raise an `AssertionError` exception and will print associated message

• They should not be caught as represents a program error