Administrivia

- Reminder: Homework 2 code due today. (Accepted without late penalty through 6pm tomorrow.)

- Homework 3 due dates posted — design next Tuesday, next Thursday.

- Quiz 3 rescheduled for after the break.

- Reminder: Midterm next Tuesday. I will post a short review sheet on the Web.

Slide 1

Sorting and Searching — Example Code

- See "Sample programs" page (here)) Code performing an instrumented sort (count number of comparisons), and other examples.

Slide 2

Sorting and Searching Arrays in Java

Slide 3

- Writing your own sorting routines is pedagogically useful, but in practice you would probably use something from Java library. `Arrays` class has some useful methods.

- One thing that's nice about Java is "polymorphic sorting"; can sort objects of any class that implements `Comparable`. Can also provide, when you call `Arrays.sort`, a `Comparator` that defines the ordering you want. Example: case-insensitive sorting of strings.

- (Examples.)

Java GUI Libraries

Slide 4

- Java being an evolving language, it has two groups of GUI-related classes:
  - Abstract Window Toolkit (AWT) — older, "look and feel" consistent with platform's windowing system.
  - Swing — newer, more extensive, look and feel more aimed at being consistent across platforms. Makes use of AWT components.

- Many, many classes to build GUIs:
  - GUI elements —- buttons, labels, text boxes, menus, etc., etc., etc., etc.
  - "Containers" to group elements and arrange them for display.
  - "Listeners" and "events" to allow program to respond to user input.

- Programs are "event-based" or "event-driven", can seem a little different from traditional text-in/text-out programs.

Slide 5

Some GUI Classes

- `Component` — base class.

- `Container` – component that can contain other components.

- `JFrame` — window with titlebar, etc.; usually the "main" window for an application.

- `JDialog` — popup dialog box.

- `JPanel` – very simple container, useful for grouping things, providing custom graphics.

- `JMenuBar`.

- Etc., etc., etc., etc. — far more than we can cover in this course! Read the API. Some classes have links to online tutorials too.

Slide 6

Using the GUI Classes — Appearance

- When using predefined components, key issue is how they're grouped into container and how things are laid out within each container.

- Preferred method is to use a layout manager — places elements in some reasonable way, does something reasonable if container is resized.

  - Simple layouts include `FlowLayout`, `GridLayout`, `BorderLayout`, `BoxLayout`.

  - `GridBagLayout` provides more control, but is more complex.

  Some of them expand components to fit, others lay them out at their minimum size. See API and tutorials for more info.

- Often makes sense to group elements hierarchically — `JPanel` is useful for that.

Using the GUI Classes — Behavior

Slide 7

- Runtime system (JVM) translates each user action (keyboard or mouse input) into an "event" and then calls method(s) in "event listener" objects.

- So, to tell the runtime system what should happen when, e.g., a `JButton` is clicked, call button's `addActionListener` with an object `listener` that implements `ActionListener` interface. Now when the button is clicked, `listener`'s `actionPerformed` method is called.

- Several approaches to defining listener objects. One is to have "main" class implement required interface. Another is to use anonymous inner classes.

- Example(s) as time permits ...

Minute Essay

Slide 8

- What are you finding most difficult about this class?

- Is the reading helpful? any comments to pass on to the author?